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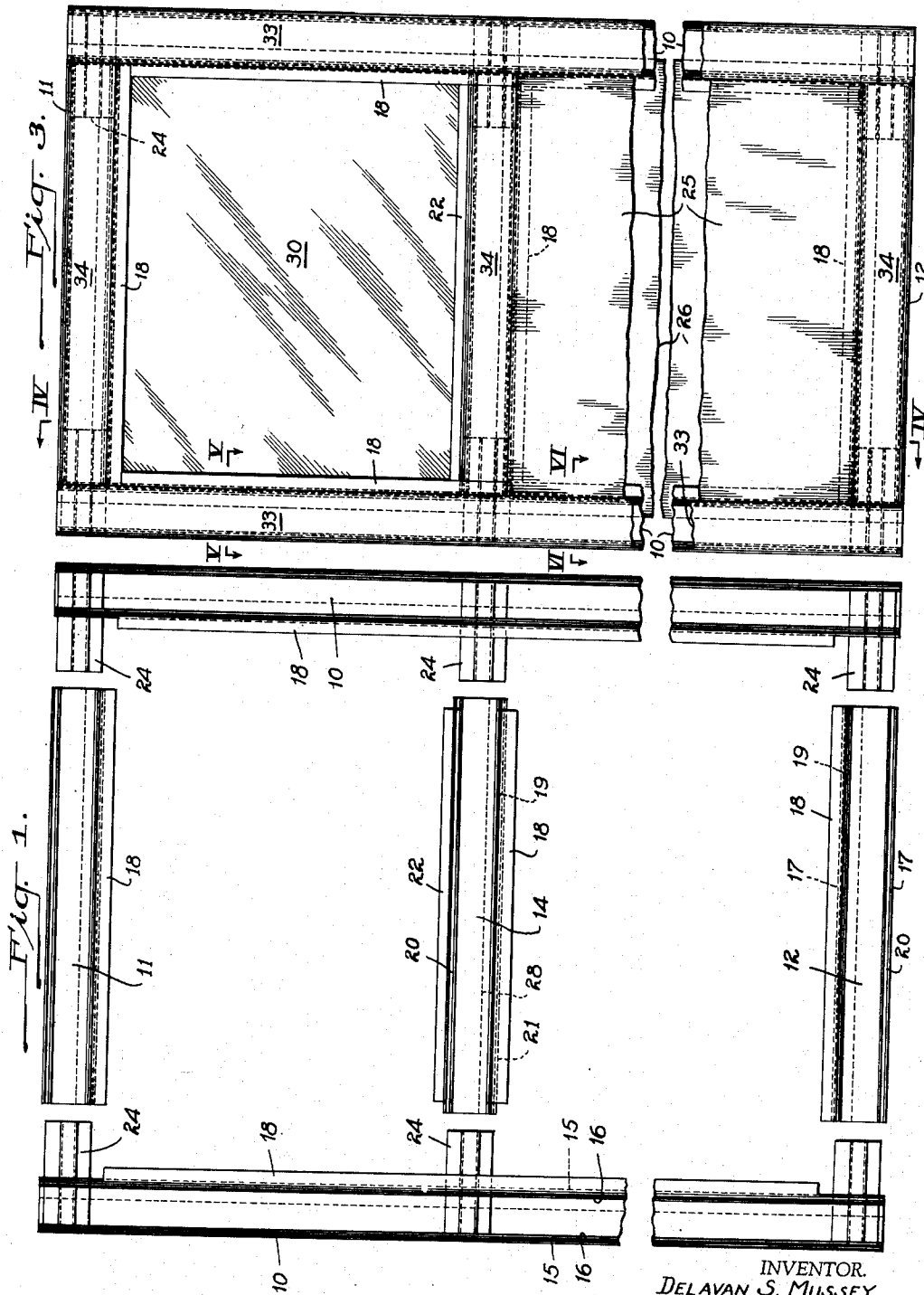
D. S. MUSSEY

2,322,700

STRUCTURE

Filed May 18, 1940

2 Sheets-Sheet 1



INVENTOR.
DELAN S. MUSSEY.
BY *S. Ernest Lewis.*
ATTORNEY.

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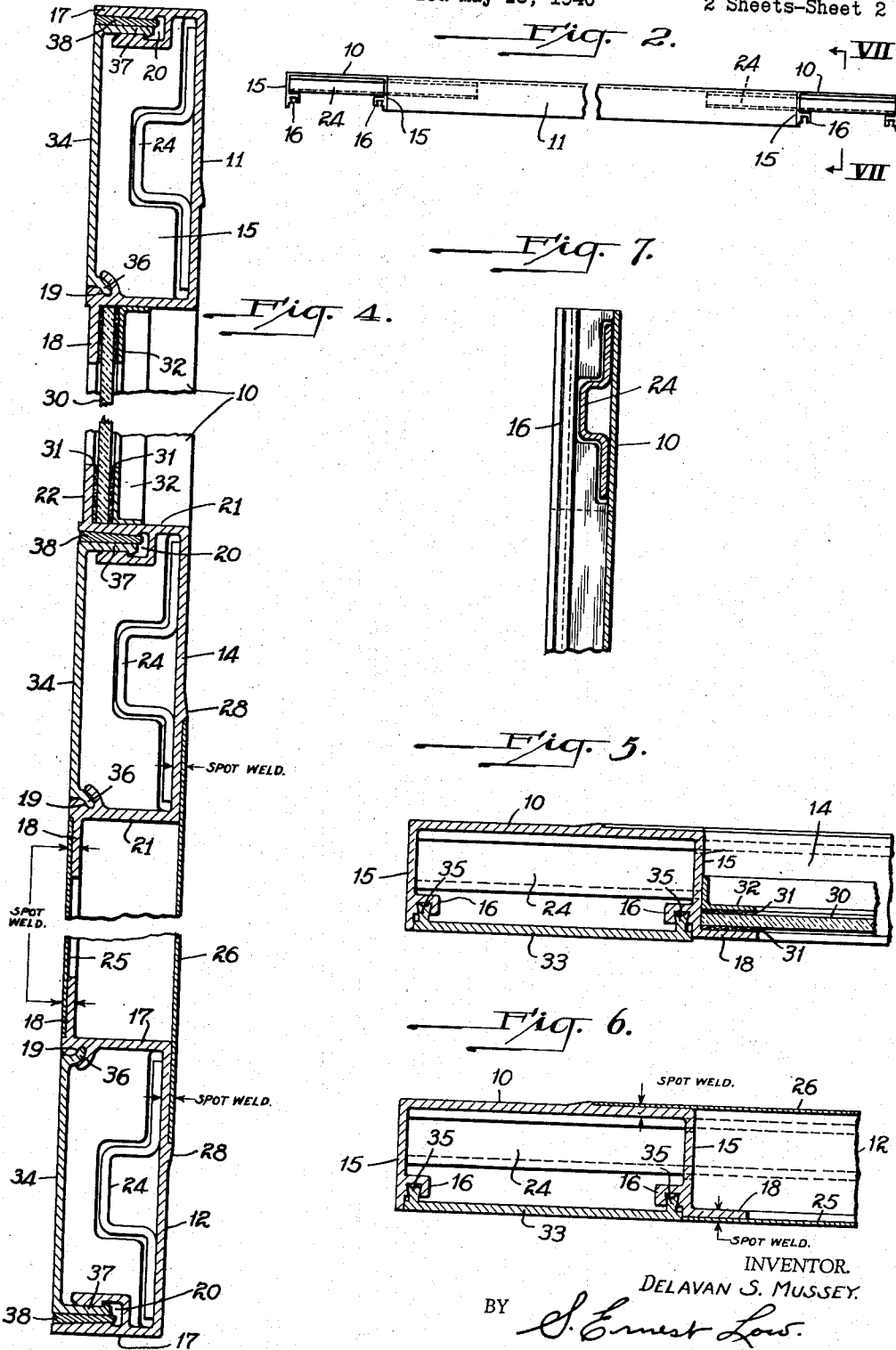
D. S. MUSSEY

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STRUCTURE

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2 Sheets-Sheet 2



INVENTOR.
DELAN S. MUSSEY.
BY *E. Ernest Low.*
ATTORNEY.

UNITED STATES PATENT OFFICE

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STRUCTURE

Delavan S. Mussey, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania

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7 Claims. (Cl. 189-46)

This invention relates in general to paneled structures, and is directed in particular to metal door structures of the fireproof type.

It is a general object of the invention to provide a paneled structure which may be readily assembled from a minimum number of component parts at minimum fabricating cost.

It is a further object of the invention to provide new and useful methods and structures for interlocking the component parts of a paneled structure in rigid assembly.

A specific object of the invention is to provide a paneled metal door, which incorporates concealed reinforcing and joining members.

A further object of the invention is to provide a welded metal door structure characterized by rigid alignment of parts, the parts being kept to a minimum without sacrificing the rigidity and fireproof qualities of the structure.

Further objects and advantages of this invention will be understood and appreciated from reading the following specification in the light of the drawings attached hereto and forming a part hereof, in which:

Fig. 1 illustrates an exploded elevational view of the frame members employed in the practice of the invention;

Fig. 2 illustrates a top plan view of the elements of the structure illustrated in Fig. 1 in assembled relationship;

Fig. 3 illustrates a front elevational view of an assembled door of the invention;

Fig. 4 illustrates a sectional view to enlarged scale taken along the line IV-IV of Fig. 3;

Fig. 5 illustrates a fragmentary sectional view to enlarged scale taken along the line V-V of Fig. 3;

Fig. 6 illustrates a fragmentary sectional view to enlarged scale taken along the line VI-VI of Fig. 3; and

Fig. 7 illustrates a fragmentary sectional view to enlarged scale taken along the line VII-VII of Fig. 2.

Although the invention of the present application readily adapts itself to paneled structures in general, it has been elected to specifically illustrate and describe the invention in its applicability to the construction of a paneled metal door of the fireproof variety.

Referring to the drawings, 10 designates the stiles or side frame members of a metal door, which are identical in form and cross section. The door is also preferably provided with a top rail member 11, a bottom rail member 12, and an intermediate rail member 14.

The stiles 10 and cross members or rails 11, 12, and 14 are all substantially channel or U-shape in cross section, as reference to Figs. 4 through 6 will more clearly show. The stiles 10 are preferably assembled (Figs. 5 and 6) with their flanges 15 extending towards the front face of the door proper. The flanges 15 are preferably provided with mortises, in the form of undercut T-grooves 16, adjacent their normally unsupported or free ends, an adjoining, angularly disposed flange 18 being also provided along one edge of each stile section. The purpose of the particular stile construction herein described will be described in more detail hereinafter.

Referring now to the rail members 11, 12, and 14, it will be noted on reference to Fig. 4 that top and bottom rail members 11 and 12, respectively, are identical in shape and form and are provided with an adjoining, angularly disposed flange 18 and an undercut, arcuately shaped groove 19 adjacent one of their flanges 17. The opposite flange 17 of rails 11 and 12 is provided with an undercut, inwardly opening pocket or socket 20.

The intermediate rail 14 (Fig. 8) is a combination of the aforescribed rails 11 and 12 in that it is provided adjacent one of its flanges 21 with flange 18 and undercut, arcuately shaped groove 19 in the same manner and form as rails 11 and 12. The opposite flange 21 of rail member 14 is provided with the inwardly opening, undercut pocket or socket 20 of rails 11 and 12, but differs therefrom in being provided with an additional angularly disposed flange 22.

By reference to the exploded view illustrated in Fig. 1, it will be noted that the rails 11, 12, and 14 are connected to the stiles 10 through the medium of flanged, hat-shaped members 24. Although the method of assembly may vary, it is preferred to first secure the members 24 within the stiles 10, as by spot welding the same to the inner web surface of the channel-shaped stiles in question. By removing a portion of the adjacent, oppositely disposed flanges 15 of stile members 10 (Figs. 4 and 7), the members 24 are permitted to extend through the flanges of stiles 10 and permit abutting assembly of the ends of rails 11, 12, and 14 with the oppositely disposed flanges 15 of stiles 10. In this assembled condition, the members 24 are thereafter secured as by spot welding to the inner web surface of rail members 11, 12, and 14 to thereby provide a rigid assembly of the stile and rail members of the paneled structure of this invention. It will be understood that the extreme end portions of flanges 18 on stiles 10 are removed, or cut away, adjacent the ends of

the paneled structure to permit flush, abutting assembly of the end rails 11 and 12 with the flanges 15 of stiles 10. Also, portions of the flanges 18 and 22 of the intermediate rail 14 are removed for this same purpose.

The door frame, comprising the stiles 10 and cross rails 11, 12, and 14, having been assembled in accordance with the description presented in the previous paragraph, a metal sheet or plate 25 is then placed in position in contact with the 10
aforescribed overhanging flanges 18, and in the preferred embodiment of the invention, electrodes of a suitable spot welding mechanism are brought into position, as indicated by the arrows and legends in Figs. 4 and 6, whereby the plate 15
25 is secured to the stiles 10 and rails 12 and 14. Plate or sheet 26 is thereafter placed in position in contact with the outer web surfaces of stiles 10 and rails 12 and 14 between shoulders 28, raised upon the outer surface or back of the webs of 20
stiles 10 and rails 12 and 14. The plate 26 is preferably secured as by spot welding in a manner similar to plate 25.

It will be noted that plates 25 and 26, when placed in position and welded in the order given 25
in the preceding paragraph, make the assembly of the door of this invention accessible to welding operations to produce a double walled or paneled door structure. If desired, the space between the plates 25 and 26 may be filled with 30
asbestos, rock wool, or any other suitable insulating material prior to securing plate 26 in place.

That portion of the door between rails 11 and 14 may, if desired, be glazed or constructed in a 35
manner similar to that previously described for the bottom panel of the structure of this invention. In order that the invention may be described in all of its possible ramifications, a glass panel has been illustrated between the rails 11 40
and 14. Therein a suitable sheet or plate of glass 30 is supported between felt or other suitable resilient gasket or washer material 31, upon the inwardly extending flanges 18 of stiles 10 and top rail 11, and flange 22 of intermediate rail 14, a suitable molding strip 32 being employed to secure 45
the glass in place and complete the glazed assembly. The molding strip may be attached to the stiles and rails as by welding or standard machine fastening instrumentalities.

The door has now been completely fabricated 50
and it only remains to affix cover plates 33 on stiles 10 and cover plates 34 on rails 11, 12, and 14. For imparting maximum strength and rigidity to the stiles 10, cover plates 33 are formed with integral depending substantially T-shaped tenons 55
35, which are slidingly engaged within the previously described mortises or undercut grooves 16. When thus assembled, the cover plates 33 present a smooth exterior front face for the stiles 10.

With reference to cover plates 34 for rails 11, 12, and 14, these plates cannot be readily slidably 60
assembled. In this connection the plates 34 are provided with complementary arcuately shaped tenons 36 along one edge thereof, and angularly depending hook-shaped tenons or flanges 37 along 65
the opposite edge thereof. The tenons 36 and flanges 37 are received, respectively, within their complementary mortises or grooves 19 and 20, and a suitable wedge plate or strip 38 is thereafter 70
driven into place between flanges 37 and the cooperating upstanding flanges of the rails 11, 12, and 14 to rigidly secure the cover plates 34 in place.

It will be recognized that the door or paneled 75

structure of this invention provides for complete assembly, as by welding, of a minimum number of parts entering into its construction, and thereafter permits the application of cover plates, the 5
initial absence of which has made it possible to complete and construct an all-welded paneled structure. It is a further advantage of the paneled structure of the invention that tapping strips, or reinforcing members and the like, may be placed in position within the stile members before the cover plates therefor have been applied 10
for the purpose of attaching hinges, locks, and other essential hardware to a door member or the like. It will be manifest that the welds herein referred to could be replaced by any number of 15
machine fastening devices which could be flush with all exposed surfaces of the door structure, and at the same time be provided with interior securing or locking members which would thereafter be hidden or concealed from sight by the application of the aforescribed cover plates 33 20
and 34.

The joining members 24 serve to reinforce the corners of the door or paneled structure of this invention as well as impart rigidity adjacent its 25
central portion, and the slidingly assembled cover plates 33 likewise serve to impart rigidity against torsion in the stile members 10.

In the preferred practice of the invention it has been found that all of the metal structural 30
elements are readily and economically produced by extrusion. For example, the stiles 10 and cross rails 11, 12, and 14, together with their cover plates 33 and 34, represent relatively simple extruded products which can be produced in indeterminate length and subsequently cut to length 35
for the manufacture of paneled structures of varying sizes. Extrusion practice likewise readily lends itself to the commercial production of the mortise and tenon joints incorporated in this invention. In so far as the selection of metal from which 40
the paneled structures of the invention may be fabricated, aluminum and its alloys have found ready acceptance, both from manufacturing and structural standpoints. It will be manifest, however, that neither the choice of material nor the process of producing the separate parts or elements entering into the paneled structures of this invention are factors which in any way limit the 45
scope of the present invention.

Although the invention has been described in connection with a specific embodiment thereof, it is to be understood that it should not be limited thereto except as defined in the appended claims.

What is claimed is:

1. In a frame work, side stile members and cross rail members, both of substantially U-shape with their legs extending outwardly in the same direction, connecting members secured to the inner web surfaces of the members to form joints 60
between the stile and rail members, oppositely disposed legs of said stiles and rails being provided with co-planar angularly disposed flanges, and detachable cover plates applied over the normally open sides of the stile and rail members to obscure the connecting members.

2. In a paneled structure or the like, the combination of stile members of substantially U-shape disposed with their legs extending outwardly, rail members connected to said stile members to form a frame work, said rail members being of substantially U-shape and having their legs extending outwardly in the same direction as the legs of said stiles, oppositely disposed 75
legs of said stiles and rails being provided with

co-planar angularly disposed flanges, a panel member secured to said co-planar flanges, and a second panel member secured to outer web surfaces of the U-shape stile and rail members, and cover plates detachably secured to the normally open sides of the frame members.

3. In a paneled structure or the like, the combination of stile members of substantially U-shape disposed with their legs extending outwardly towards a front face of the structure, rail members of substantially U-shape positioned with their legs extending outwardly in the same direction as the legs of the stile members, members secured to the inner web surfaces of juxtaposed stiles and rails to form a rigid frame work of the same, oppositely disposed legs of said stiles and rails being provided with co-planar angularly disposed flanges, a panel plate secured to said co-planar flanges, a second panel plate secured to the outer web surfaces of said stiles and rails, and detachable cover plates for the normally open sides of the U-shape rails and stiles, whereby the first-mentioned panel plate and cover plates present a substantially co-planar front face on the paneled structure.

4. A door structure comprising side stiles and cross rails of substantially U-shape assembled to form a rectangular frame with the legs of the stiles and rails extending in the same direction, said stiles and rails having angularly disposed flanges adjacent their oppositely disposed legs to form a ledge within the rectangular frame, a panel sheet secured along its edges to said ledge, a second panel sheet secured to the outer web surfaces of said stiles and rails, and detachable cover plates applied to the normally open sides of the U-shape stiles and rails.

5. A stile member for paneled structures, said stile being substantially channel shape in cross section and having undercut mortises formed in 40

its upstanding legs, one or more portions of a leg of said channel being removed for receiving an element connecting said stile to a cross rail member, said leg with the removed portions being outwardly provided with a co-planar angularly disposed flange, and a cover plate for said stile member, said cover plate having depending tenons adapted to be slidably received within the undercut mortises of the upstanding legs of the channel to close its open side.

6. In a frame structure or the like, the combination of stile members of substantially U-shape disposed with their legs extending outwardly, rail members connected to said stile members to form a framework, said rail members being of substantially U-shape and having their legs extending outwardly in the same direction as the legs of said stiles, oppositely disposed legs of said stiles and rails being provided with co-planar, angularly disposed flanges, and cover plates detachably secured to the normally open sides of the frame members.

7. A door structure comprising a plurality of stiles and rails, all of substantially U-shape with the legs of the stiles and rails extending in the same direction, assembled to form a framework having an upper and a lower rectangular portion, the oppositely disposed legs of said stiles and rails being provided with co-planar, angularly disposed flanges to form a ledge within each said rectangular portion, a panel secured to the ledge within the upper rectangular portion, a panel secured to the ledge within the lower rectangular portion, and a second panel secured to the outer web surfaces of said stile and rail members surrounding said lower rectangular portion, and detachable cover plates supplied to the normally open sides of the U-shape stiles and rails.

DELAN S. MUSSEY.