

Aug. 5, 1969

M. V. BROOKS
DOOR CONSTRUCTION

3,458,955

Filed May 1, 1967

3 Sheets-Sheet 1

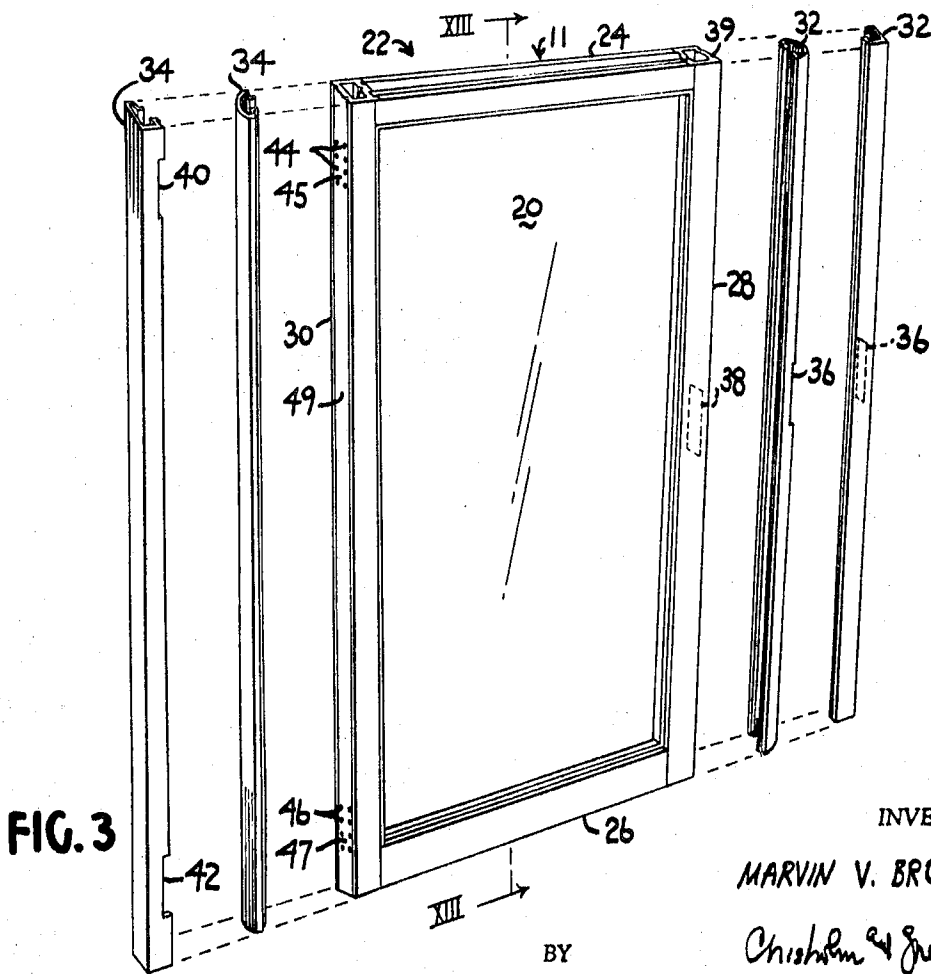
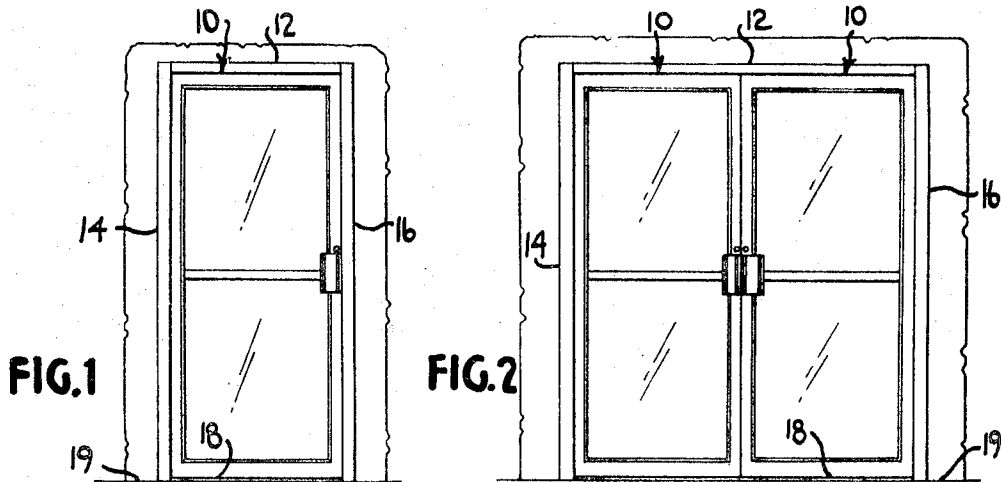


FIG. 3

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3 Sheets-Sheet 2

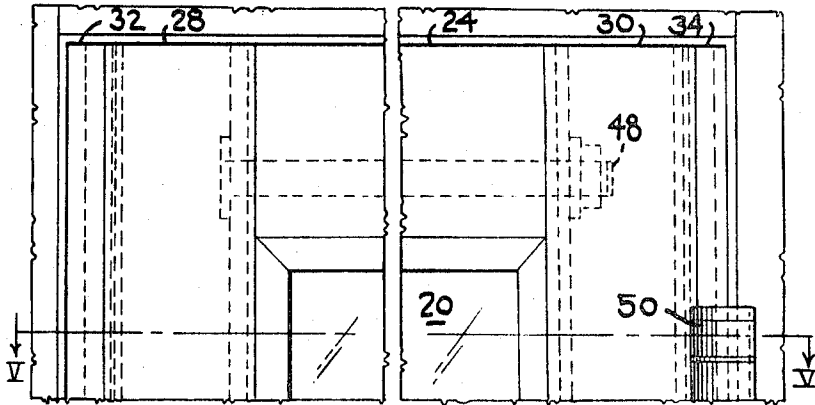


FIG. 4

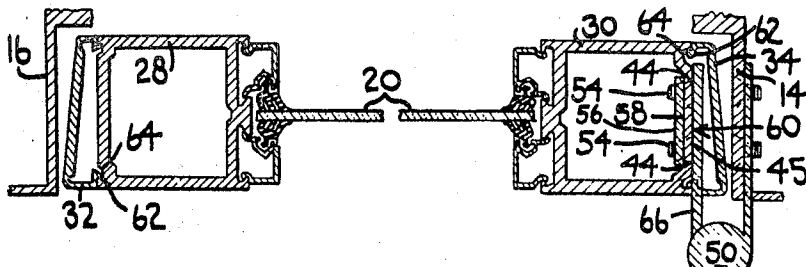


FIG. 5

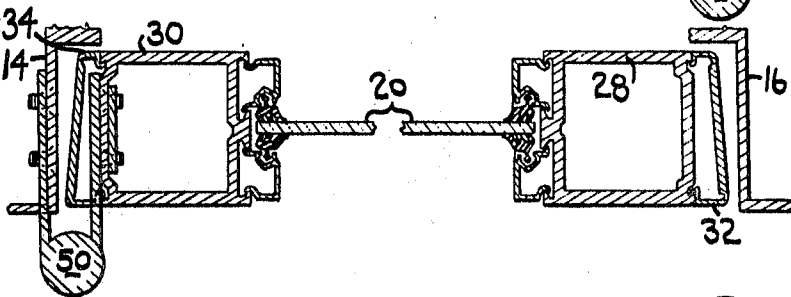


FIG. 6

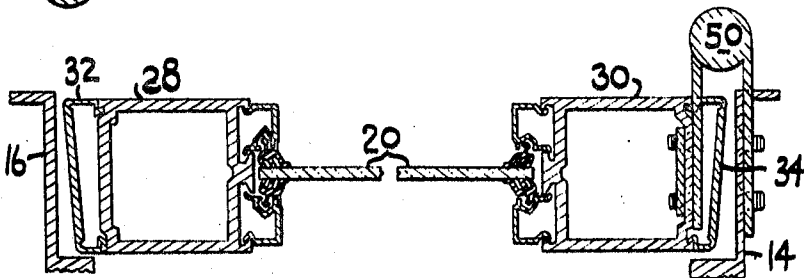


FIG. 7

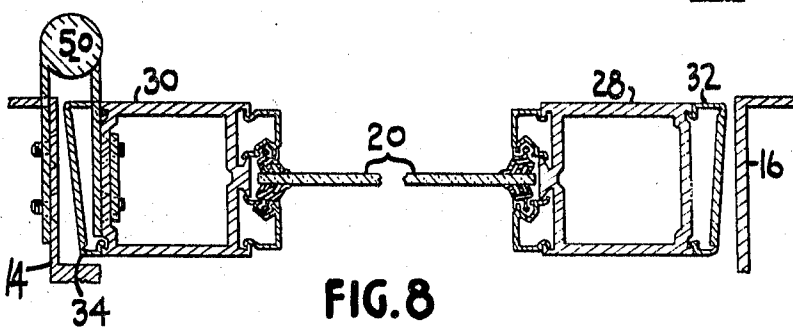


FIG. 8

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3 Sheets-Sheet 3

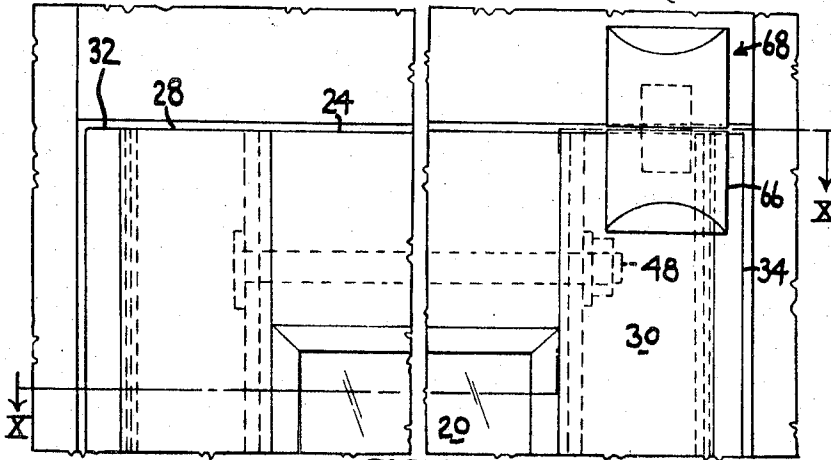


FIG. 9

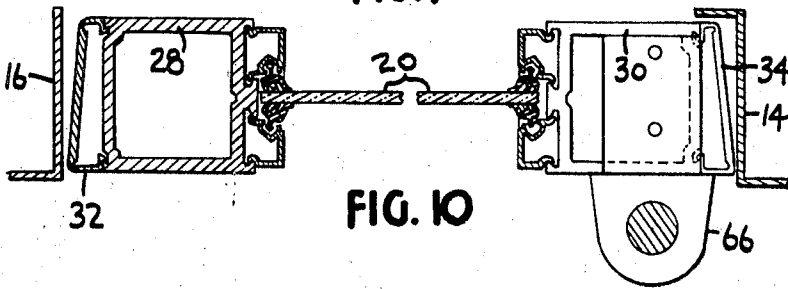


FIG. 10

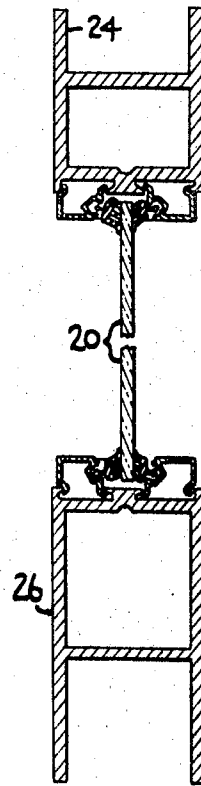


FIG. 13

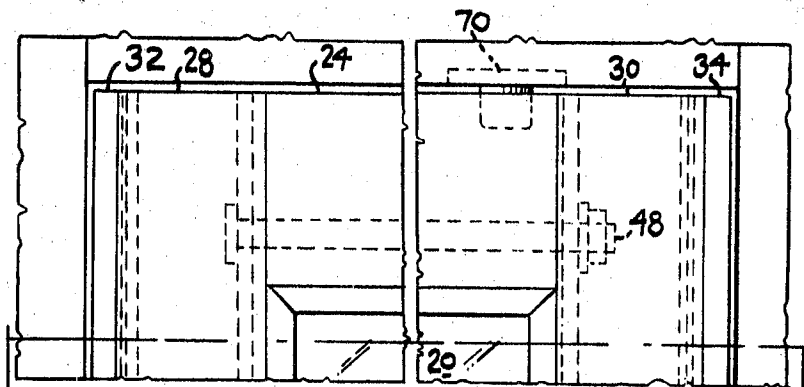


FIG. 11

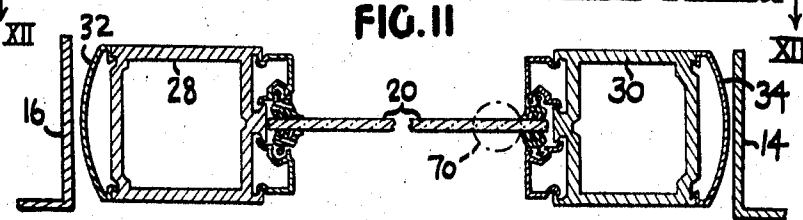


FIG. 12

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3,458,955

DOOR CONSTRUCTION

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Int. Cl. E05d 7/02

U.S. Cl. 49-382

10 Claims

ABSTRACT OF THE DISCLOSURE

A tubular door that includes a door frame construction with vertical stiles having removable edge moldings. The vertical stiles are constructed to provide a basic non-handed door leaf. The removable edge moldings are constructed to be reversible or replaceable with functionally similar edge moldings. The structure of the stile members of the basic door leaf and the structure of the removable edge moldings are cooperatively interrelated to permit providing a stock, non-handed door unit that will fulfill all normal door requirements, including those of hand, swing and desired mode of attachment.

Background of the invention

This invention relates to an improved door and, more specifically, to a tubular aluminum entrance door comprised of a panel, such as a glass panel, set in a frame of extruded panel framing members. In particular, the present invention involves a unique door frame construction characterized by novel vertical stile members and removable edge moldings. The vertical stile members of the present invention are specifically constructed to provide a non-handed and/or functionally unrestricted basic door leaf. Attached to and concealing the edges of this basic door leaf are removable edge moldings. By proper selection and/or orientation of these removable edge moldings, a basic door unit can be provided that will accommodate any desired hand, swing or pivot arrangement. Furthermore, by reason of the novel door construction of the present invention, once a pivot, hand and swing arrangement is initially incorporated into the door, it is thereafter possible, in the case of both butt hung and center pivoted doors, to selectively change any or all three of these arrangements without changing or affecting the appearance of the door. However, when an offset pivot arrangement is initially incorporated into the door of this invention, it is generally only possible to thereafter change the door to the opposite swing and hand without changing or affecting its appearance. Accordingly, it will be appreciated that the door of this invention is constructed to provide a high degree of versatility and, more specifically, a degree of versatility that was not capable of being achieved by prior art tubular door structures.

Prior to the present invention, it was generally essential, in ordering a tubular entrance door from a door manufacturer, to specify the particular type of pivot, the hand and the swing desired. Once specified, the door was installed in the prescribed manner and was thereafter not generally susceptible of any further changes or, at best, only very limited changes. The reason for this was that when one-piece stile extrusions were used, the shape of the leading and trailing edges, the notching for butt hinges and offset pivots and the location or design of push-pull hardware attachments were fixed during manufacture, and generally restricted the use of the door to a particular type of pivot, as well as swing and hand. One possible exception to the above was in the case of single-acting center pivoted doors, which were generally restricted to swing and hand, but could in some instances

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be changed to either a butt hung or offset pivoted door if desired.

The foregoing was also generally true of known door constructions employing a two-piece stile, although the two-piece stile, when employed for both the lock and the hinge stile, afforded some additional versatility compared to one-piece stile constructions. Using two-piece lock and hinge stiles allowed the door manufacturer to use the same basic door for both single and double door arrangements, as well as single-acting and double-acting door arrangements. Known two-piece stiles have generally taken the form of a tubular stile with outwardly extending edge flanges forming a U-shaped edge channel that enclosed or retained companion edge strips. Examples of these structures are shown in Sweet's Architectural Catalog File, Sections 16a/Am and 16a/Mar, 1966, and in U.S. Patent No. 2,605,869 to J. W. Backman. Generally, the shape of the edge strip was selected by the manufacturer depending on whether the door was to be single- or double-acting or used in a single or double door arrangement. The function of the edge strip was to give the desired edge contour and, in some cases, to provide a certain amount of adjustability for fitting the door to the door jambs. However, the general mode of attaching pivot or hinge hardware, as well as push-pull and lock hardware, required notching or drilling the edges and faces of the stiles in a manner that was more or less the same as it would have been had the stile been a one-piece extrusion. Accordingly, these doors were also restricted as to swing and hand by the notching or drilling performed on the edges and faces of the stiles.

It will be evident from the foregoing that one of the principal deficiencies of prior art doors was that notching of the edge or face of the hinge stile was normally required for the application of butt hinges in order to provide a strong hinge attachment and an acceptable or aesthetically pleasing door edge. Once the door was notched for butt hinges, and this was generally done by the door manufacturer, it became permanently handed and restricted to the use of butt hinges. Moreover, little, if any, attention was given in the prior art to the arrangement of push-pull and lock hardware. Accordingly, even if notching for butt hinges had not been a problem in limiting the versatility of tubular entrance doors, the doors were still usually handed by reason of the various other hardware attachments.

Summary of the invention

The novel door of the present invention is constructed to be basically a butt hung type door that requires no notching of the faces or edges of the basic door leaf to accommodate the butt hinge leaves. All notching of door members for butt hinge attachment is done in the reversible and/or replaceable hinge stile edge molding. Accordingly, since the basic door leaf is not notched or changed in appearance, through proper choice and/or orientation of edge moldings the door can be butt hung and used to answer all normal door requirements of hand and swing, as well as single and double door arrangements, without previous knowledge of these requirements. Moreover, the layout of the hinge locations and the holes for hardware attachments or the like in the edge moldings and stiles is such that, by merely inverting the edge moldings and re-attaching hardware, the swing of a butt hung door is automatically changed. Furthermore, by merely inverting the edge moldings, rotating the door 180° about a vertical axis through the center of the door, and re-attaching hardware, the hand of a butt hung door is automatically changed. The push-pull hardware can be mounted on either side of the door to accommodate the selected hand and swing.

Similarly, where center pivots are desired, since the basic door leaf is not notched or changed in any manner, by proper choice and/or orientation of edge moldings the door of this invention can be center pivoted and used to answer all normal door requirements of hand and swing, as well as single or double door and single- or double-acting door arrangements. Where required by the shape of the leading and/or trailing edge, i.e., the lock stile and hinge stile, respectively, swing and hand are changed in essentially the same manner as indicated above in connection with butt hung doors. Of course, when rounded edge moldings or edge moldings that are not handed are employed, it is not necessary to invert the edge molding to change the hand and/or swing of the door. Only when handed edge moldings, such as beveled edge moldings, are used does it become necessary to invert the edge molding when changing the hand or swing of the door.

The construction of the door of this invention is such that notching of the hinge stile is required to accommodate offset pivots. However, up to the time that this notching occurs, the basic door leaf remains unchanged from that employed in connection with butt hung or center pivoted doors. Accordingly, the basic door leaf can initially be offset pivoted and used to accommodate all normal requirements of hand and swing, as well as single and double door arrangements. Once installed in a particular manner, an offset pivoted door of this invention can only be changed to the opposite hand and swing without changing its appearance. As with butt hung doors, this is essentially accomplished by inverting or replacing all handed edge moldings and rotating the door 180° about a vertical axis through the center of the door. All other changes of hand and swing would require remounting the offset pivot on the opposite face of the door, and would thereby leave an exposed notch requiring some form of concealment. Concealing this exposed notch would almost invariably affect the appearance of the door.

In the door construction of the present invention, either butt hinges or center pivots can be freely substituted for the other as often as required without changing the appearance of the door or its inherent versatility. Furthermore, a butt or center pivoted door can be changed to any desired arrangement of an offset pivoted door without affecting its appearance. However, for the reasons given above, once a door is notched to accept an offset pivot, it can only be changed to the opposite hand and swing without affecting the external appearance of the door. All push-pull hardware can be mounted on either side of the door to accommodate any desired hand and swing without affecting the appearance of the door.

Accordingly, it is an object of this invention to provide a tubular entrance door that is functionally unrestricted and non-handed.

It is a further object of this invention to provide a stock, non-handed door that can be either butt hung, center pivoted or offset pivoted, hinged either left or right to swing either in or out and arranged in single- or double-acting and single or double door arrangements.

It is also an object of this invention to provide a door wherein it is possible to change the hand and swing, as well as make hardware changes and alterations in size, without affecting the appearance of the door.

An additional object of this invention is to provide means for securing hardware that is simple, direct and strong.

Furthermore, it is an object of this invention to provide a more versatile door than was known in the prior art and a door that is both attractive in appearance and competitive in cost.

These and other objects, features and advantages of the present invention will become more apparent when reference is had to the accompanying drawings, wherein certain details have been omitted for the sake of clarity,

like numerals are generally used to indicate like parts throughout the same, and in which:

FIG. 1 is an outside elevation showing a single door arrangement of the present invention;

FIG. 2 is an outside elevation showing a double door arrangement of the present invention;

FIG. 3 is an exploded view showing the basic door leaf and removable edge moldings of this invention;

FIG. 4 is a fragmentary elevational view of the top of a butt hung door of this invention;

FIG. 5 is a sectional view taken along the line V—V of FIG. 4;

FIGS. 6–8 are sectional views similar to FIG. 5 showing alternate butt hung arrangements of the door of this invention;

FIG. 9 is a fragmentary elevational view of the top of an offset pivoted door of this invention;

FIG. 10 is a sectional view taken along the line X—X of FIG. 9;

FIG. 11 is a fragmentary sectional view of the top of a center pivoted door of this invention;

FIG. 12 is a sectional view taken along the line XII—XII of FIG. 11; and

FIG. 13 is a sectional view taken along the line XIII—XIII of FIG. 2 showing the shape of the top and bottom rail members of the door of this invention.

Referring more particularly to the drawings, FIGS. 1 and 2 generally illustrate single and double door arrangements, respectively, of the tubular entrance door 10 of this invention mounted within a framed opening comprising a header 12, a pair of jambs 14 and 16 and a threshold 18 or a portion of floor 19. As best shown in FIG. 3, the door 10 comprises a panel 20, such as a glass panel, set in a frame 22 of extruded panel framing members. The door frame 22 is comprised of a top rail member 24, bottom rail member 26, vertical lock stile 28, vertical hinge stile 30, removable lock stile edge molding 32 and removable hinge stile edge molding 34. Door leaf 11, on the other hand, comprises panel 20 and framing members 24, 26, 28 and 30.

For reasons that will become more apparent hereinafter, it is also shown in FIG. 3 that, when a throw lock is used, the throw lock notch or aperture 36 in the edge molding 32 and the throw lock notch or aperture 38 in the lock stile 28 are in proper register and each notch is symmetrically arranged about both horizontal and vertical planes through the center of the edge or jamb facing surface 39 of the lock stile. Similarly, as shown in FIG. 3, when butt hinges are used, the hinge leaf notches 40 and 42 in the edge molding 34 and the upper and lower hinge leaf mounting means, e.g., apertures 44 and 46 carried on the edge or jamb facing surface 49 of hinge stile 30, are in proper register and spaced equal distances from the nearest adjacent end of each of the respective members. Also, notches 40 and 42 extend through only one longitudinal surface portion of the edge molding 34 and the hinge mounting apertures 44 and 46 are symmetrically arranged about a vertical plane through the center of the edge or jamb facing surface 49 of the hinge stile 30. Furthermore, the hinge stile 30 is free of notched portions for the purpose of receiving the door mounting portion of a butt hinge leaf, and the hinge mounting surface portions 45 and 47 of the hinge stile 30 comprise the outermost edge or jamb facing surface portions of the hinge stile. Each of the foregoing structural features provide an essential element in achieving the desired versatility and/or reversibility contemplated for the door of this invention.

Referring now to FIGS. 4 and 5, there is shown in greater detail the preferred construction and one possible arrangement of a butt hung door of this invention. In this regard, FIG. 4 shows that the preferred construction of the door of this invention includes square cutting all stile and rail members and using a tensioned-steel tie rod 48 in both the top rail 24 and the bottom rail 26 (not shown

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in FIG. 4) to provide strength of construction and hair-line joints. This construction also allows for field repair and replacement of damaged components without costly time delay or special equipment.

In FIG. 5 there is shown a butt hung door and, as illustrated, the butt hinge 50 is attached to the right-hand stile and the door is arranged to swing out. Although not essential for the practice of the present invention, it will be noted that hinge stile 30 and lock stile 28 are identical in cross-section. It is essential, however, for the practice of this invention, that the hinge stile 30 be provided with hinge leaf mounting portions, such as web surface portions 45 and 47, that comprise the outermost edge or jamb facing surface portions of hinge stile 30. In this manner, there is avoided the necessity for any notching of the hinge stile 30 for the purpose of mounting thereon butt hinge 50. Screw fasteners 54 are received in apertures 44 and apertures 46 provided in the edge or jamb facing surface of the hinge stile 30, and are further received in correspondingly located threaded apertures provided in a steel backup plate 56 on the inside face 58 of the web 60 of the hinge stile. This arrangement requires that for a sufficient force to be applied to the hinge to cause failure of the attachment, either the screws must shear out of the steel backup plate or the whole web must deform excessively or tear out of the hinge stile.

Continuous channel-shaped edge moldings, such as beveled edge moldings 32 and 34, are attached to both the hinge stile 30 and the lock stile 28 by means of spaced longitudinal tongues 62 on the laterally extending, opposed flanges of the edge moldings being received in correspondingly spaced longitudinal grooves 64 on the edge of each of the stiles. Additional or alternative means for securing the edge moldings to the stile may be provided and may include such an obvious expedient as the use of screw fasteners joining the edge moldings to the stiles. As aforesaid, the hinge stile edge molding 34, and not the hinge stile 30, is suitably notched to permit passage of the door mounted leaf 66 of the hinge 50. This arrangement permits easily repairing damage introduced through the application of sufficient force to the door to cause deformation of the hinge and/or damage to the notch through which the hinge passes by merely changing the hinge and/or the edge molding. Except in extremely rare cases, it should never be necessary to replace the entire door in order to correct a situation caused by damage to the door.

FIGS. 6-8 represent alternative butt hung arrangements of the door of this invention. In this connection, it should be appreciated from the foregoing description that the arrangement of FIG. 7 consists essentially of merely an inverted arrangement of each of the respective edge moldings shown in FIG. 5 with the butt hinges attached to swing the door in the opposite direction to that shown in FIG. 5. On the other hand, the arrangements of FIGS. 6 and 8 consist essentially of merely rotating the door, as shown in FIG. 5, 180° about a vertical axis through the center of the door leaf. In the arrangement of FIG. 6, the edge moldings are inverted in relation to the edge molding arrangement of FIG. 5 to complement the desired swing, whereas in FIG. 8 the edge moldings are not inverted with respect to the arrangement of FIG. 5 because the edge molding arrangement of FIG. 5 already complements the swing shown in FIG. 8. As in FIG. 7, the butt hinges are attached in FIG. 6 and FIG. 8 to provide the desired swing. It will be appreciated that each of the foregoing alternative arrangements is made possible by reason of making suitable provisions for locating the butt hinges at equal distances from the ends of the hinge stile and the lock throw in the precise center of the edge or jamb facing surface of the lock stile. These provisions, the details of which are set out in connection with the discussion of FIG. 3 above, permit inverting the edge moldings and re-attaching the edge moldings and hinge hardware as required.

FIGS. 9 and 10 show one offset pivot arrangement of

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the door of the present invention. As will be apparent from the foregoing, the door leaf 11 and edge moldings 32 and 34 are initially non-handed. Accordingly, any desired hand and swing, including that shown in FIG. 10, is susceptible of being initially incorporated into the door of this invention by merely notching the appropriate face of the hinge stile 30, at both ends, to receive the door mounted portions 66 (one of which is shown) of the offset pivot 68 and orienting the edge moldings to accommodate the selected swing and hand. Once the cutout is made for an offset pivot, the door leaf automatically becomes restricted as to swing and hand, but not until this time. However, as mentioned above, by reason of the push-pull hardware of the door of this invention being reversible, the door can be changed to the opposite swing and hand. Furthermore, it will be apparent that a butt hung door may be changed to an offset pivoted door merely by making a simple notch at both ends of the stile, either in the shop or in the field. The edge molding notched to receive the butt hinges would be replaced with one notched to receive the pivots. On known doors where the door stile is notched to receive butt hinges, the foregoing conversion was generally not considered to be possible. Once the face of the door stile had been notched to receive butt hinges, it could not be converted to either offset or center pivots without leaving exposed notches that would seriously affect the appearance of the door.

FIGS. 11 and 12 illustrate a typical center-pivoted, double-acting, single door arrangement of the door of this invention. Examples of center pivots 70 are fully disclosed in U.S. Patents Nos. 2,549,611 and 2,800,323. Rounded channel-shaped edge moldings are shown on both the leading and trailing edges of the door arrangement of FIG. 12, as is generally typical with double-acting doors. However, in lieu of rounded edge moldings, beveled edge moldings could be used on both edges where the door is only single-acting. In any event, the basic door leaf and edge moldings of the door of this invention are completely non-handed and readily adapted to any and all desired center pivot arrangements.

Among other features that distinguish the present door from known prior art doors are the complete reversibility of the push-pull hardware, the location of the lock or lock throw, where used, in the precise center of the jamb facing surface of the lock stile, and the location of the butt hinges at equal distances from the ends of the hinge stile. As will be appreciated, each of the foregoing provisions is necessary in order to fully develop the desired versatility of the door. Of course, a center-pivoted door of this invention can be easily changed to an offset-pivoted door or a butt hung door by notching the hinge stile, in the case of an offset-pivoted door, and/or appropriate selection and orientation of hinge stile and lock stile edge moldings.

FIG. 13 is a vertical section through the door of this invention and shows the preferred cross-sectional shape of both the top and the bottom rail members 24 and 26. These members complement the stile members of the door of this invention to provide a door that not only possesses a high degree of inherent versatility but, in addition, a door with which hardware of almost any hardware manufacturer can be used. The open channel construction of the top and bottom rail members and the precise dimensioning of these channels permits accommodating and concealing practically all known types of concealed overhead and floor type hardware.

While single door arrangements are shown in FIGS. 4-12, it will be apparent, of course, that double door arrangements can also be provided using the door construction of this invention. Generally, double door arrangements of single-acting doors will employ beveled edge moldings at the hinge stiles and rounded edge moldings at the meeting stiles. On the other hand, double door arrangements of double-acting doors generally employ rounded edge moldings at both the hinge stiles and the meeting stiles.

While the present invention has been described with reference to the specific details of certain embodiments, it is not intended that such details shall be regarded as limitations upon the scope of the invention, except insofar as included in the accompanying claims.

I claim:

1. An aluminum door frame construction comprising a hinge stile and a lock stile fastened to top and bottom rail members that respectively provide between said stiles an upper and lower door edge having an open channel construction, and wherein said hinge stile has a body portion providing a jamb facing surface, said body portion having upper means for mounting an upper butt hinge and lower means for mounting a lower butt hinge, said upper mounting means being spaced from the upper end of said hinge stile essentially the same distance as said lower mounting means is spaced from the lower end of said hinge stile, said upper and lower hinge mounting means each being symmetrically arranged about a vertical plane through the center of said jamb facing surface and each being carried by the outermost body portion of the outer edge of said hinge stile, and a continuous edge molding removably attached to said hinge stile.

2. The door frame construction of claim 1 wherein said hinge stile and said lock stile are both tubular members having a continuous edge molding removably attached thereto.

3. The door frame construction of claim 1 wherein said hinge stile is a tubular member, said upper and lower hinge mounting means are apertures in said hinge stile, and at least one steel backup plate is provided within said hinge stile and adjacent said upper and lower hinge mounting means having threaded apertures aligned with said apertures in said hinge stile.

4. The door frame construction of claim 3 wherein said lock stile is a tubular member having a continuous edge molding removably attached thereto, and said lock stile and said lock stile edge molding each has a jamb facing portion with a notch therein, said notches being symmetrically arranged about both a horizontal plane and a vertical plane through the center of the jamb facing surface of said lock stile.

5. The door frame construction of claim 4 wherein said hinge stile removable edge molding is channel-shaped in cross-section and a pair of notches are provided therein extending only through one flange of said edge molding, said notches being in an amount sufficient to receive the door mounting portions of an upper and lower butt hinge, and said hinge stile is free of notched portions for the purpose of receiving the door mounting portions of an upper and lower butt hinge.

6. A tubular aluminum door frame construction comprising a tubular hinge stile and a tubular lock stile fastened to top and bottom tubular rail members that respectively provide between said stiles an upper and lower door edge

having an open channel construction, and wherein said hinge stile has upper and lower web portions each with jamb facing surfaces that comprise the outermost surface portions of the outer edge of said hinge stile, said upper web portion having upper apertures for mounting an upper butt hinge and said lower web portion having lower apertures for mounting a lower butt hinge, said upper apertures being spaced from the upper end of said hinge stile the same distance as corresponding said lower apertures are spaced from the lower end of said hinge stile, said upper and lower apertures also being symmetrically arranged about a vertical plane through the center of the outer edge surface of said hinge stile, and said hinge stile and said lock stile each having a continuous edge molding overlying the outer edge of the stile and removably attached thereto.

7. The tubular door frame construction of claim 6 wherein said open channel of said top rail has less depth than said open channel of said bottom rail.

8. The tubular door frame construction of claim 7 which further includes at least one steel backup plate carried on the inside surface of said web portions and having threaded apertures aligned with said apertures for mounting said upper and lower butt hinges.

9. The tubular door frame construction of claim 8 wherein said removable edge moldings are channel-shaped in cross-section, said hinge stile removable edge molding is notched in the location of said upper and lower apertures an amount sufficient to receive the door mounting portion of a butt hinge leaf, said notched portions extend only through one flange of said hinge stile edge molding, and said hinge stile is free of notched portions for the purpose of receiving the door mounting portion of a butt hinge leaf.

10. The tubular door frame construction of claim 9 wherein said lock stile and said edge molding removably attached to said lock stile have opposed portions that have a notch therein, and said notches are symmetrically arranged about both a horizontal plane and a vertical plane through the center of the outer edge surface of said lock stile.

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KENNETH DOWNEY, Primary Examiner

U.S. Cl. X.R.

49—382, 399, 400, 501; 52—624