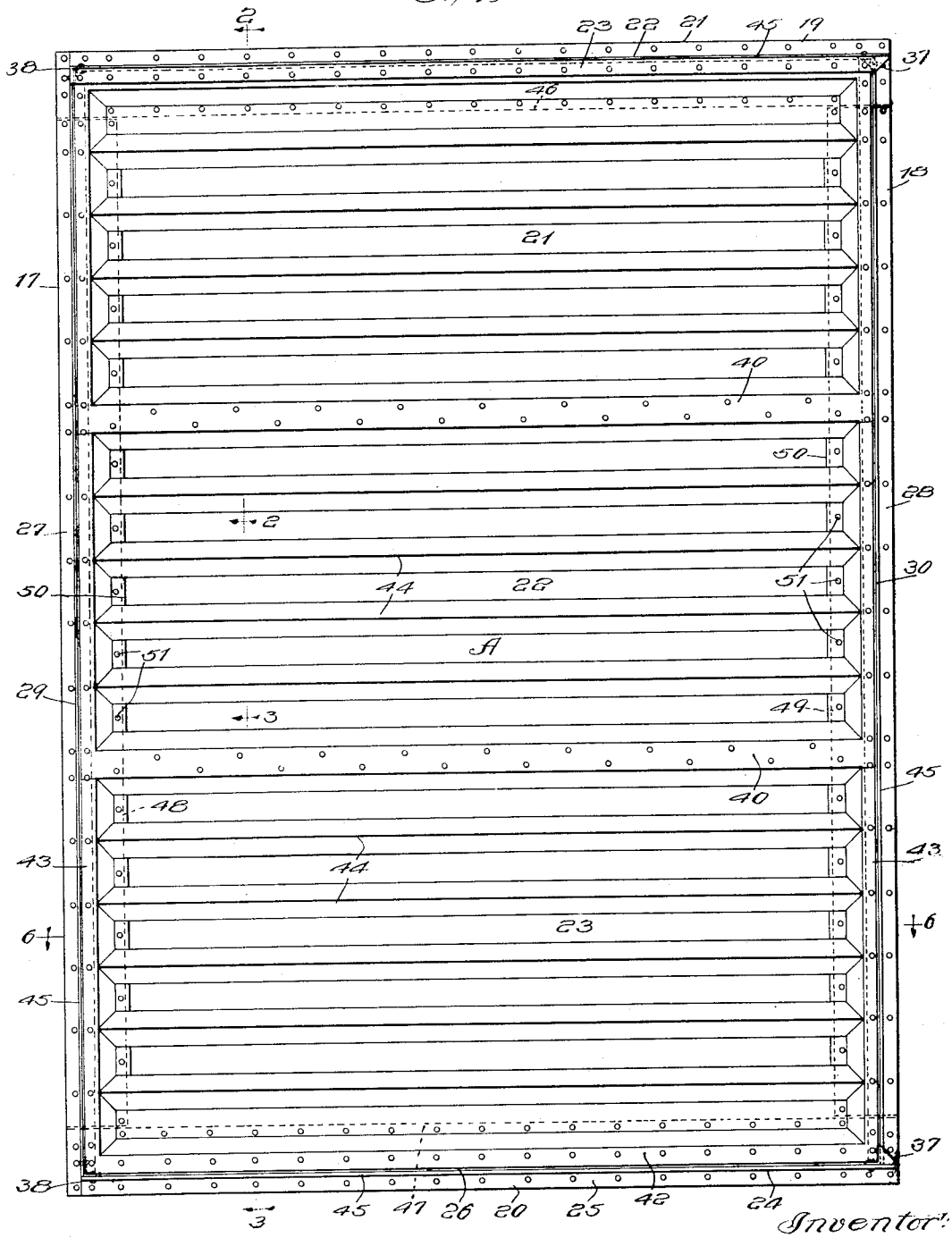
Dec. 12, 1933. J. P. McWILLIAMS 1,938,634

DOOR

Filed March 28, 1931 3 Sheets-Sheet 1

Fig. 1.



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DOOR

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Fig. 2

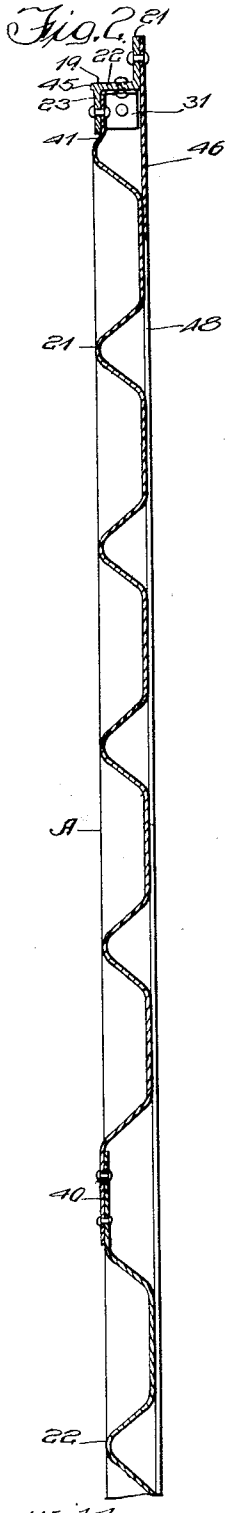


Fig. 3

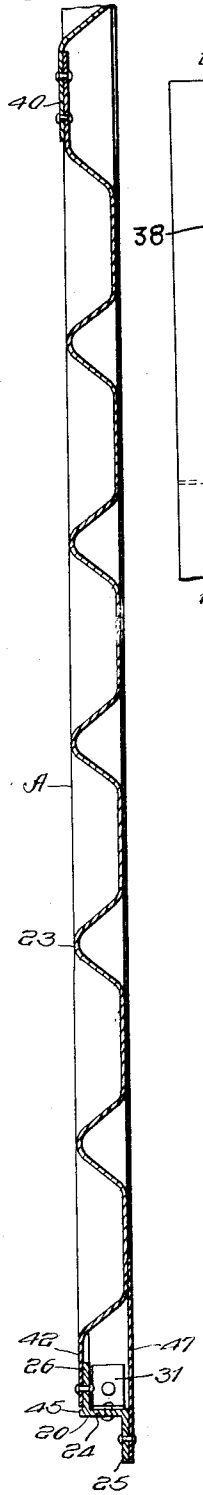


Fig. 4

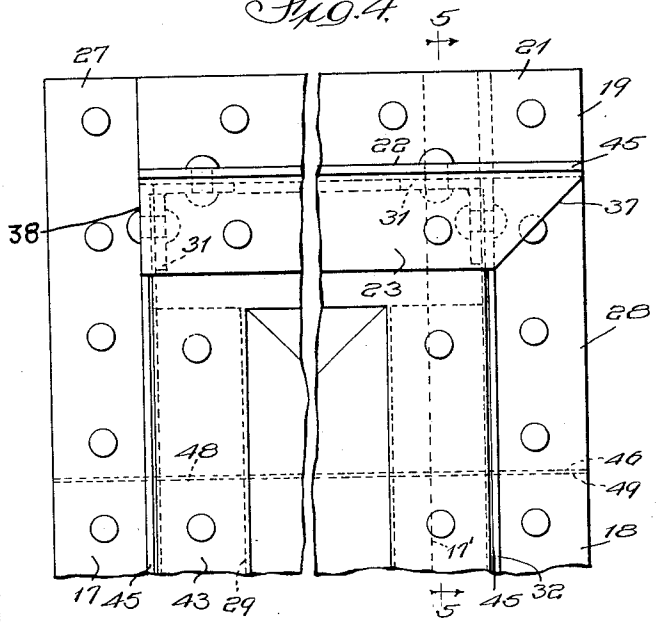
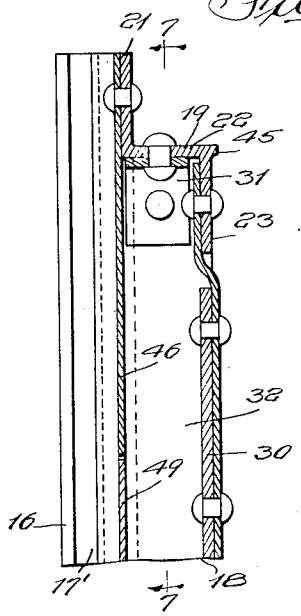


Fig. 5.



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DOOR

Filed March 28, 1931 3 Sheets-Sheet 3

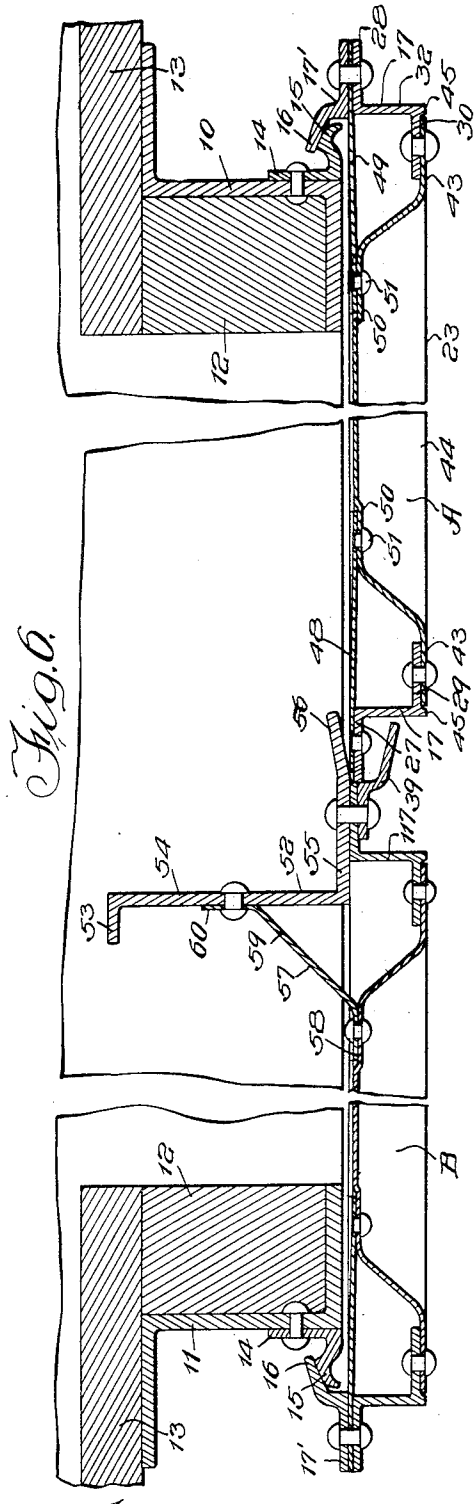


Fig. 6.

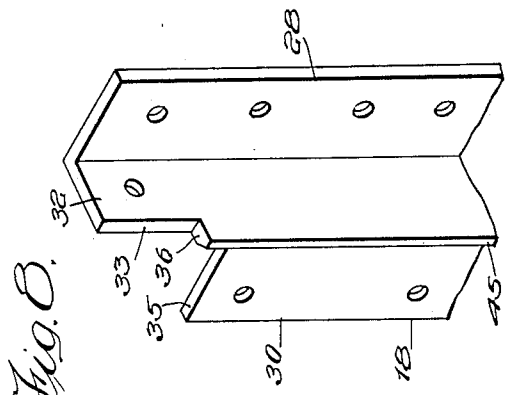


Fig. 8.

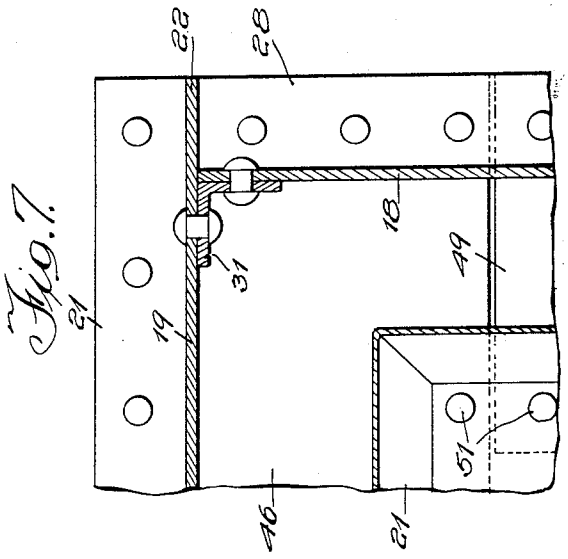


Fig. 7.

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1,938,634

UNITED STATES PATENT OFFICE

1,938,634

DOOR

John P. McWilliams, Cleveland, Ohio, assignor to The Youngstown Steel Door Company, Cleveland, Ohio, a corporation of Ohio

Application March 28, 1931. Serial No. 525,899

10 Claims. (Cl. 189—46)

This invention relates to improvements in doors and more particularly metal side doors for railway cars of the house type.

In the art of metal side doors for railway cars, it is common to employ a rectangular frame composed of rolled commercial shapes, to the flanges of which are riveted the edges or margins of the sheet metal panels. Actual experience has shown that it is practically impossible to obtain complete true full surface contact between the overlapped riveted marginal portions of the sheets and the flanges of the frame members, due to the fact that the marginal portions of the sheet will buckle or warp more or less between rivets. This results in gaps at the margins of the sheets so that rain and other foreign matter may frequently be driven into and through the gaps when the car is in motion, particularly if such gaps are along the vertical edges of the doors, thus allowing rain or other foreign matter to enter the car through the door proper, notwithstanding that all the edges of the door may be properly weather-sealed with respect to the car body.

One object of my invention is to provide a door of that type comprised of frame elements and sheet metal panels riveted thereto so constructed that the edges of the sheet metal panels will be weather protected throughout, so as to thereby eliminate danger of rain or other foreign matter entering through any portion of the door proper.

In car doors of the class hereinbefore referred to, it is well known that the same are subject to very rough handling at times with danger of the doors becoming skewed or distorted, particularly from slamming of the doors against the usual door stops, with the result that it thereafter becomes difficult to slide the doors open and shut as well as ultimately requiring replacement of or major repairs to the doors.

Another object of my invention therefore is to provide a door of that type comprised of frame elements and sheet metal panels secured thereto, so constructed that blows transmitted to the door when brought against the door stops, will be delivered directly to the ends of and lengthwise of certain of the frame elements in line with the stops so that the strains will be most effectively distributed over the entire door with minimization of danger of distorting or skewing the door and without danger of localized indenting of the door edge portions.

Other objects of the invention are: to provide a door frame structure of exceptional strength and rigidity; to provide a door which, per se, is weather-proof throughout; and to provide a door having all of the advantages hereinbefore mentioned that will be economical to fabricate and of minimum weight consistent with the desired strength.

In the drawings, forming a part of this specification, Figure 1 is a front, elevational view of a door having my improvements incorporated therein. In this figure is illustrated the main door only of a two door arrangement such as employed on automobile cars. Figures 2 and 3 are enlarged, vertical, sectional views corresponding to the section lines 2—2 and 3—3 respectively of Figure 1. Figure 4 is an elevational view, parts being broken away, illustrating more particularly the details of construction at the top corners of the door, shown in Figure 1. Figure 5 is a vertical, sectional view corresponding to the line 5—5 of Figure 4. Figure 6 is an enlarged, horizontal, sectional view corresponding to the section line 6—6 of Figure 1, illustrating the main door of Figure 1 in association with an auxiliary door as applied to an automobile car. Figure 7 is a vertical, sectional view corresponding to the section line 7—7 of Figure 5. And Figure 8 is a detailed, perspective view of the upper end of the rear vertical frame element of the door, shown in Figure 1.

In said drawings, and referring first to Figure 6, sufficient portions of the car body are there illustrated to show the manner of application of my improved doors to a car of the automobile or furniture type. As there shown, the car is provided with a door opening, which is defined in part by vertically extending Z-bar posts 10 and 11, having suitable wood fillers 12—12 applied thereto, the side wall sheathing of the car being indicated at 13. In the double door type of car, each of the posts will be provided with a weather sealing strip 14, each having a suitable specially former flange 15—15 adapted to provide a weather tight joint or seal with a corresponding cooperating flange 16 of a weather or sealing strip 17' secured to the respective rear edges of the main door A and auxiliary door B. In the following description, the main door A will be described in detail with particular reference to my improvements, it being understood that the auxiliary door B is similarly constructed except as to certain features at the forward edge of the door B, hereinafter pointed out.

In carrying out my invention, which may be incorporated either in single type of side doors

or in double type of side doors for railway cars, the door is preferably comprised of a rectangular frame consisting of a front edge Z-bar 17, a rear edge vertically extending Z-bar 18; a top horizontally extending Z-bar 19', a lower, horizontally extending Z-bar 20; and three sheet metal panels 21, 22 and 23, together with certain other reinforcing plates and angle clips hereinafter referred to.

In constructing the rectangular frame, the top and bottom Z-bars 19 and 20 extend the full width of the door, as best shown in Figures 1 and 4. The top Z-bar 19 is arranged with its innermost flange 21 extending vertically upward, that is away from the central area of the door. The web is extended horizontally, as indicated at 22, and the outer flange 23 extends downwardly, as best shown in Figures 2 and 5. The bottom Z-bar 20 has its web 24 extended horizontally, the inner flange 25 extending downwardly in the inner plane of the door and its outer flange 26 extended vertically toward the central area of the door.

Each of the vertically extending front and rear Z-bar frame elements 17 and 18 extend from the web of the bottom Z-bar 20 to the web of the upper Z-bar 22, and are so disposed, as best shown in Figure 6, that the inner flanges 27 and 28 in the inner plane of the door extend outwardly or away from the central area of the door, whereas the outer flanges 29 and 30 respectively extend inwardly toward the central area of the door. In this connection, it will be understood that all of the inner flanges 21, 25, 27 and 28 of the four frame elements are in the same plane and that all of the outer flanges 23, 26, 29 and 30 are in a common plane. Where the ends of the vertical Z-bars 17 and 18 meet the upper and lower Z-bars 19 and 20, angle clips 31—31 are riveted in the corners to secure the same together as illustrated in Figures 2, 4 and 7, thus providing extremely rigid joints at the corners of the frame.

In order to permit of all the frame elements lying in the same plane as hereinbefore described, the vertically extending Z-bars are coped to clear the flanges of the top and bottom Z-bars. Referring first to the rear Z-bar 18, and particularly Figures 4, 5 and 8, the web 32 thereof is coped or notched, as indicated at 33, for a depth corresponding to the width of the top Z-bar flange 23. In addition, the outer flange 30 of said rear edge Z-bar 18 is cut off, as indicated at 35, to a point somewhat below the shoulder 36 for the purpose hereinafter described. With this construction of the rear edge Z-bar 18, the flange 23 of the top Z-bar may be allowed to extend the full length of said top Z-bar 19, although said flange will preferably be beveled off, as indicated at 37 in Figure 4, at the rear edge of the door. The front edge Z-bar 17 will be similarly coped or cut away as the rear Z-bar 18, but in the case of the top Z-bar 19, both the web 22 and the depending flange 23 thereof will be cut off or coped, as indicated at 38, in line with the web of the front edge Z-bar 17. This is done in order to provide clearance for the combined sealing and guiding strip 39 secured to the forward edge of the auxiliary door B, which strip or element 39 is extended the full vertical height of the auxiliary door. The same construction of front edge of the maindoor A would be used when the door A is employed as a single door, it being understood that an equivalent weather-sealing and door stop element corresponding to the element 39 would be mounted on the front door post of the car.

At its bottom, the rear edge Z-bar or frame element 18 is coped the same as at the top except that it is unnecessary to cut back the flange 30 to the extent shown at 35 in Figure 8. Likewise, the lower end of the front Z-bar or frame element 17 is made the same as at the top thereof, except that the flange is not cut as far back as at the top and also the lower horizontal frame element or Z-bar 20, at its front end, will have its web and upstanding flange cut back flush with the web of the Z-bar 17 in order to provide the necessary clearance for the combined guiding and weather sealing strip 39 of the auxiliary door. With the arrangement described, it is evident that blows transmitted to the door from the usual door stops in line with the top and bottom frame elements are delivered directly to the ends of said top and bottom frame elements, the blows thus being distributed lengthwise of the top and bottom elements and hence most effectively to the entire door with minimization of distortion or skewing of the framework. Should there be any other stops or shoulders intermediate the top and bottom lines of the door encountered when the door is forced open, the blows therefrom will be received by the out turned flange of the rear edge Z-bar or frame element 18, thus minimizing any tendency to distort or buckle the sheet metal panels, as will be apparent.

As hereinbefore described, preferably three sheet metal panels 21, 22 and 23 are employed to form the closure for the framework of the door. These panels are arranged one above the other and are overlapped horizontally, the lower flange of the upper panel 21 being disposed on the outer side of the upper flange of the middle panel 22, as indicated at 40 in Figure 2, and a similar construction 40 is employed where the middle panel 22 overlaps and is riveted to the lower panel 23. The upper edge of the upper panel 21 is offset inwardly, as indicated at 41 in Figure 2 and lies against the inner face of the depending flange 23 of the upper Z-bar 19 and is riveted thereto, as shown, so as to provide a weather sealed joint. The lowermost panel 23 has its lower flange 42 riveted to the outer face of the upstanding flange 23 of the lower Z-bar 20, as shown in Figure 3. Along each vertical edge, the panel sheets have flat marginal portions 43—43, which overlap the outer faces of the flanges 29 and 30 of the front and rear edge Z-bars 17 and 18, respectively, as best shown in Figure 6. By cutting back the inwardly extended flanges of the front and rear bars 17 and 18, as shown best at 35 in Figure 8, it is evident that the upper marginal portion of the panel 21 may be bent under the depending flange 23 of the top Z-bar 19 without leaving gaps or openings that might otherwise permit entry of rain or other foreign matter. All of the panel sheets are preferably provided with a plurality of horizontally extending corrugations 44—44, the crests of which lie flush with the marginal portions 43, the original planes of the panel sheets or uncorrugated portions lying in the inner plane of the door coinciding with the plane defined by the out turned flanges of the frame elements 17, 18, 19 and 20.

As hereinbefore indicated, it is practically impossible to rivet a panel sheet to a flange of the frame element without more or less gaps resulting between the spaced rivets and in order

to overcome this practical difficulty and prevent admission of rain or other foreign matter through the sheet metal and frame element joints, the frame elements or Z-bars will be specially rolled to provide longitudinally extending shoulders or ribs 45—45 in line with the webs of the Z-bars and projecting outwardly beyond the surface of the inwardly extended flanges a distance corresponding to the thickness or gage of the sheet metal panels, as clearly shown in Figure 6. The extreme edges of the sheet metal panels will be brought as close as possible to said longitudinally extending shoulders 45 so that said shoulders 45 act as guards or weather-protecting flanges for the joints to prevent admission of rain or other foreign matter through any gaps that may be unavoidable in the riveting of the sheets to the frame elements. Such weather-protecting construction is particularly advantageous on the front and rear edges of the door and to some extent along the bottom edge and, for economy of manufacture, the top Z-bar 19 will also preferably be similarly rolled even though this sealing arrangement is not there necessary because of the underlapping of the sheet metal, as shown and described. With this construction, an effective joint seal is formed without any increased expense in manufacture of the several parts or assembling.

In order to strengthen or brace the frame elements and the sheet metal panels along the several edges where a groove-like or tubular formation results from the manner of attaching the sheets and frame elements, reinforcing or bridging strips are preferably employed on the inner side of the door, as indicated at 46, 47, 48 and 49 for the top, bottom, front and rear edges, respectively. In the case of the top and bottom plates 46, the same are extended the full width of the door, as shown, whereas the vertical plates or strips 48—49 extend between the top and bottom plates 46—47. Each of said plates is riveted to the flange of the corresponding frame element along its outer marginal portion, the top and bottom plates 46 having their opposite edges riveted to the sheet metal panels in the original plane of said sheets at the opposite sides of the corresponding grooves or tube-like formations of the door structure. In the case of the vertical bridging plates 48—49, the panel sheets will preferably be laterally outwardly offset, as indicated at 50—50, an amount corresponding to the thickness or gage of the plates 48—49 and the latter riveted to said offset portions, as indicated at 51—51 in Figure 6. With this arrangement, as will be evident, the outermost marginal portions of all of the plates 46, 47, 48 and 49 lie in a common plane and the inner vertical edge portions of the vertical plates 48—49 are laterally outwardly offset from said plane so as to eliminate any shoulders or projections in the central areas of the sheet metal panels, which might foul the door posts or other fixed parts of the car in moving the door to open and closed position. As will be obvious, all of the bridging plates effectively serve to prevent twisting of the respective frame elements about the longitudinal axes thereof.

Referring to the auxiliary door B, the same has incorporated therein all of the structural features of the main door A, except as necessarily modified at the front edge where an auxiliary door post 52 is attached to the front Z-bar frame element 117. Said auxiliary post 52 is preferably in the form of a modified L or Z section having a relatively narrow inner flange 53, main web 54 extending at right angles to the plane of the door, and an outer, heavy flange 55 extending generally parallel to the plane of the door and having its forward portion 56 bent inwardly so as to provide a guiding surface for the front edge of the main door A. Said post 52 and element 39 are riveted to and on opposite sides of the outwardly extending flange of the Z-bar 117, as clearly shown in Figure 6. To brace the auxiliary post 52, a vertically extending plate 57 is employed, the latter having a flat edge 58 riveted to the sheet metal panels, an inwardly inclined section 59 and a flat portion 60 riveted to the web 54, as shown.

I have herein shown and described what I now consider the preferred manner of carrying out my invention, but the same is merely illustrative and I contemplate all changes and modifications that come within the scope of the claims appended hereto.

I claim:

1. In a door, the combination with a main door portion comprised of sheet metal; of a frame including a flanged bar along one edge of the door, the corresponding adjacent margin of the sheet metal being lapped over the outer face of the flange and secured thereto; and a shoulder extending lengthwise of the bar opposite and immediately adjacent the free edge of the sheet margin to weather protect the lapped joint of the flange and sheet.

2. In a door, the combination with a main door portion comprised of sheet metal; of a frame including flanged bars extending along the front and rear vertical edges of the door, the corresponding adjacent margins of the sheet metal being lapped over the outer faces of the bar flanges and secured thereto; and a shoulder extending lengthwise each bar opposite and closely adjacent the corresponding free edge of the sheet to thereby weather protect the lapped joints of the flanges and sheet.

3. In a door, the combination with a main door portion comprised of sheet metal; of a frame including a Z-bar along one edge of the door and to the outer face of one flange of which the marginal portion of the sheet is secured, said Z-bar having a shoulder extending lengthwise thereof adjacent to and directly opposite the secured edge of the sheet to thereby provide a weather seal for the joint.

4. In a door, the combination with a main door portion comprised of sheet metal; of a frame including Z-bars along the front and rear vertical edge of the door, the marginal portions of the sheet being secured to the outer faces of flanges of the Z-bars, each Z-bar having an integral longitudinally extending shoulder adjacent to and directly opposite the corresponding free edge of the sheet to thereby provide a weather seal for the joints.

5. In a door, the combination with a rectangular frame comprised of four Z-bars having their inner flanges extending away from the door center and their outer flanges extending toward the door center; of sheet metal secured along the bottom and vertical sides to the outer faces of the correspondingly inturned Z-bar flanges, the top portion of the sheet metal being bent under and secured to the under side of the inwardly extended flange of the top Z-bar.

6. In a door, the combination with a rectangular frame comprised of four Z-bars having their inner flanges extending away from the door

center and their outer flanges extending toward the door center; of sheet metal secured along the bottom and vertical sides to the outer faces of the correspondingly inturned Z-bar flanges, the top portion of the sheet metal being bent under and secured to the under side of the flange of the top Z-bar which is extended toward the door center; and shoulders on the vertically extending Z-bars extending lengthwise thereof adjacent and opposite to the corresponding sheet metal edges to provide weather protected joints therefor.

7. In a horizontally slidable door adapted to abut door stops, the combination with top and bottom Z-bars extending the full width of the door; of front and rear vertically extending Z-bars secured at their upper and lower ends to said top and bottom Z-bars, the outer flanges of all the Z-bars being extended toward the central area of the door, the outer flanges and webs of the vertically extending Z-bars at the top and bottom being coped to accommodate the adjacent flanges of the top and bottom Z-bars; and sheet metal panels directly secured along their edges to said Z-bars.

8. In a door of the character described, the combination with a top Z-bar; of front and rear vertical edge Z-bars, all of said Z-bars having their outer flanges extended inwardly toward the central area of the door and the top Z-bar extending laterally beyond the vertical Z-bars at each end thereof; and a main sheet metal portion secured along its vertical edges to the outer surfaces of said flanges of the vertical Z-bars, the upper margin of said sheet metal portion being bent under and secured to the inner side of the depending flange of the top Z-bar, the upper ends of said vertical Z-bars being coped to accommodate the bending of the panel sheets.

9. In a horizontally slidable door, the combination with a top, horizontally extending Z-bar having its web disposed horizontally and the inner and outer flanges extended upwardly and downwardly respectively; of front and rear vertically extending Z-bars disposed in the same plane as said top Z-bar, the web and one of the flanges of each of the vertically disposed Z-bars at their upper ends being coped to accommodate the depending flange of the top Z-bar; means rigidly connecting the vertical Z-bars and the top Z-bar; and sheet metal panels having their vertical edge portions directly secured to the outer faces of said outer flanges of said vertical bars and its upper edge portion secured to the inner side of the depending flange of the top Z-bar; and bridging strips on the inner side of the door each secured along its outer edge portion to the inner flange of a Z-bar and along its inner edge portion to the panel sheets.

10. In a door of the character described, the combination with a rectangular frame comprised of four Z-bars, each having its outer flange extended toward the central area of the frame and disposed in the same plane, the webs and outer flanges, at the opposite ends of two of the Z-bars on opposite sides of the frame being coped to accommodate the inwardly extended flanges of the corresponding remaining Z-bars; means rigidly uniting the Z-bars at the several corners of the frame; and a closure for the frame comprised of a plurality of sheet metal panels having the marginal portions thereof laterally outwardly offset from the original plane of the sheets, said marginal portions on the vertical sides and bottom being lapped over and directly secured to the outer faces of the inwardly extended flanges of the corresponding Z-bars, said panels being provided also with horizontally disposed corrugations pressed outwardly from the original plane of the sheets; top and bottom horizontally extending bridging plates secured to the respective top and bottom Z-bars and the panel sheets on the inner side of the door; vertically extending bridging plates on the inner side of the door, each secured to a Z-bar along one edge and to the panel sheets along its other edge; and means on each of the vertically extending Z-bars projecting over, closely adjacent to, the corresponding vertical edges of the panel sheets to thereby weather protect the vertical lapped joints between the panel sheets and vertical Z-bars.

JOHN P. McWILLIAMS.