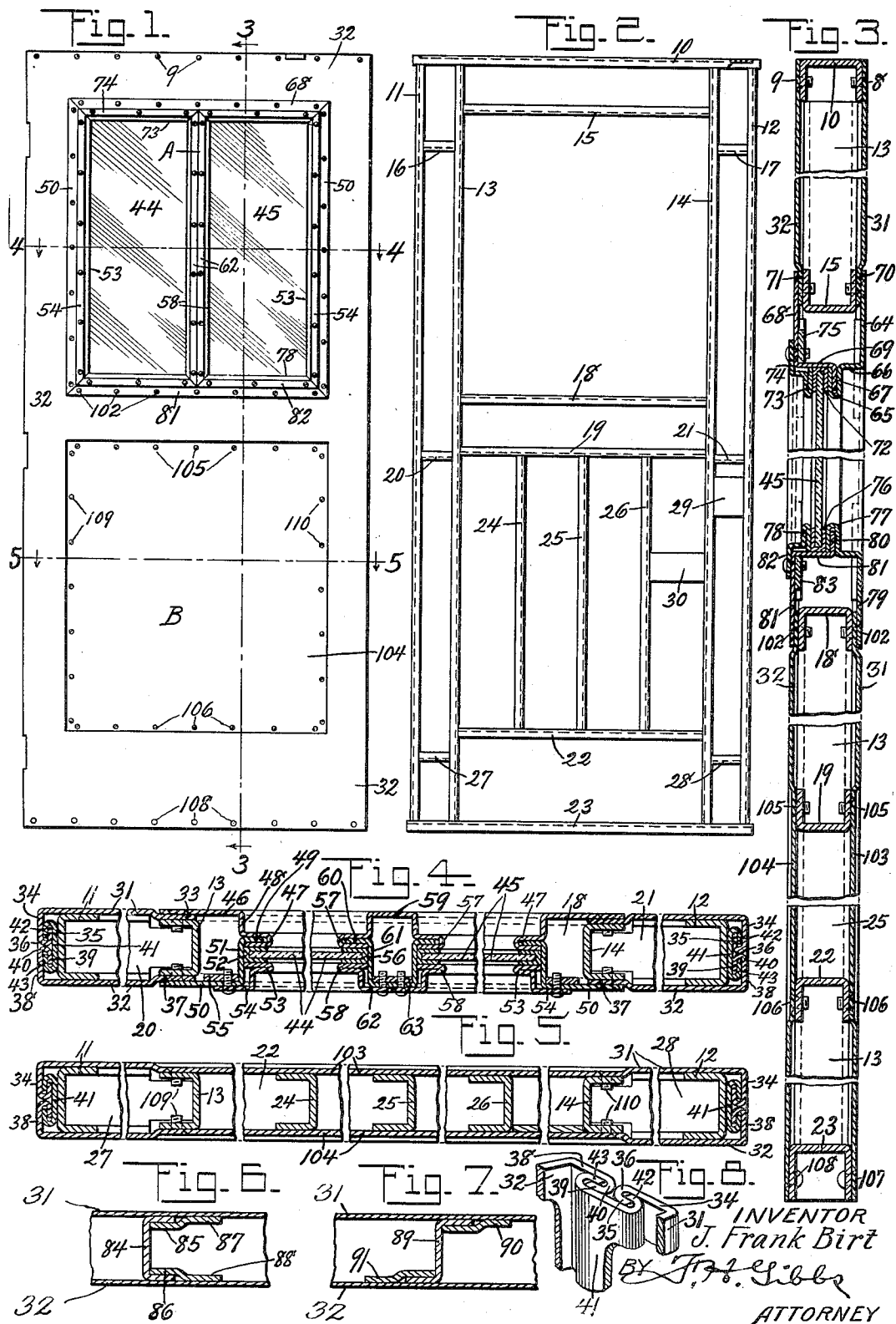


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UNITED STATES PATENT OFFICE

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VESTIBULE CAR DOOR

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This invention relates to the art of door construction and is more particularly concerned with doors designed for railway cars as used for side doors of the vestibule.

The invention has in view as an important object the provision of a door construction which comprises a frame structure defined by rigid beams and struts such as channel beams and which frame provides openings for receiving glass and which is also adapted to be covered by an outer casing of thin sheet metal such as aluminum. It is an important object of the invention to provide a door of this type which is easily and readily assembled and at the same time provide the features of rigidity and sturdiness necessary in a door which is to be subjected to severe service conditions such as vestibule side doors of passenger cars receive. Following this thought a more detailed feature of the invention is the provision of a novel seam structure for assembling the sections of the casing about the frame. This invention contemplates the use of a connection between the opposite sections of the casing having meeting flanges, which connection consists of portions bent back and spaced from the meeting flanges and which are engaged by a connecting member with intumed flanges forming a slot which receives the abutting portions of the flange structure. Such a connection is shown in the patent to Stevens, No. 1,748,195. As one aim of the present invention is to use exceptionally light and thin sheet metal, such as aluminum, for the casing, such a connection combines with the particular frame and casing, described herein, to great advantage in that it not only effects a good interlock of the oppositely disposed casing parts but it produces a strong edge construction from the thin sheet aluminum used.

An important feature of the invention is the provision of bracing means between the sheet metal sections which are disposed on opposite sides of the door. In accordance with this invention rigid bracing members are availed of which have flanges engaging the opposite sections and thereby supporting the latter to maintain them in spaced position intermediate their points of connection

with the steel frame. In a somewhat more developed phase this thought is carried out in the construction consisting of bracket members having opposite ends which are connected to the sheet metal sections, and opposite portions being joined in an interlocking structure with a U- or Z-shaped strut.

In providing the rigid frame or skeleton I propose to avail of steel channel sections or units as the structural beams and I join these units at their points of joinder with welded connections to provide a unitary self-sustaining frame having united inner and outer skeletons.

Other more detailed objects and advantages of the invention will in part become apparent and in part be hereinafter set forth as the description of the invention proceeds. For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawing wherein

Fig. 1 is a front elevational showing of a vestibule side door made in accordance with the precepts of this invention.

Fig. 2 is a view somewhat similar to Fig. 1, but with the sheet metal covering or casing removed.

Fig. 3 is a vertical section taken through the door about on the plane represented on the line 3—3 of Fig. 1, parts being broken away to permit of a showing on an enlarged scale.

Fig. 4 is a horizontal sectional showing similar to Fig. 3 but taken at right angles thereto. This view is taken about on a plane as shown by line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 4 taken on the plane represented by the line 5—5 of Fig. 1.

Fig. 6 is an enlarged detail sectional view illustrating the bracing structure between the braced sheet metal sections of a modified form.

Fig. 7 is a view similar to Fig. 6 of still another modification, and

Fig. 8 is an enlarged detailed perspective view illustrating the interlocking connection between the sheet metal sections.

Referring now to the drawing and more

particularly to Fig. 2, the door of the present invention comprises generally a frame and metal sheets secured to each side thereof and having their adjoining side edges connected by suitable keys; the sheets being preferably each of one piece, all of which will be presently more fully described.

The door frame comprises spaced pairs of stiles 11, 13, and 12, 14, connected at their upper ends by a lintel 10 and at their lower ends by a sill 23. As clearly shown in the drawing, the stiles, lintel and sill are formed of channels and are connected in any suitable or desired manner, as by welding. The channels joining the pairs of stiles face each other (see Figs. 4 and 5) and are maintained in their proper spaced relation and against distortion by channel braces 16, 17, 20, 21, 27 and 28. The door frame is further stiffened by means bracing the respective pairs of stiles, said means extending transversely between the inner stiles 13 and 14 and comprising the spaced channels 15, 18, 19 and 22 having their ends welded or otherwise secured to the inner stiles 13 and 14, and braces 15 and 18 being so spaced as to define with adjoining portions of the stiles 13 and 14 an area for a window; the braces and said adjoining portions of stiles 13 and 14 defining attaching portions for window framing members as more clearly pointed out hereinafter.

The lower portion of the frame and hence the entire door is stiffened by spaced vertical channel struts 24, 25 and 26, arranged between and connected to the transverse braces 19 and 22. As clearly shown, the outer stiles 11 and 12 and lintel 10 and sill 23 are of greater width than the stiles 13 and 14 and the internal braces, whereby the finished door provides oppositely arranged walls or faces having inset panels, and the window portion of the door is also inset.

Inasmuch as door structures of this type generally include handles and latch mechanism, supporting plates for this mechanism are indicated at 29 and 30, these plates preferably being welded to the frame.

The door of the present invention comprises metal sheets 31 and 32 disposed on each side of the frame above described, and each provided with an opening corresponding to the window opening defined by the frame members 13, 14, 15 and 18, and the lower portions of the sheets are formed with depressed areas indicated at 103 and 104, respectively. These sheet metal sections may be made of any suitable sheet metal having the desired properties of lightness and durability, but I prefer to avail of an alloy of aluminum. Throughout the whole structure these aluminum sheets may be connected to the steel frame members and to the struts by any suitable connecting means, although I prefer to employ aluminum rivets or suit-

able screws for this purpose, the particular manner in which the sheets are connected to the beams not being an essential part of the invention.

Section 31 has an inwardly offset flange 33 which bears against and is connected with the corresponding flange of the vertically extending upright 13. At its outer edge the section 31 is bent to provide a side flange 34 which is turned back on itself to provide a reentrant flange 35 spaced from the side flange 34 and connected therewith by an intermediate bent portion 36. Section 32 is similarly formed with an inwardly offset portion 37 and at the edge offset thereto has a side flange 38 formed with a spaced reentrant flange 39 connected to the side flange 38 by a U-shaped portion 40.

When the door is assembled the bent portions of the side flanges 34 and 38 may abut (see Figs. 4 and 5) and the side flanges and spaced portions 35 and 39, respectively, are all disposed in substantially the same plane. Vertically extending connecting member 41 has inwardly disposed edge flanges 42 and 43 which are spaced from the intermediate portion, and this connecting member is fitted over and interlocked with the abutting side flanges to establish the connection as clearly shown in Fig. 8. When in this assembled position, the portions 42 and 43 fit in the spaces defined by the side flanges 34 and offset portion 35, and side flange 38 and offset portion 39, respectively.

It is notable that the intermediate or main body portion of the connecting member 41 engages the web portion of the stile 11 to positively maintain the assembled condition, this compact engagement positively preventing any deformation of the metal sheeting or connecting parts to break the connection. The construction just described for joining the spaced sections 31 and 32 to the vertically extending beams or struts is duplicated on the other side of the door and this latter construction is not again described in detail. This same condition is true of the moulding structure provided for the window openings, hence, one-half of the window opening will be described as the mounting for the two panes of glass 44 and 45 are identical.

As above pointed out, the edges 33 and 37 of the sheets 31 and 32 are offset inwardly with respect to the main body portions of these sections. This offset arrangement provides accommodation for an edge portion of a sheet metal window frame member 46 which has a U-shaped edge portion 47 that is offset from and connected with the main body portion by an intermediate portion 48. The U-shaped edge portion 47 receives the free edge 49 of a sheet metal member 50, which free edge portion is offset from the main body portion of the member 50 and connected thereto by an intermediate portion 51. The

main body portions of the members 46 and 50 are connected to the inwardly offset flanges 33 and 37, respectively. The groove which receives the glass holding member 52 is defined by the U-shaped edge portion 47 and a flange structure 53 that is formed on the member 54 which is connected to the member 50. It is notable that these fastening members which effect this connection between the members 54 and 50 also hold in position a bracing or supporting member 55 which is disposed on the inner face of the member 50 and extends vertically along the side of the window opening.

A glass holding member 56 which extends vertically and is disposed oppositely to the member 52 is held in position between a pair of flange structures 57 and 58. The flange structure 57 consists of a U-shaped edge portion of a member 59, which U-shaped portion receives the free edge 60 of a member 61. The flange structure 58 is formed on a member 62 which is connected to the member 61 and an inner bracing member 63 by the fastening members as shown in Fig. 4. It is evident that the proper positioning of the glass holding members 52 and 56 provides for the holding of the glass 44 in position so far as the vertical connections are concerned. These same connections are duplicated on the right hand side of the opening. The structure consisting of the members 59, 61, and 62 defines the middle line or central structure of the window opening which is designated A in Fig. 1.

Referring now more particularly to the horizontally extending fastening members for the pane of glass and the moulding on the horizontal edges of the openings, it is noted that a sheet metal piece 64 has a U-shaped edge portion 65 that is offset and connected with the main body portion by an intermediate portion 66. The U-shaped edge 65 receives the free edge 67 of a sheet metal member 68 which edge 67 is connected thereto by an intermediate portion 69. The main body portions of the members 64 and 68 are connected to the inwardly offset flanges 70 and 71, respectively, formed on the sheet metal sections 31 and 32 which are connected at their upper edges to the lintel 10 as shown at 8 and 9. The groove which receives the glass holding member 72 is defined by the U-shaped edge 65 and the flange structure 73 that is formed on the member 74 which is connected to the member 68. It is notable that the fastening members which effect this connection between the members 68 and 74 also hold in position a bracing or supporting member 75 which is disposed on the inner face of the member 68 and extends horizontally along the side of the window opening.

A glass holding member 76 which extends horizontally and is disposed oppositely to the member 72 is held in position between a pair

of flange structures 77 and 78. The flange structure 77 consists of a U-shaped edge portion of a member 79 which U-shaped portion receives the free edge 80 of the member 81. The flange structure 78 is formed on the member 82 which is connected to the member 81 and an inner bracing member 83 by means clearly shown in Fig. 3. The members 79 and 81 and the sheets 31 and 32 are attached to the transverse brace 18, as shown at 102 in Fig. 3. It is evident that the proper positioning of the glass holding members 72 and 76 provides for the holding of the glass pane 45 in position so far as the horizontal sections are concerned.

Referring now more particularly to the lower structure of the door, which is fully covered by the sheets 31 and 32, it will be noted that lower portions of these sections form depressed panel members 103 and 104, as clearly shown in Figs. 1 and 3. These panel members are attached to the transverse bracing members 19 and 22 by means of rivets or screws 105 and 106 (Fig. 3), and to the inner stile members, 13 and 14, by the screws or rivets 109 and 110, respectively, (Fig. 1). One of these depressed panel portions of the door is very clearly shown in Fig. 1 and is referred to by the reference character B. Outside of the panel B the sheets 31 and 32 assume their normal spaced relationship and their lower edges are connected to the bottom sill 23 as indicated at 107 and 108, respectively, as shown in Fig. 3. It is to be noted that the sheets covering these panels, such as B, and the bottom portion of the door are of considerable extent and hence maintaining them in properly spaced position is an important feature and to this end the struts 24, 25 and 26 are provided. In addition to this, these struts reinforce the transverse braces 19 and 22, adding considerable strength and rigidity to the structure of the door.

This invention also contemplates a somewhat more positive type of connection between the struts 24, 25 and 26 and the aluminum sheets 31 and 32 which may be effected by the arrangement shown in Figs. 6 and 7 which are modified forms. In Fig. 6 a bracket member 87 is secured to the casing section 31 in any preferred manner as by welding. This bracket member has an offset end portion 85 which is spaced from the sheet 31. A similar bracket member 88 is also connected to the sheet 32 as by welding and has an inwardly offset portion 86 spaced from the latter wall. A connecting member in the form of a channel beam 84 is positioned between the casing sheets 31 and 32 with the flanges thereof received in the spaces defined by the offset portions 85 and 86 and the respective walls.

This same thought is carried out in a slightly different way in the form shown in Fig. 7

in which a Z-shaped connecting member 89 is
availed of instead of the U-shaped channel
unit 84. This naturally involves a different
mode of disposition of the brackets 87 and 88
5 which in this form are shown at 90 and 91 in
staggered relationship with the offset ends
properly positioned to receive the flanges of
the Z-shaped connecting member 89.

It is evident from the foregoing that I have
10 provided a door for vestibules of passenger
cars which is of rigid and sturdy construc-
tion and at the same time is comparatively
light as compared to the prior art doors and
having these properties of rigidity and
15 sturdiness to the desired extent. The door is
characterized as having a rigid frame which
is covered with an aluminum casing that is
readily assembled, thereby rendering the
manufacture of the door a reasonable and
20 practical proposition. Suitable connections
between the sheet metal portions are availed
of to provide for the mounting of window
panes and at the same time provide against
accidental disassembly of the parts consti-
25 tuting the door.

While a preferred specific embodiment of
the invention has been hereinbefore set forth,

it is to be understood that I am not to be limit-
ed to the exact construction illustrated and
described because various modifications of
these details may be provided in putting the
invention into practice within the purview of 70
the appended claim.

What is claimed is:

In a door of the character described, a
frame comprising two opposed pairs of stiles, 75
a lintel connecting said pairs of stiles at their
upper ends, a sill connecting the stiles at their
lower ends, cross members between the said
pairs of stiles and between the stiles of each
pair, the inner stiles and certain of the cross
members being of less width than the outer 80
stiles and the lintel and defining a window
frame opening in the upper portion of said
frame, and a sheet metal casing constituting
the faces of the door and mounted on the 85
frame, said casing comprising metal facings
fitted over the outer stiles with inset marginal
areas opposite the inner stiles and cross mem-
bers and secured thereto.

In witness whereof I have hereunto set my 90
hand.

J. FRANK BIRT.

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