

May 13, 1952

L. V. ROBINSON

2,596,792

METAL DOOR

Filed June 21, 1946

2 SHEETS—SHEET 1

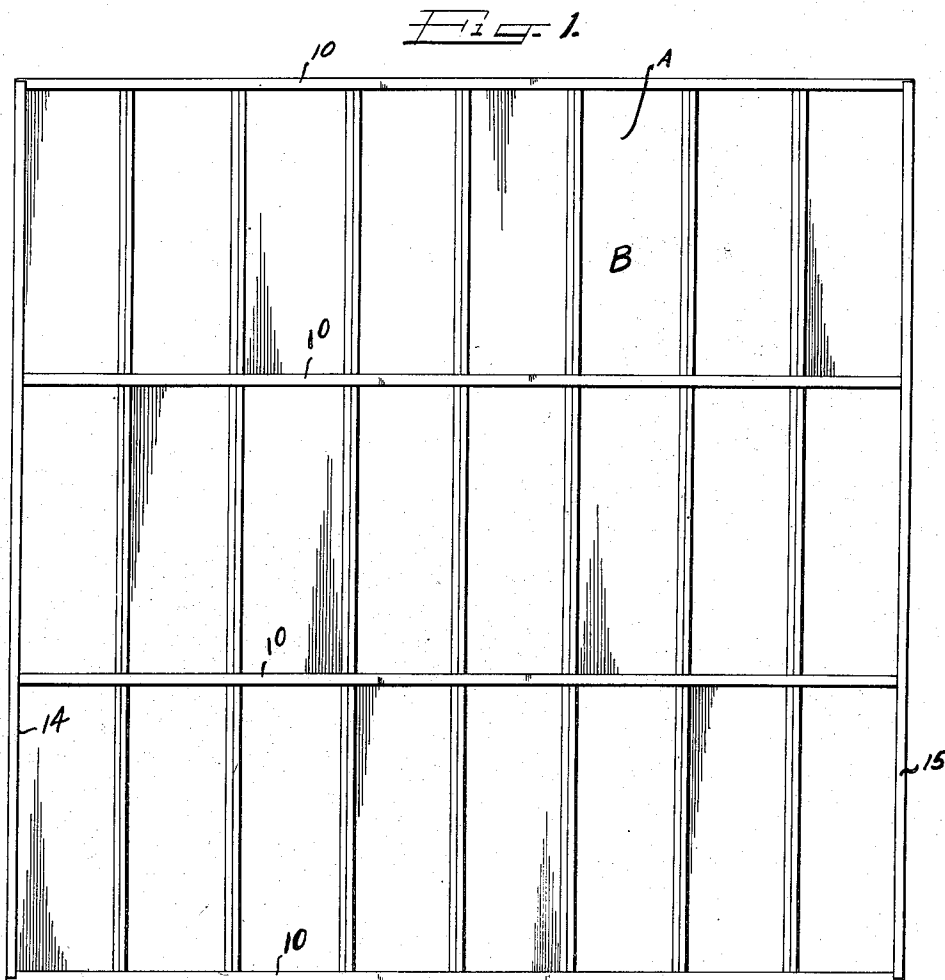


Fig. 2.

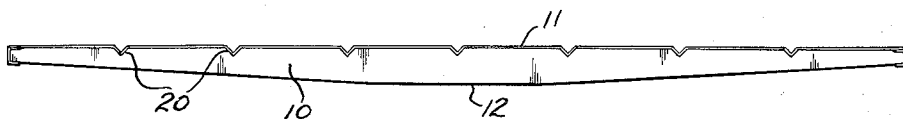


Fig. 9.

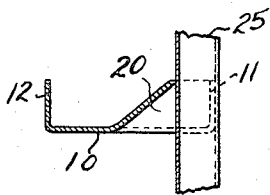
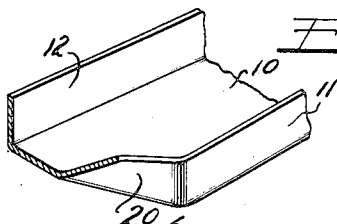


Fig. 8.



INVENTOR
LOWELL V. ROBINSON

BY *The Firm of Charles H. Hill & Sons*

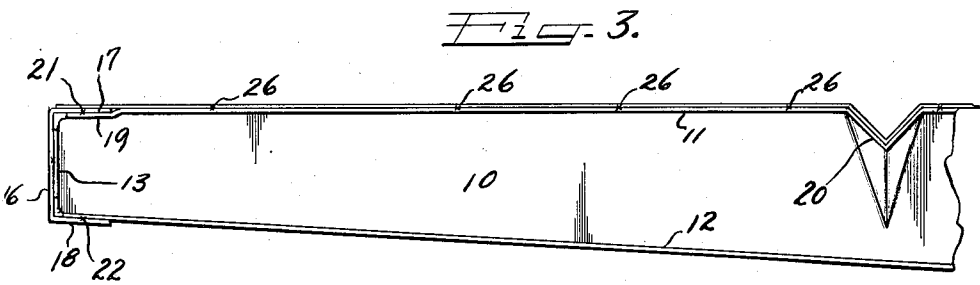
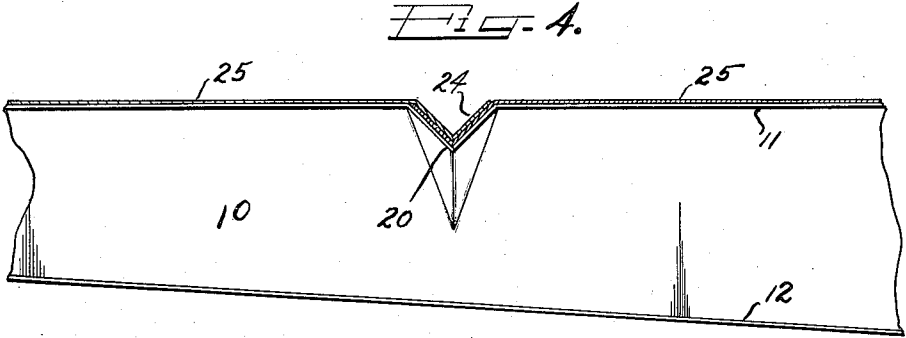
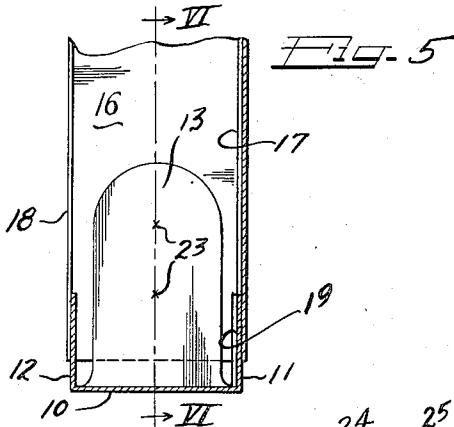
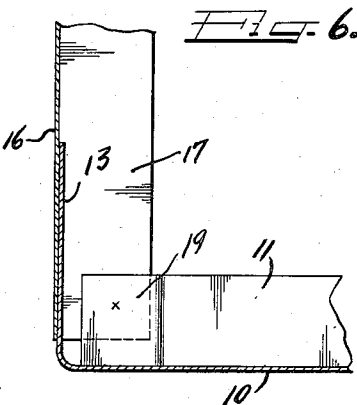
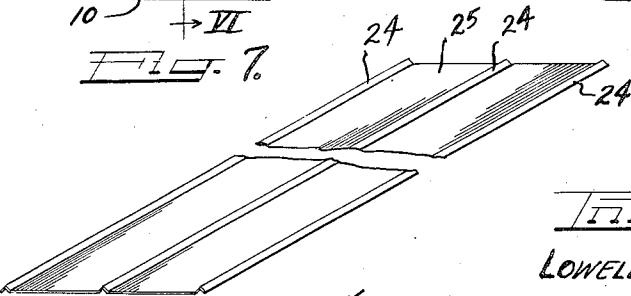
May 13, 1952

L. V. ROBINSON
METAL DOOR

2,596,792

Filed June 21, 1946

2 SHEETS—SHEET 2



Inventor

LOWELL V. ROBINSON

The Firm of Charles M. Hill

UNITED STATES PATENT OFFICE

2,596,792

METAL DOOR

Lowell V. Robinson, Detroit, Mich., assignor to
Crawford Door Company, Detroit, Mich., a cor-
poration of Michigan

Application June 21, 1946, Serial No. 678,268

1 Claim. (Cl. 189—46)

1

The present invention relates generally to a metal door, and more particularly to a rigid and strong one-piece metal door of light weight.

According to this invention, the door comprises a facing of corrugated or indented sheet material, such as steel, aluminum, magnesium, or the like, reinforced by a frame which is welded to the facing in such manner that the need for diagonal struts or braces is eliminated.

An object of the present invention is to provide a sheet metal door construction including a facing and a frame having inter-engaging means for preventing sag.

Another object of the invention is to provide a sheet metal door construction including a facing and a frame having inter-engaging means for preventing sag, and with the frame and facing spot-welded together to prevent displacement of such means.

A further object of the present invention is to provide a sheet metal door construction including a facing and a frame having tongue and groove interlocks.

The invention has for an additional object the provision of a frame for a metal door comprising a plurality of parallel trusses secured together by members engaging their ends.

An additional object of the present invention is to provide a door frame truss of channel cross section having one flange straight and the other curved or bellied.

A still further object of the present invention is to provide a metal door construction including a facing and a frame secured together in interlocked and welded relation to rigidify the door against sag when hung.

The above, other and further objects of the present invention will be apparent from the following description and accompanying drawings.

An embodiment of the present invention is illustrated in the accompanying drawings, and the views thereof are as follows:

Figure 1 is an elevational view of the interior or rear side of a complete door;

Figure 2 is an end view of the door;

Figure 3 is a fragmental enlarged end view showing a manner of welding;

Figure 4 is a fragmental enlarged vertical section through a joint between two lapping facing sheets and showing a portion of a truss in elevation;

Figure 5 is a fragmental sectional view at a corner of the frame showing the relationship of an end truss and a side member and the pre-

2

ferred manner of welding the truss web to the side member web;

Figure 6 is a sectional view taken in the plane of line VI—VI of Figure 5;

Figure 7 is an isometric view of one facing sheet, showing marginal tongues and a middle tongue;

Figure 8 is a vertical sectional view through an isometric drawing of a truss showing how a portion of a flange and web of the truss is deformed to provide a groove for receiving a tongue of a facing sheet; and

Figure 9 is a vertical sectional view through a groove of a truss and showing in section a tongue of a facing sheet resting in the truss groove.

As shown on the drawings:

Figure 1 shows the inside or interior elevation of a door A of the present invention.

The door comprises a facing on its exterior side or surface, and a frame.

The frame as illustrated includes four trusses 10 which are channel-shaped in cross section as may be observed in Figures 5 and 8. A truss includes a straight flange 11 and a curved flange 12, the latter being bellied, as may be observed in Figure 2. Projecting from each end of a truss 10 are extensions 13, one of which is shown in Figures 5 and 6.

Side frame members 14 and 15 are provided, and these also are of channel cross section with the flanges parallel. The webs of the members 14 and 15 are designated as 16, the top flange as 17, and the bottom flange as 18. The extremities of the flanges 11 of the trusses 10 are depressed at 19 a distance substantially equal to the thickness of the top flanges 17 of the side members 14 and 15 so that, when the side members are assembled on the trusses, the outer surface of the side member flange 17 will be flush with the outer surface of the flange 11 of a truss. The lower flanges 18 of the side members are bent slightly out of parallelism, endwise, with respect to the upper flanges 17 to conform to the belly of the lower flanges 12 of the trusses.

The trusses 10 have formed in the upper flanges 11, and in the web adjacent such flanges, a plurality of V-shaped grooves 20. Figure 2 shows seven of such grooves.

Figures 8 and 9 show the preferred manner of forming the grooves 20 on the channel trusses. A V-shaped tool is applied against the corner between the upper flange 11 and web of a truss and acting in a diagonal direction, and under pressure, depresses the material of the flange 11 and web to the shapes shown in section in Fig-

ures 8 and 9, and in end view, Figures 2, 3, and 4. It should be understood that the grooves 20 in the trusses may be formed in any other suitable and convenient manner.

In assembling the frame, one truss 10 is disposed to form one of the ends of the door with its web outermost, to thereby provide a smooth end for the door. A side member is then engaged with one end of the truss with its flanges 17 and 18 against the flanges 11 and 12 respectively of that end of the truss and with the extension 13 at that end of the truss bent and lying against the web of the end member. The flanges 17 and 18 are welded to the flanges 11 and 12 of the truss at the points 21 and 22 as shown in Figure 3. The extension 13 is welded to the web of the end member at points 23. The other side member is welded to the other end of the truss in a similar manner. The intermediate trusses are applied to the side members and thereunto welded as described. The truss at the other end of the door frame is arranged with its web outermost and its flanges extending toward the flanges of the other end truss to thereby provide a smooth exterior for the end truss at this end of the frame, which truss is welded to the side members in a manner described with reference to the first truss.

It will thus be observed that the door frame is formed of channel members welded together in a strong and rigid manner.

The facing is designated generally at B. The facing might be co-extensive with the outline of the frame but, for convenience in manufacture and assembly, it is preferred to make the facing in the form of a series of strips 25, one of which is illustrated in Figure 7. The strip illustrated in Figure 7 is formed with three V-shaped parallel tongues 24, with two of the tongues along the side margins of the strip and the third tongue along its middle. The cross-sectional shape of the tongues 24 is such as to readily fit into the V-grooves 20 in the trusses.

For the facing strips along the marginal portions of the frame one of the side grooves would be omitted, so that such strips would have a middle V-shaped groove and a V-shaped groove along its other margin. Such strips would then be applied with its non-grooved margin overlying the flange 17 of the side member and its tongues 24 engaging in two of the grooves 20 in the trusses. The strip so disposed is welded to the several trusses at the points indicated by 26 in Figure 3 and welded to the flanges 17 of the side member at a convenient place.

After a marginal strip has been thus applied along one of the side margins of the door frame, a second strip is thereto applied with one of its grooves 24 fitted into the groove formed by the marginal groove of the strip so that the tongues of the strip 25 would enter the second, third and fourth grooves 20 of the truss, as illustrated in Figure 2, it being understood that one of the marginal tongues of such strip fits into the groove formed by the marginal groove of the first applied strip which is, of course, applied in upside down position from that viewed in Figure 7. Another strip 25 with three tongues in it is then applied and welded to the trusses. Along the other marginal portion of the frame a marginal strip is applied in a manner described with reference to the first marginal strip, whereupon the facing is completed with all of the facing strips welded to all of the trusses and to the side members 14 and 15, and with certain tongues 24 of

certain strips interlocked with certain grooves of other strips.

The use of channels for constructing the frame prevents warp of the door. Welding the trusses to the side members provides sidewise rigidity, and welding the facing to the trusses of the frame provides endwise rigidity and prevents torsion strains, the door thus being rigidified endwise and sidewise, cannot sag or twist to cause relative endwise movement of the side members, thereby eliminating need for diagonal bracing.

Because of the frame construction described, it is possible to use 16-gauge metal for the trusses and side members, and 24-gauge metal for the facing.

It will be understood that the door of the present invention is strong and rigid, and at the same time is light enough to be readily moved in service.

A door constructed in accordance with the present invention may be mounted on hinges to swing, or might be mounted as an overhead door in a garage or warehouse to move from a vertical closed position to an open overhead horizontal position, or might be mounted on rollers for sliding movement with respect to a doorway.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention, and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claim.

I claim as my invention:

A metal door comprising a frame and a sheet metal facing on said frame, said frame including a pair of side members and a plurality of truss channels secured in spaced parallel relation between said side members, each of said truss channels having a solid web and an integral flange at either side of said web, said web and one of said flanges being inwardly deformed at longitudinally spaced points to provide at each point a pair of trapezoidal portions integrally joined at an apex line extending from an intermediate point on said web and inclined toward said one of said flanges, said portions having terminal edges in the plane of the terminal edges of said flanges and defining a V-shaped notch, and said facing being deformed to provide integral elongated V-shaped projections complementary to and disposed in said V-shaped notches.

LOWELL V. ROBINSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
781,068	Hewitt	Jan. 31, 1905
973,751	Budd	Oct. 25, 1910
1,168,539	Murphy	Jan. 18, 1916
1,240,634	Williams	Sept. 18, 1917
1,354,929	Williams	Oct. 25, 1920
1,365,059	Piccirilli	Jan. 11, 1921
2,075,558	Tobin	Mar. 30, 1937

FOREIGN PATENTS

Number	Country	Date
501,158	Great Britain	1939
549,474	Germany	Apr. 28, 1932
652,633	Germany	1937