Oct. 16, 1928. 1,687,537

W. R. BRACE

METAL DOOR

Filed June 16, 1926 2 Sheets-Sheet 1

Fig. 1

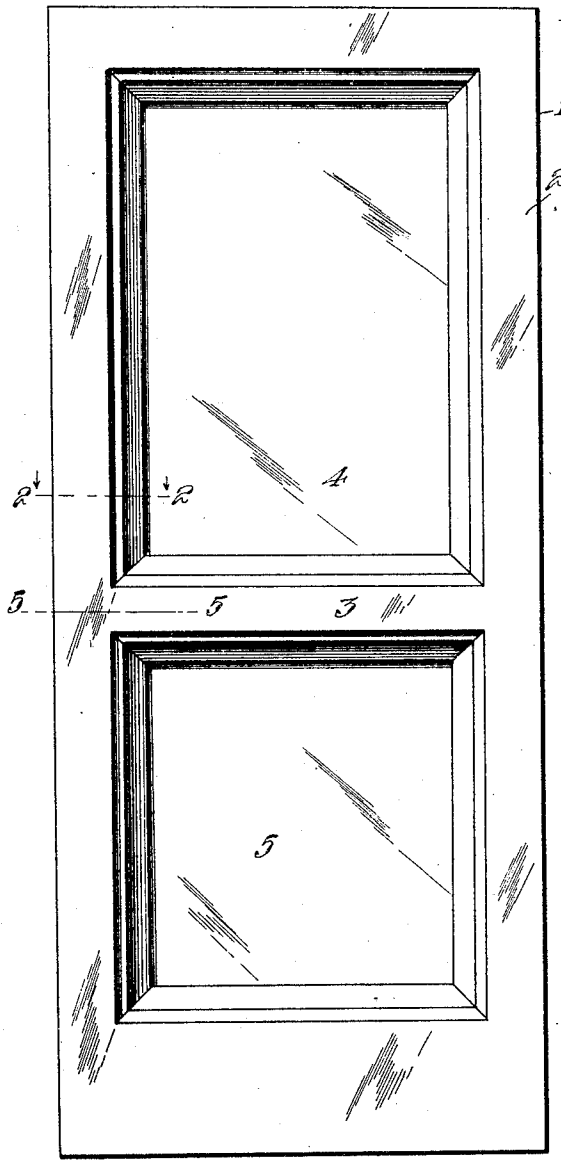


Fig. 2

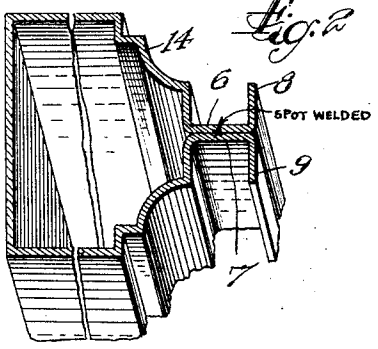


Fig. 3

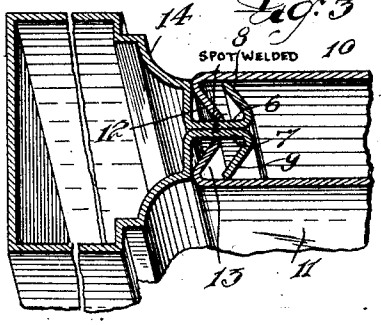


Fig. 4

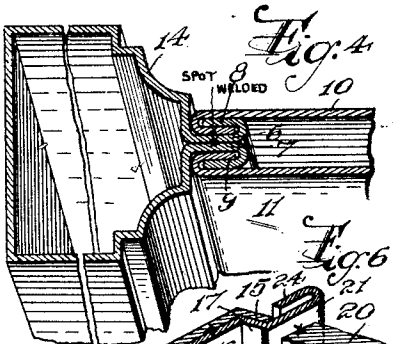


Fig. 6

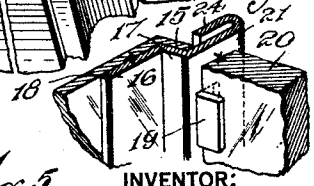
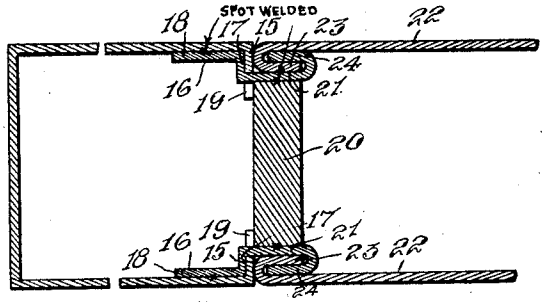


Fig. 5



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Fig. 7

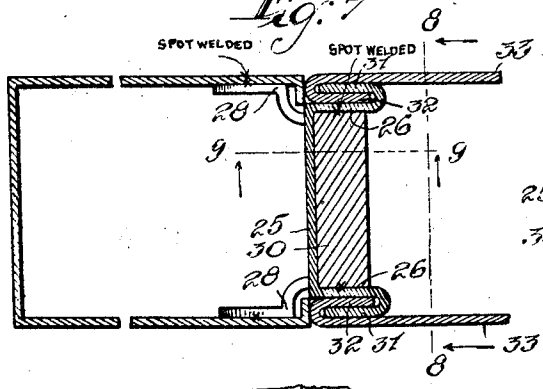


Fig. 8

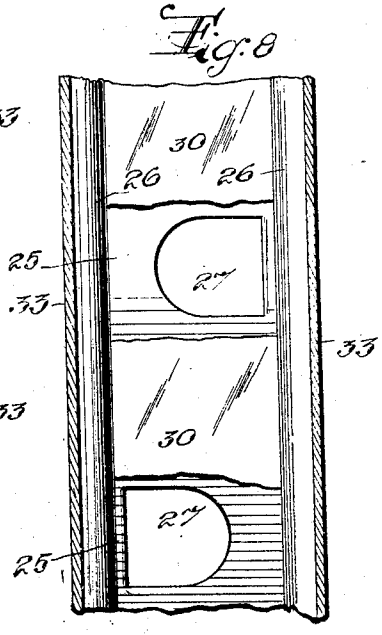


Fig. 9

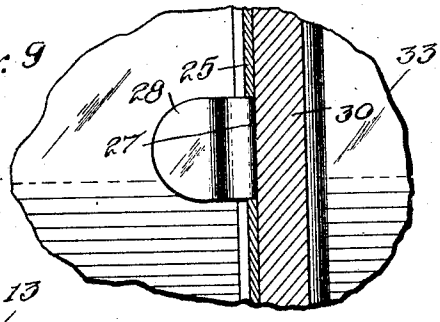


Fig. 10

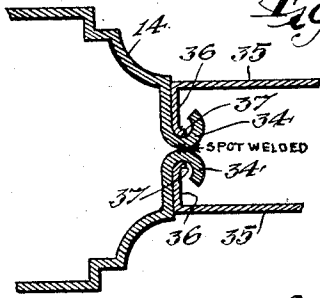


Fig. 12

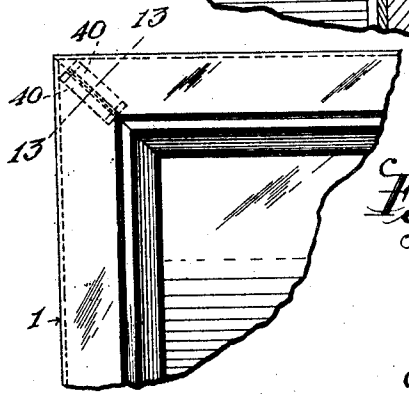


Fig. 11

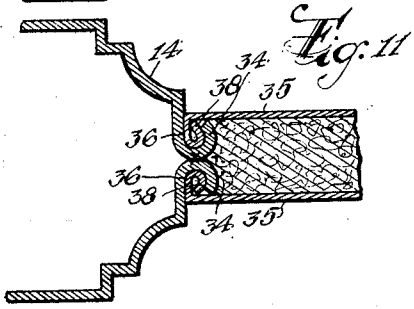
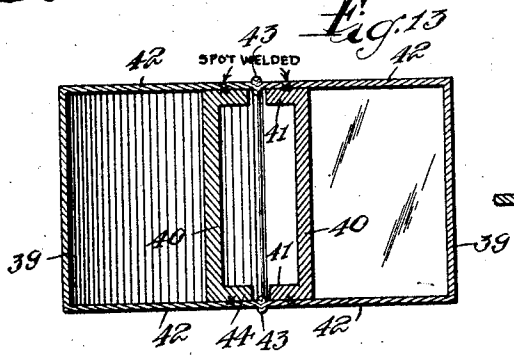


Fig. 13



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Patented Oct. 16, 1928. 1,687,537.

UNITED STATES PATENT OFFICE.

WILLIAM R. BRACE, OF NEWARK, NEW JERSEY.

METAL DOOR.

Application filed June 16, 1926. Serial No. 116,293.

This invention relates to all-metal doors or other structural elements in which paneling is employed, the door or other structure being hollow when completed, and more especially the invention relates to the insertion of the panels, not only so that they are very firmly and readily assembled but so that they can be inserted as a final step to complete the door or other element.

The objects of the invention are to provide an improved structure of panels and method of inserting them in a door or other element of steel furniture or other construction by which said panels shall be very firmly and at the same time quickly inserted; to enable the panels to be inserted as a final step in the formation of a door or the like and thus serve to bind the other parts together; to enable the frame of the door or the like to be first made as an endless hollow member into which the panels are later inserted; to provide for the insertion of cross-bars between panels in a manner analogous to that of inserting the panels, and to obtain other advantages and results as may be brought out by the following description.

Referring to the accompanying drawings, in which like characters of reference indicate the same parts throughout the several views,

Figure 1 is a side elevation of a door of my improved construction;

Figure 2 is an isometric section of the frame of the door, as on line 2—2 of Figure 1, showing the same as formed with its edge flanges projecting in substantially the same plane;

Figure 3 is a similar view showing said edge flanges and the edge flanges of panel plates in position for assembling;

Figure 4 is a similar view showing the panel plates assembled with the frame as in Figue 1;

Figure 5 is a section on line 5—5 of Figure 1, showing how a cross-bar is assembled with the frame;

Figure 6 is a detail perspective view further illustrating the same;

Figure 7 illustrates a modified construction of connecting the cross-bar to the frame of the door;

Figure 8 is a section of the same on line 8—8 of Figure 7;

Figure 9 is a cross-section on line 9—9 of Figure 7;

Figure 10 illustrates a modified connection of panels to frame, showing the same in position to be assembled;

Figure 11 shows the panels and frame of Figure 10 assembled;

Figure 12 is a view of one corner of a door having its top and side members mitered and welded together, and

Figure 13 is a section of the same on line 13—13 of Figure 12, before the ridge caused by welding has been removed.

In said drawings, Figure 1 shows a specific embodiment of my invention in which the door 1 has a continuous hollow peripheral portion 2 of sheet metal, with a cross-bar 3 flush at both sides of the door with the portion 2, and upper and lower panels 4, 5 which are thinner than the rest of the door as is common. The sheet metal forming the portion 2 of the door is, as shown in the cross-sectional view in Figure 2, bent up into suitable form with its edge portions 6, 7 brought flatwise together and preferably secured to each other, as by the spot welding shown, the outer margins 8, 9 of said edge portions being bent outwardly apart. For inserting a panel, as 4, the margins 8, 9 are bent further backward, as shown in Figure 3, and then the panel plates 10 and 11 are brought against the edges of said margins 8 and 9, said plates having at their edges flanges 12 and 13 which are bent inwardly substantially parallel to the flanges 8 and 9. Pressure is then applied to the panel plates 10 and 11 at the opposite outer sides thereof, as by means of dies (not shown), and said flanges 8, 9 and 12, 13 are by such pressure folded flat upon one another so as to form the lock joints shown in Figure 4. Said panel plates are thus secured in proper position and lock the outer peripheral portion 2 of the door so as to hold the same in shape and position.

If desired, any suitable lining or filling (not shown) may be inserted between the panel plates 10 and 11, for the purpose of deadening sound or the like, as is now commonly done in the construction of doors. Also the outer frame portion 2 of the door may be bent up into any suitable cross-section, particularly with respect to the molding parts 14 thereof, which may be of any desired configuration other than shown herein. It should also be observed that the spot welding of the parts 6, 7 of the frame of the door might be dispensed with if de-

sired, and the interlocking of the panel flanges with said frame flanges be depended upon for holding the parts in position.

Preferably the cross-bar 3 is inserted in the frame portion 2 of the door in a manner analogous to the insertion of the panels just described, and the preferred way of doing this is illustrated in Figures 5 and 6. The molding parts 14 of the inner sides of the upright side pieces of the door frame are cut away for a distance equal to the width of the cross-bar 3, such cutting being done on a bevel which will miter with a similar bevel on the molding parts of the cross-bar, so that such mitered edges can be soldered or otherwise secured together after the cross-bar is inserted. Only an inturned portion 15 is left where the molding parts are cut away, and over the edge of this projects a flange strip 16 which is bent to lie against the inside of said inturned portion 15, as at 17, and then against the inside of the side bar of the door as at 18, these flange strips being fastened as by spot welding to the side pieces of the door, as shown in Figure 5. Ears 19 extend inward from the flange strips 16 preferably in alinement with the inturned portions 15 and serve to position a spacing piece 20 which extends edgewise between the projecting portions 21, 21 of the flange strips 16 and is preferably spot welded thereto, as shown in Figure 5. The end of each of the opposite side walls 22, 22 of the cross-bar is provided with a flange 23 which interlocks with a flange 24 on the adjacent strip 16 in the same manner as the panel plates shown in Figures 3 and 4, and thus the entire cross-bar is secured firmly in place, the spacing piece 20 rigidly holding the opposite strips 16, 16 apart during the pressing operation, and the side walls 22 of the cross-bar forming continuations of the side walls of the door frame.

Another way of securing flanges on the side pieces of the door for attachment of the cross-bar is shown in Figures 7, 8 and 9 where a single transverse flange strip 25 is employed to lie against the inturned portions 15, 15 of the side piece of the door and provide projecting flange portions 26, 26. This flange strip has stamped out of itself, so as to leave openings 27, ears 28 having flattened end portions 29 to lie against the inside of the said side piece of the door and be fastened thereto, as by the spot welding shown in Figure 7. A spacing piece 30 is then inserted flatwise against the flange strip 25 and preferably spot welded at the ends to its flanges 26, 26, as shown in Figure 7, said flanges providing at their outer ends portions 31 to be interlocked with corresponding flange portions 32 on the opposite side walls 33, 33 of the cross-bar.

While I have shown up to this point interlocking flanges adapted to be pressed flatwise together, it will be understood that other forms can be employed which interlock by pressure so as to hold the panel plates in place, one such other form being shown in Figures 10 and 11. Here the meeting marginal portions 34, 34 of a side piece of a peripheral part of the door or of a cross-bar are shown curved oppositely apart and spot welded together at their tangential point of contact; then the panel plates 35, 35 have each a flange 36 which is slightly turned at its extremity 37 so that when pressure is applied to said opposite panel plates to force them into place the ends of said flanges 36 become curled inside of the heavier curled flanges 34, 34 and interlock therewith as shown at 38, 38 in Figure 11. In this illustration I have shown a sound-deadening filling 44 of any suitable kind between the panel plates 35, 35.

While the peripheral portions of a door having my improved panels can be secured together in any suitable way at the corners of the door, I prefer to have them mitered at said corners, and in Figures 12 and 13 of the drawings I have shown this accomplished by inserting along the mitered edges of adjacent portions 39, 39 of the door before they are joined, light channels 40, 40 with their flanges 41, 41 projecting outwardly so that the side walls 42, 42 of the portions 39, 39 of the door may be spot welded or otherwise secured thereto, as shown. Then by welding machines common and well-known in the art the mitered edges are brought together and welded as at 43, the exterior rib being afterwards removed to leave a smooth surface. The channels 40, 40 support said side walls 42, 42 in perfect alinement for the welding, and a very finished result is secured.

Various modifications of the details of my invention may be made by those skilled in the art, in using the same for manufacturing purposes, without departing from the spirit and scope of the invention, and I wish to be understood as not limiting myself except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. In structural hollow sheet metal construction, the combination of opposite side walls one having an inturned edge portion provided at spaced parts of its length with moldings, panels secured to the edges of said moldings, a flange strip secured to the inside of said side wall back of its inturned edge in the space between said moldings and having with respect to the side walls a transverse portion and a parallel portion with an outwardly bent marginal flange, a spacer secured to said flange strip in engagement with said transverse and parallel portions thereof and the opposite wall, and a

bar having a marginal flange forming a lock seam with said marginal flange of the flange strip.

2. In structural sheet metal construction, the combination with opposite side walls one having an inturned edge portion, of a flange strip secured to the inside of said side wall with inturned edge and having a portion transverse to said side wall and another portion parallel to said side wall and with an outwardly bent marginal flange, a spacer secured to said flange strip in engagement with said transverse and parallel portions thereof and the opposite wall, and a continuation side wall having a marginal flange forming a lock seam with said marginal flange of the flange strip.

3. In a hollow sheet metal door, the combination with a peripheral frame portion having at opposite points of the inner edges of its side parts inturned edge portions, a cross-bar extending between said opposite parts of said frame having said inturned edge portions and being substantially flush with the sides of the frame, flange strips each secured to the inside of one of the opposite side walls of the door frame and having a transverse portion parallel to the inturned edge thereof and another portion parallel to a side wall of the cross-bar and underlying the same, said cross-bar side wall and underlying portion of the strip having interlocking flanges, and a spacer secured to opposite flange strips in engagement with the said transverse and parallel portions thereof.

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