Nov. 15, 1966 F. KADISH 3,284,976

DOOR CONSTRUCTION

Filed Feb. 27, 1964

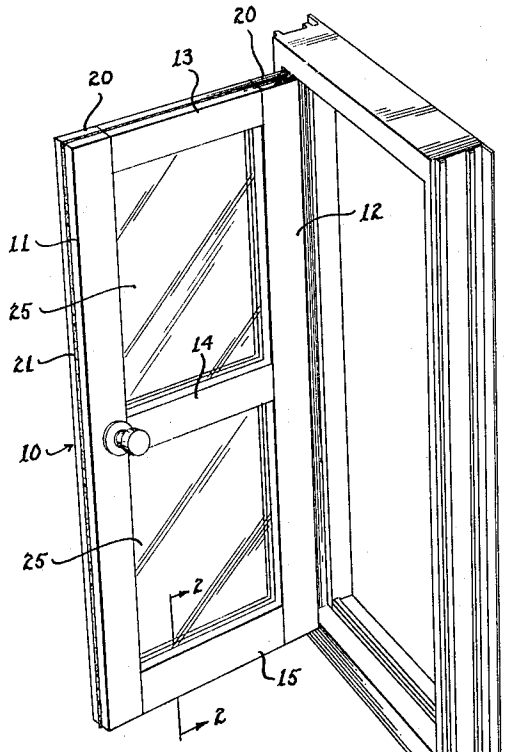


Fig. 1

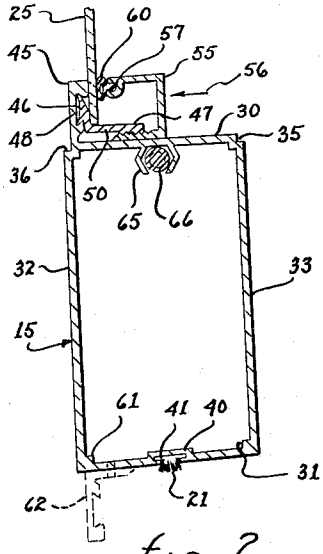


Fig. 2

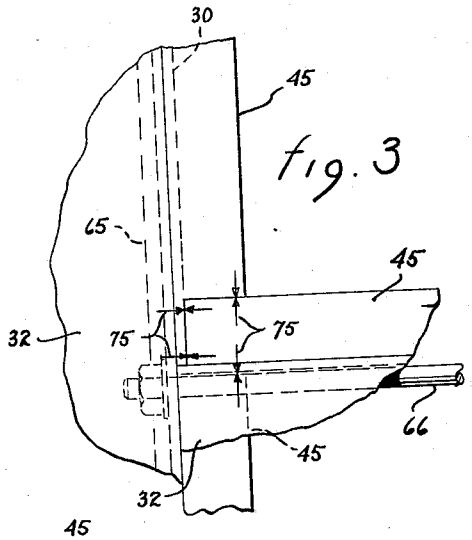


Fig. 3

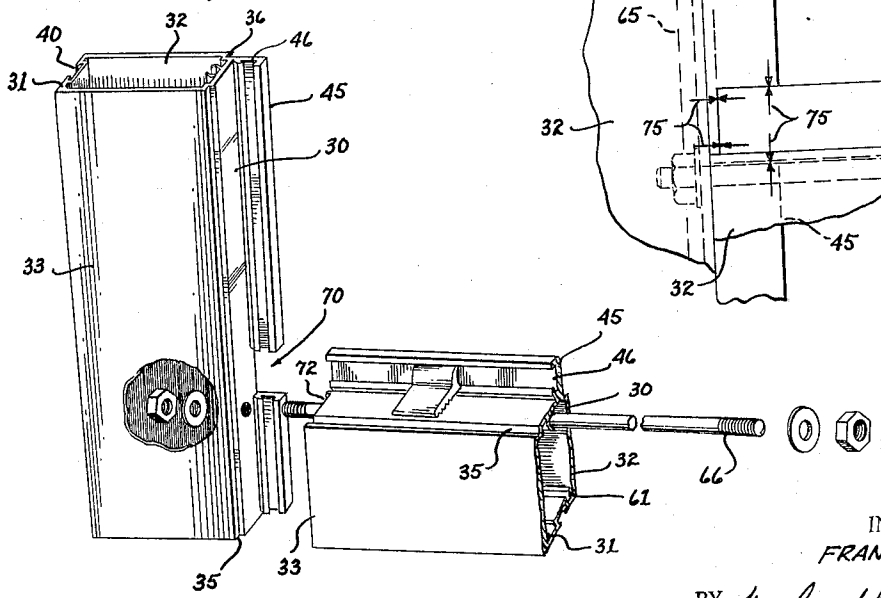


Fig. 4

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DOOR CONSTRUCTION

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The present invention pertains to a door construction, and more specifically, to door construction of the type utilizing extruded channel portions of a material such as aluminum.

Aluminum extrusions have been utilized in the past for the construction of doors and door frames and have been found to be generally acceptable. The durability and pleasing appearance of aluminum construction members in a door or frame and the lasting qualities of aluminum, have greatly increased the use of aluminum doors in recent years. The doors are most commonly formed by providing vertical frame members, having a specific extrusion or channel cross-section, and separating the frame members by horizontal braces or cross-braces secured perpendicularly to the vertical frame members. Difficulty has been encountered in providing substantial rigidity and resistance to deformation at the joints between the vertical and horizontal members of the door construction. Many designs have been implemented, some at great cost, to achieve the desired rigidity without detracting from the appearance of the door. Frequently, expensive channel cross-sections have ben utilized for the horizontal members to achieve the necessary joint rigidity; further, extensive schemes have been proposed to more rigidly fasten the horizontal and vertical members together.

It is therefore an object of the present invention to provide a rigid door structure using extruded channel members.

It is still another object of the present invention to provide a door construction utilizing extruded channel members for vertical and horizontal frame portions of the door and wherein joint rigidity is assured.

It is still another object of the present invention to provide a door construction that may readily be manufactured from a single extrusion having a given cross-section thereby rendering a door construction that is inexpensive and easily manufactured.

Further objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

Briefly, in accordance with one embodiment of the present invention, a door structure is provided having vertical and horizontal frame members each constructed by the same extrusion material. The extrusion is characterized by a rib extending along one side and by a pair of stops parallel to the rib and extending along the junction between two sides of the channel and the top surface of the channel. Joints are formed between the vertical and horizontal members by appropriately notching the rib of either the vertical or horizontal member to accept the end of the rib of the other member. The top and bottom of the channel of the unnotched member is milled or otherwise cut back beyond the edge of the sides of the channel so that the protruding sides will engage the stops of the notched member.

The present invention may more readily be described by reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a door constructed in accordance with the teachings of the present invention showing the door appropriately secured to a door frame and jamb assembly;

FIG. 2 is a cross-section of the extrusion comprising the channels of the door construction of FIG. 1, taken along line 2—2 of FIG. 1;

FIG. 3 is an enlarged side view of a portion of the door construction of FIG. 1 showing a joint between a horizontal and a vertical member;

FIG. 4 is an exploded isometric view of a joint between a horizontal and vertical member of the door construction of FIG. 1.

Referring to FIG. 1, the door **10** is shown comprising vertical frame members **11** and **12** joined by three cross-brace members **13**, **14** and **15**. The vertical frame members and cross-brace members are constructed of an aluminum extrusion and are formed from the same extrusion material. Caps **20** are provided for covering the open ends of the channels of the vertical frame members **11** and **12**. Weather stripping **21** is secured around the periphery of the door and is secured to the door in a manner to be described more fully hereinafter. Glass **25**, or other panel such as a screen, is secured within the openings provided by the vertical and cross-brace frame members.

Referring now to FIG. 2, the cross-brace member **15** is shown in section and includes a top wall **30**, a bottom wall **31**, and side walls **32** and **33**. The side walls **32** and **33** are joined to the top wall to form stops **35** and **36** extending along the junctions between the top and sides. The bottom wall **31** is joined to the sides **32** and **33** at an angle other than 90°. The slight inclination of the bottom wall **31** permits the door to be mounted within a close-fitting framework without interference when the door is opened and closed. The bottom wall **31** also includes a longitudinal slot **40** which accepts the metal base **41** of weather stripping **21**.

The top wall **30** includes a longitudinal rib **45** protruding at right angles therefrom and extending along the top wall **30** adjacent the stop **36**. The rib includes a dovetail slot **46** for accepting a keyed clip **47** having a mating configuration **48** for slideably engaging the dovetail slot **46** and also having a clip portion **50** extending parallel to the top wall **30** and urged toward the top wall **30** by the clip's shape. The surface of the clip **47** adjacent the top wall **30** may be serrated to form a locking surface when it engages a corresponding serrated surface. A locking member **55** may be placed in contact with the top wall **30** and pushed in the direction of the arrow **56** to cause the serrated edges thereon to engage the serrated edges of the clip **47**. The locking member **55** is then held firmly in place by the keyed clip **47**. The locking member **55** also includes a channel **57** for securely holding a resilient member **60**. When the locking member is forced to the left, the resilient member **60** is forced against the glass **25**, is deformed, and firmly holds the glass in place.

The top wall **30** also includes a channel **65** for guiding a fastening shaft **66** for locking the vertical frame members to the cross-brace members. The joints between the vertical and horizontal members of the door of FIG. 1 may be described by reference to FIGS. 3 and 4.

In the embodiment chosen for illustration, the cross-brace members abut the vertical frame members and have the open channel end of the cross-brace member in contact with the vertical frame member. It will be obvious that the horizontal cross-brace members may extend the entire width of the door and the vertical frame members may abut the cross-brace members and have the open ends thereof in contact with the cross-brace member.

A fillet **61** is also provided extending along the inside of the junction between the side wall **32** and the bottom wall **31**. The fillet provides dimensional identity when an additional rib **62** is riveted or otherwise secured to the bottom wall when the channel **15** is to be used as the center cross-brace of the door construction such as cross-brace **14** in FIG. 1. The additional rib **62** permits glass **25** to be secured to the upper as well as the lower walls

of the channel; the fillet **61** permits the use of the same milling jig or punch to cut notches in the vertical members **11** and **12** whether the vertical members are being notched to receive upper and lower cross-brace members **13** and **15** or middle cross-brace member **14**.

Referring now to FIGS. 3 and 4, the vertical frame member **11** is joined to the horizontal cross-brace member **15** and is held in orthogonal relation to the cross-brace through the expediency of a notch **70** provided in the rib **45**. The rib of the member **15** will thus snugly fit into the notch provided in the rib of the member **11** to permit contact of the open face of the channel **15** with the top wall **30** of the member **11**. The member **15** is milled or otherwise cut so that the sides **32** and **33** thereof extend longitudinally beyond the end of the top and bottom walls and rib. The side walls **32** and **33** of the member **15** will thus engage the stops **35** and **36** of the member **11** and permit the entire end surface of member **15** to come into contact with the top wall **30** of the member **11**. The joint thus formed includes the abutting edge of the member **15** in contact with the top wall **30** of the member **11**, and, significantly, the rib **45** of the member **15** snugly engages the notch in the rib of the member **11**. The mating relationship of the two ribs may best be seen in FIG. 3 where it may be noted that any attempt to alter the chosen angular relationship between the members **11** and **15** will result in counter-acting forces as indicated in FIG. 3 by the arrows **75** which act upon the ribs of the respective members. The additional joint rigidity and resistance to change of angular relationship is readily demonstrated by the fact that the joint resists distorting forces even though the fastening shaft **66** is not in place or is not drawn up tightly. A door constructed in accordance with the teachings of this invention presents a structure that will retain its rectangularity and will not "sag" and will have joints that will prevent deformation. The structure is thus constructed of a single aluminum extrusion without complicated joint strengthening schemes or added members.

It will be obvious to those skilled in the art that many modifications may be made in the present invention without departing from the spirit and scope thereof; accordingly, the scope of the present invention is intended to be limited only by the claim appended hereto.

I claim:

A door structure comprising:

(a) a plurality of vertical frame members,

(b) a plurality of cross brace members extending between said vertical members to define openings bordered by said cross brace and vertical members,

(c) said vertical frame members and said cross braces having the same cross-sectional configuration and each comprising:

(1) an elongated channel including oppositely disposed sides separated by a top member and a bottom member,

(2) said top member joined to said sides, longitudinally extending recessed portions at the joints between said top member and said sides to form stops,

(3) a rib protruding from said top and extending along said top adjacent to one of said stops,

(4) a dovetail slot in said rib,

(5) a keyed slip with a mating configuration to extend into said dovetail slot and having a clip portion extending therefrom urged into contact with said top,

(6) means defining a shaft guiding slot in said top opening to the inside of said channel to guide a fastening shaft,

(7) means defining a slot in said bottom opening to the outside of said channel to provide support for weather stripping,

(d) each vertical frame member secured to a cross brace member to form a joint,

(e) one of the members of said joint having a notch in its rib to receive the end of the rib of the other member,

(f) said other member of said joint having the sides thereof extending longitudinally beyond the top and bottom thereof, the extended sides of said other member seated in the stops of said one member,

(g) the members of said joint held together by a fastening shaft extending through the shaft guiding slot of said other member and extending through holes provided therefor in said one member, and

(h) panels positioned in the openings defined by said vertical frame members and cross brace members, and retaining means for holding said panels in said openings.

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