May 19, 1931. J. P. McWILLIAMS ET AL 1,806,173

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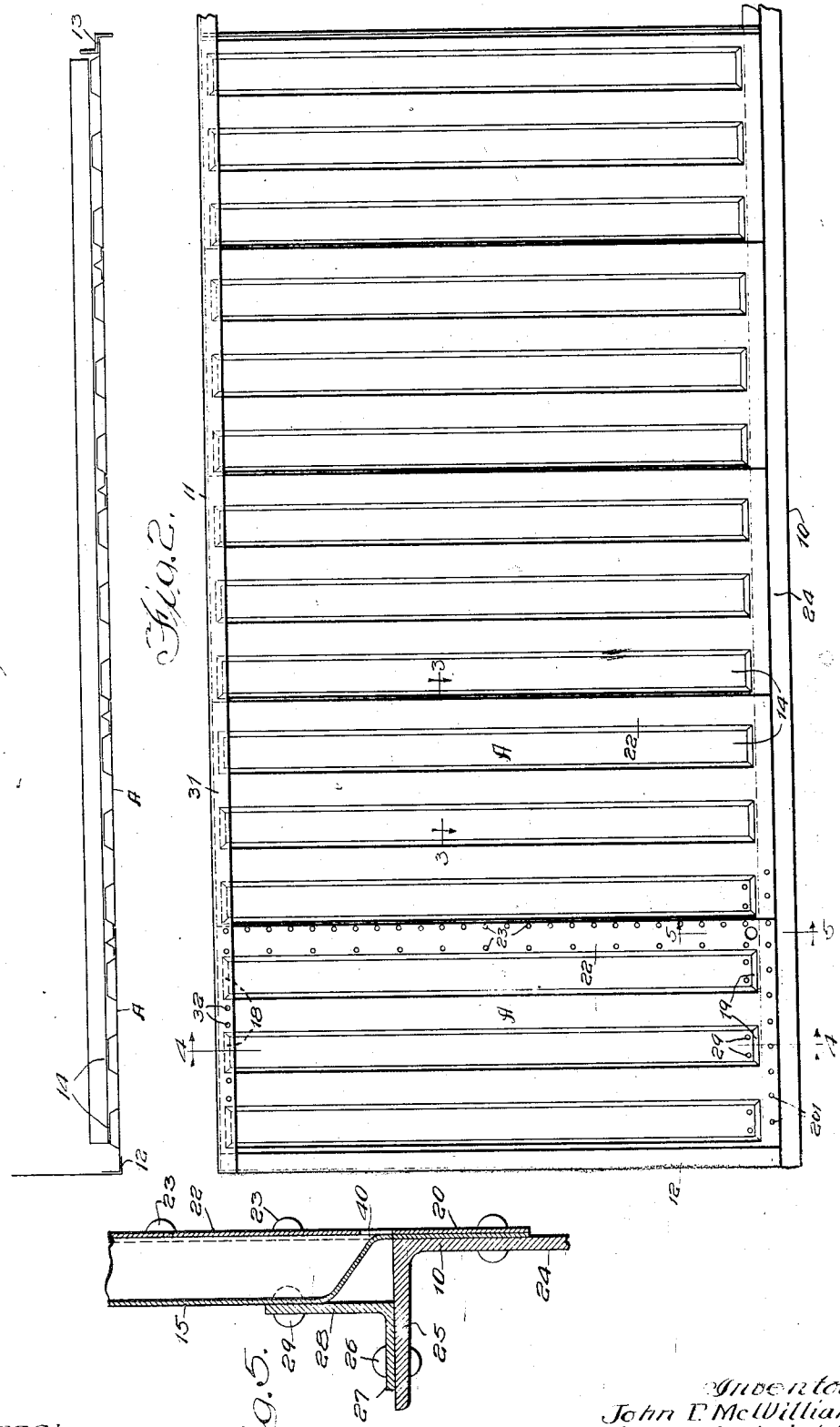


Fig. 1.

Fig. 2.

Fig. 5.

Witness:
William R. Kilroy

Inventors
John P. McWilliams
Frank Hitchfield
Joseph Harris
By Their Attys

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Fig. 3.

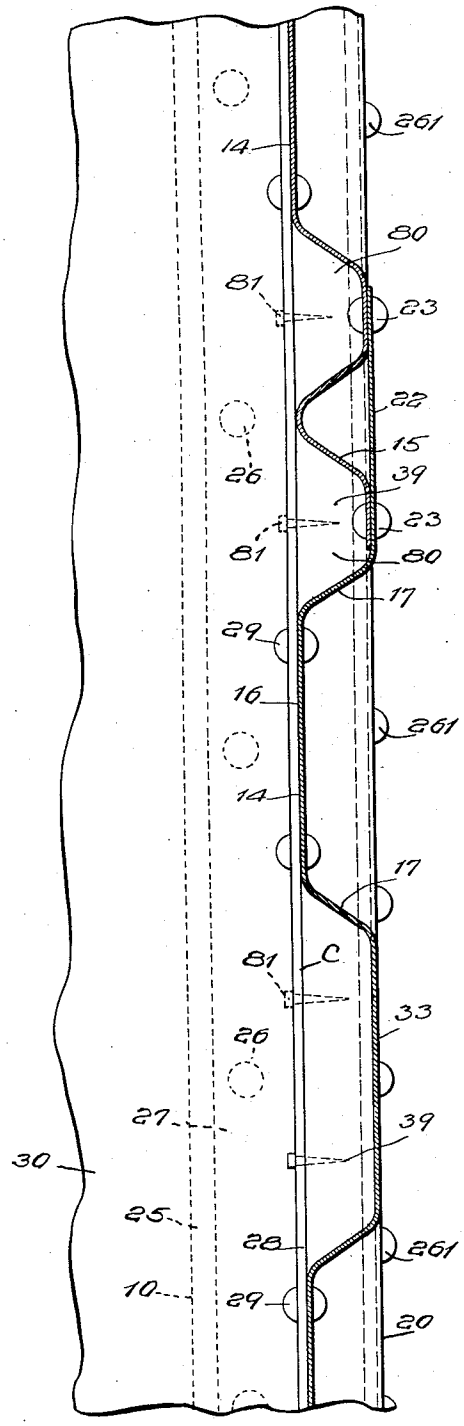
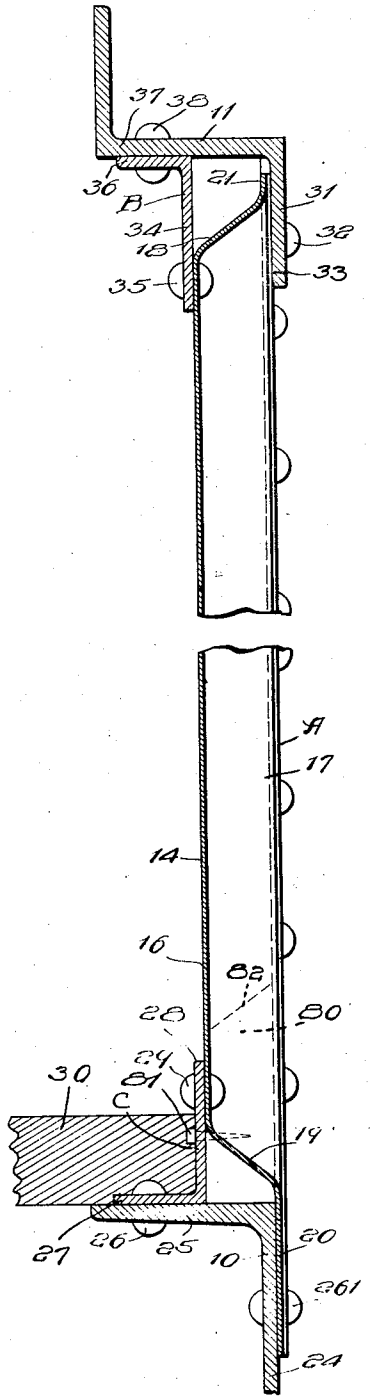


Fig. 4.



Witness:

William P. Kilroy

Inventors
John P. McWilliams
Frank Nitchfield

By Joseph Harris
Their Attys

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Fig. 6.

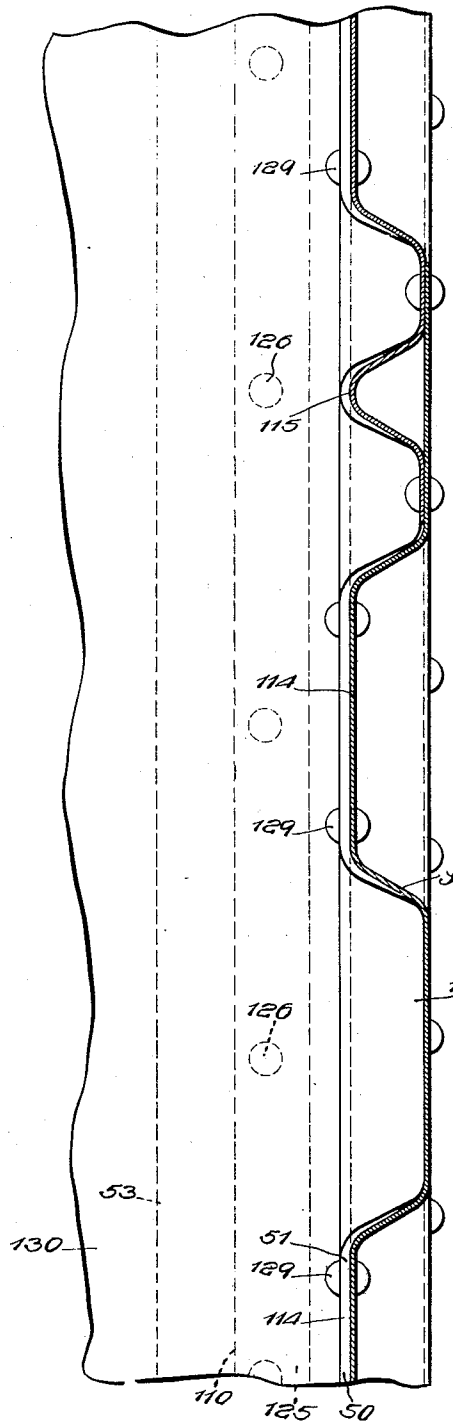
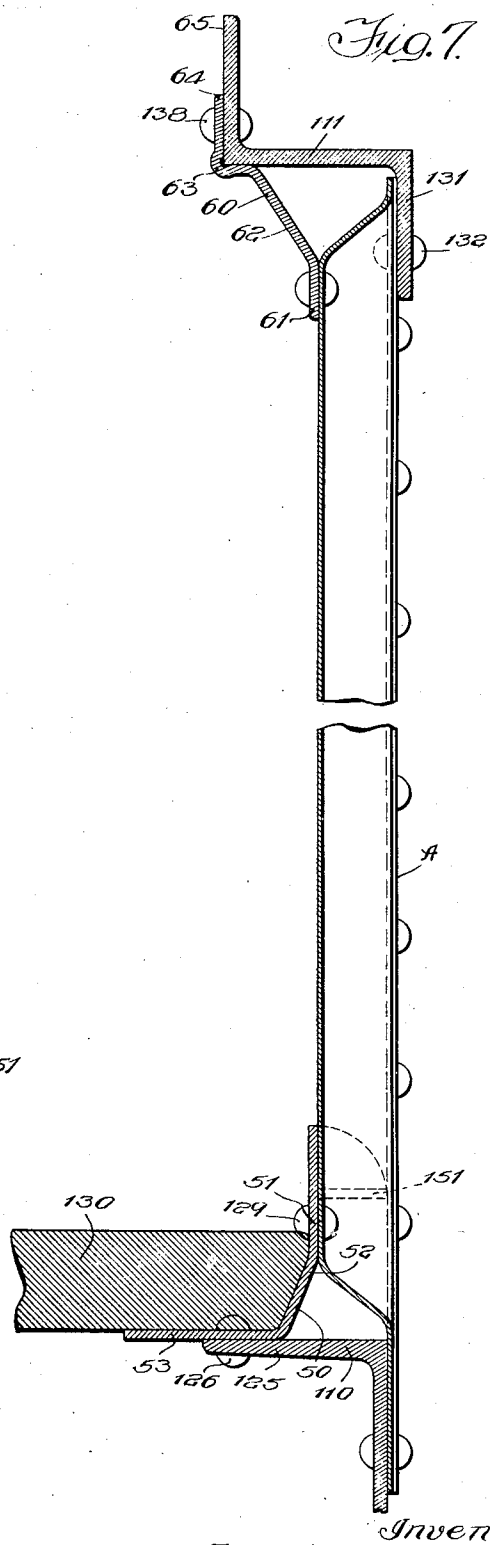


Fig. 7.



Witness:

William P. Kilroy

Inventors

John P. McWilliams

Frank Ditchfield

Joseph Harris

By Their Attys

May 19, 1931. J. P. McWILLIAMS ET AL 1,806,173

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Filed May 9, 1928 4 Sheets-Sheet 4

Fig. 9.

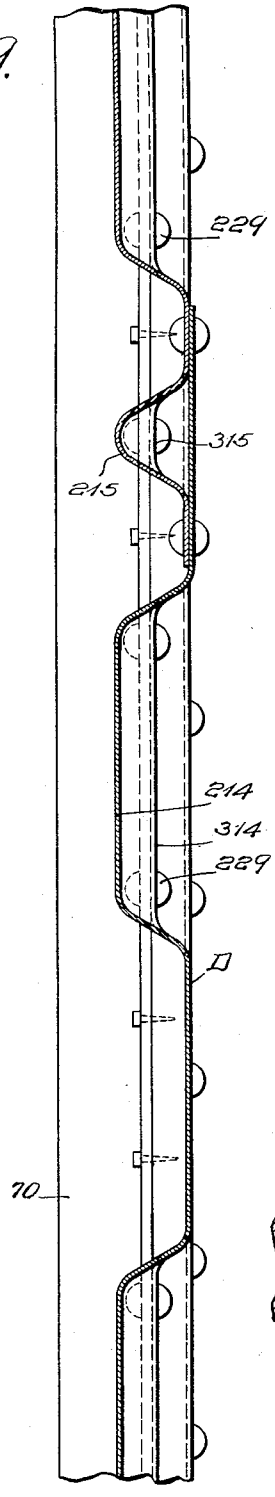


Fig. 10.

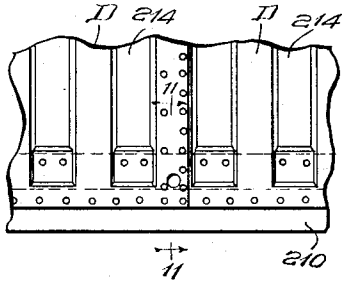


Fig. 11.

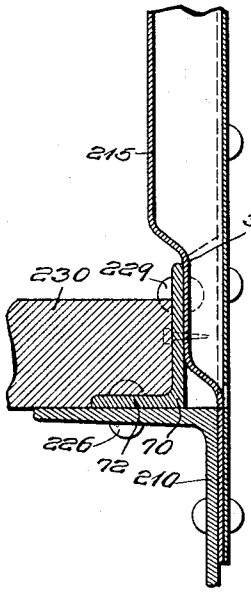
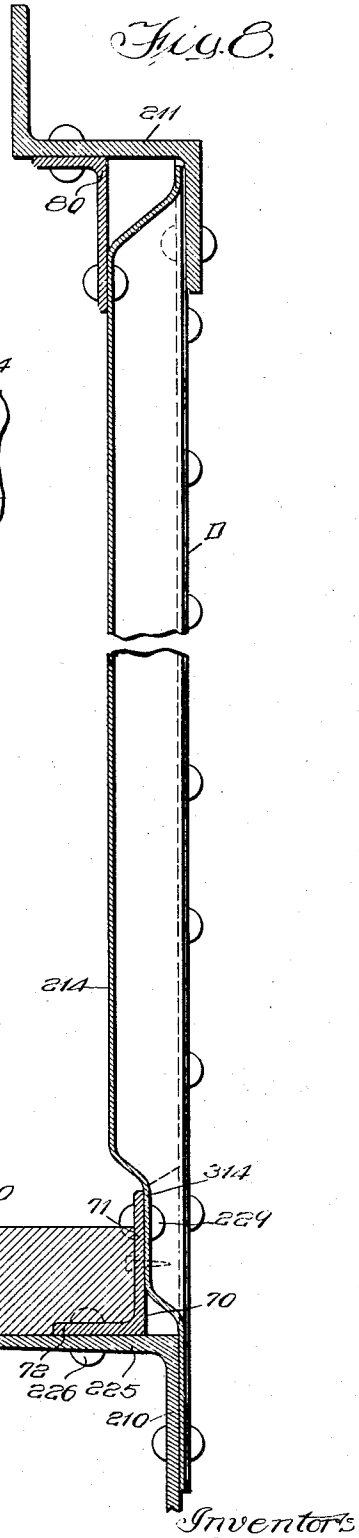


Fig. 8.



Witness:
William P. Kilroy

Inventors
John P. McWilliams
Frank Ditchfield
By Joseph Harris
Their Attys

Patented May 19, 1931 1,806,173

UNITED STATES PATENT OFFICE

JOHN P. McWILLIAMS AND FRANK DITCHFIELD, OF CLEVELAND, OHIO, ASSIGNORS TO THE YOUNGSTOWN STEEL DOOR COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

CAR

Application filed May 9, 1928. Serial No. 276,337.

This invention relates to improvements in cars.

As well known to those skilled in the art, the railroads for many years have sought an efficient durable and relatively light weight metal wall box car. Numerous patents have been granted illustrating various proposed types of such cars and a few designs have been tried out in service, but with indifferent success. One of the chief difficulties heretofore has been due to inability to provide sufficient rigidity in the superstructure to resist the swaying and weaving effects without at the same time using an excessive amount of metal, particularly in the form of posts and braces and which in turn involves high initial cost and increases the unproductive load of the car. Another source of difficulty in metal wall box cars, heretofore, has been due to the rapid corrosion of the metal, particularly at the floor line, where the moisture from the lading collects at the floor joints.

One object of our invention is to provide an all-metal wall structure for cars, particularly box cars, which is relatively light in weight; easy to fabricate and apply; and so combined with the car framing members as to obtain great strength and rigidity against stresses in all directions and thereby eliminate or minimize the damaging effects of weaving, swaying and distortion of the superstructure.

Another object of our invention is to provide, in a box car or the like, integrally reinforced sheet metal wall-forming panels combined with a simple form of attachment to the car framing members, which form of attachment affords a wide base or footing for the panels so as to prevent flexing or bending of the panel sheets at the points of attachment to the framing members, said means of attachment also being characterized by the fact that it is entirely practical from manufacturing and shop practice standpoints.

Another object of our invention is to provide a sheet metal wall structure particularly adapted for box cars wherein the use of separate posts or braces is entirely eliminated, the metal wall-forming sheets having included therein corrugations or other suitable indentations so arranged as to function as posts with reinforced integral post formations at spaced intervals where the wall sheets are overlapped.

Other objects of our invention are: To utilize the attaching means at the lower portions of the wall-forming sheets so as to function as fenders with reference to the sheets to prevent seepage of moisture from the lading to the joints; to so arrange the attaching means for the wall-forming sheets that the stresses will be distributed uniformly along the sheets; to so arrange the means of attachment of the upper and lower portions of the sheets to the top plates and floor beams that the plates and beams are strengthened; and to otherwise increase the efficiency and long life of a structure of the character indicated.

In the drawings forming a part of this specification, Fig. 1 is a horizontal sectional view of a portion of a side wall of a box car showing our improvements in connection therewith, the portion of the car shown being that between one corner and the nearest side door post, that is, approximately one-half of the car side. Fig. 2 is an elevational view of the car side embodying our improvements and corresponding to the structure shown in section in Fig. 1. Fig. 3 is a horizontal sectional view, upon an enlarged scale, corresponding to the section line 3—3 of Fig. 2. Fig. 4 is a vertical sectional view upon an enlarged scale, corresponding to the line 4—4 of Fig. 2, parts being broken away to better accommodate the view on the sheet. Fig. 5 is a detail vertical sectional view corresponding to the line 5—5 of Fig. 2 and upon a larger scale. Figs. 6 and 7 are views similar to Figs. 3 and 4, respectively, showing another embodiment of our invention. Figs. 8 and 9 are views similar to Figs. 3 and 4, respectively, illustrating a still further embodiment of our invention. Fig. 10 is a broken elevational view of a portion of the car side wall built in accordance with the structures illustrated in Figs. 8 and 9. And Fig. 11 is a detail vertical sectional view corresponding to the line 11—11 of Fig. 10.

Referring first to the construction illustrated in Figs. 1 to 5, inclusive, the side sill of the box is indicated at 10, the side plate at 11, the corner post at 12, and the nearest side door post at 13. The side wall of the car, in accordance with our improvements, is comprised of a series of sheet metal panels, each of which is designated generally by the reference character A. In carrying out our invention, we also employ a top longitudinally extending angle designated generally by the reference character B, and a lower longitudinally extending angle designated generally by the reference character C.

The panels A are of like construction, except for such slight changes as occur on the end panels where the same are attached to the corner post 12 and to the door post 13, the corresponding vertical marginal portions of the panels at these places being flat and riveted to the posts.

Each panel A will preferably be of a height corresponding to the height of the side plate 11 above the side sill 10 and the width of the panels may be varied without departure from the invention. Each panel includes a plurality of preferably uniformly spaced, vertically extending corrugations 14—14 and also, along one edge thereof, a narrow vertical corrugation 15. The corrugations 14 are relatively wide, as shown in Fig. 3, each having a flat bottom 16, sloping sides 17—17, and sloping tops and bottoms 18 and 19, the corrugations thus defined being of generally elongated rectangular formation, as clear from Fig. 2. Said corrugations are pressed inwardly from the normal main plane of the sheet and a lower, relatively wide flat marginal portion 20 is left and also a relatively narrow flat top marginal portion 21. The corrugation 15 of each panel, located along one vertical edge thereof, is much narrower than the other corrugation 14. Each said corrugation 15 is adapted to be bridged by a flat, wide, vertical, marginal portion 22 of the next adjacent sheet, the overlapped portions of the two sheets being secured along two lines of rivets 23—23 on opposite sides of the corrugation 15. In this manner, a tubular formation is obtained at the lapped vertical joints of the sheets, which tubular formation affords great strength and rigidity against stresses in all directions.

Referring now more particularly to Fig. 4, it will be observed that the side sill 10 (ordinarily a channel) has a vertically extending section 24 and a top horizontally extending flange or section 25. The lower flat marginal portions 20 of the sheets are secured to the vertical section 24 of the side sill by a line of rivets indicated at 261. It will be observed that the sloping bottoms 19 of the vertical corrugations begin near the top of the side sill 10, said portions sloping upwardly and inwardly.

In addition to the line of rivets 261, the panel sheets are secured to the side sill 10 by the angle C which has a horizontal flange 27 secured to the top horizontal flange 25 of the side sill by a line of rivets 26. The angle C also has an upstanding vertical flange 28 secured to the crests or bottoms 16 (dependent upon the point of view of the observer) of the vertical corrugations 14, as by rivets 29—29, there preferably being two or more such rivets to each corrugation 14. As will be apparent from inspection of Figure 4, the upper flange 25 of the side sill and the upstanding flange 28 of the angle C, and the sloping portions 19 of the side sheets together form what may be termed a tubular construction or formation possessing great strength against distortion in any direction.

The vertical flange 28 of the angle C is extended above the floor, which is composed of the floor boards or planks 30, the outer ends of which meet the vertical flange 28 and are supported upon the flanges 27 and 25 of the angle C and side sill 10, respectively. It will be observed that the free edge of the vertical flange 28 is above the floor line, as shown in Fig. 4.

The top portions of the sheet metal panels are secured to the depending outer flange 31 of the side plate 11, as by a series of rivets 32, the latter being fastened to the outer flat areas 33 of the panel sheets which are intermediate the corrugations and located in the normal main plane of the sheet. The panel sheets are further secured to the side plate by the angle B, the latter having a depending vertical flange 34 secured to the offset wall 16 of the vertical corrugation, as by the line of rivets 35, there preferably being two or more such rivets to each corrugation, as at the bottom. It will be observed that the line of rivets 35 is located below the sloping top portions 18 of the corrugations, as shown in Fig. 4. The other flange 36 of the angle B is secured to the horizontal web or section 37 of the side plate by a line of rivets 38. By referring to the upper portion of Figure 4, it will be seen that the horizontal web 11 of the side plate, the depending flange 34 of the angle B and the sloping section 18 of the side sheets, together form a tubular construction, substantially similar to that at the bottom of the side sheets.

As shown best in Fig. 3, spaces 39—39 will be left between each of the corrugations 14 and the flange 28 of the angle C, these spaces being open upwardly. To prevent any of the lading from entering these spaces, the same are preferably closed by wood blocks 80 which are secured in place by coach screws 81 entered through openings in the flange 28, the tops of the blocks being beveled downwardly and inwardly as indicated at 82, so as to deflect any material inwardly of the car.

Should any moisture enter the lap joint

of the sheets it would be trapped within the corrugation 15, and escape therefor is provided through the vent 40 located at the bottom of the sheet just above the side sill, as indicated in Fig. 5.

With a wall structure as hereinbefore described, it will be observed that we obtain a very wide footing or base at the points of attachment of the panel sheets to the side sill and side plate of the car framing. This insures an extremely rigid and effective attachment for the panel sheets, preventing their flexing or bending inwardly or outwardly from the vertical and hence overcomes danger of weaving or flexing or shifting of the body superstructure with reference to the underframe. By extending the attaching angles B and C continuously from one end to the corresponding adjacent door post, and securing the same to the crests of the panel corrugations, the stresses in the panels and in said angles are thereby uniformly distributed to all of the corrugations, thus avoiding undue concentration of a stress at any particular point. The attachment of the angles B and C to the side plate and side sill, respectively, by continuous lines of rivets, gives increased strength to the side plate and side sill, as will be obvious to those skilled in the art. In the case of the connection at the top of the panels to the depending flange 31 of the side plate and depending flange of the angle B, the sloping top walls 18 of the corrugations, together with the adjacent sloping side walls 17 effectively act as struts to brace said flanges 31 and 34 and prevent their flexing or bending in a horizontal plane, an important consideration in the elimination of weaving or warping of the superstructure, particularly in the zone of the roof.

By forming the corrugations 16 at frequent intervals and extending them vertically, the same act as integral posts in the panel sheets so that the use of separate posts or braces is entirely eliminated, thus reducing the cost of fabrication and assembling. The reinforced post structures at the overlapped vertical edges of the panels give increased vertical strength at desirable intervals, as will be understood.

Referring next to the construction illustrated in Figs. 6 and 7, the side sill of the car is indicated at 110, the side plate at 111, and the panels at A.

In this modification, the panels A are constructed exactly as in the modification first described and, so far as the direct connections or attachments between said panels and the side sill and side plate are concerned, they remain the same. At the bottom, the panels A are additionally secured to the top flange 125 of the side sill by a preferably formed heavy strip 50, the latter having an upper vertical flange 51, a downwardly and inwardly sloping section 52 and a bottom horizontal flange 53. The vertical flange 51 is secured to the crests of the corrugations by a line of rivets indicated at 129 and the horizontal flange 53 is secured to the horizontal flange 125 of the side sill by a series of rivets 126. It will be understood that the strip 50 is continuous as in the case of the angle C of the first modification.

In the modification of Figures 6 and 7, the lower flange 53 is made relatively wide so as to extend inwardly beyond the inner edge of the side sill flange 125, thus providing a wide bearing support for the ends of the floor boards 130. Also, in this construction, the flange 51 of the attaching strip is preferably bent outwardly, at intervals, to the dotted line position shown at 151, these bent-out portions occurring between the corrugations 114 and also between the corrugations 114 and the vertical narrowed corrugation 115. In this manner, the spaces between corrugations are covered or sealed, thus eliminating any necessity for filling material or blocks. Incidentally, the panel sheets are additionally strengthened by the outturned flanges 151, as will be obvious.

At the tops, the panel sheets are secured to the depending flange 131 of the side plate by the series of rivets 132. Instead of employing an angle such as B shown in the first modification, we employ a rolled or formed strip 60, the latter having a lower vertical flange 61, upwardly and inwardly sloping section 62, preferably a corner bead 63 and a vertical upper flange 64, the latter being secured to the vertical flange 65 of the side plate by a series of rivets 138.

By employing the strips 50 and 60 with their inwardly inclined sections, a still wider base or footing is obtained for the points of attachment of the panel sheets to the car framing members or beams, thus adding greater rigidity to the connection.

Referring next to the construction illustrated in Figs. 8 to 11, the panel sheets are indicated at D—D, the car side sill at 210, the top side plate at 211, the lower attaching angle at 70 and the upper attaching angle at 80.

In this modification, the sheet metal panels are substantially the same as those heretofore described, except that the vertical corrugations 214 and 215 are necked-in at their bottom ends, as indicated at 314 and 315, respectively. The necked-in portions are of a height corresponding approximately to the height of the vertical flange 71 of the lower attaching angle 70 which is secured to the necked-in portions of the corrugations by a line of rivets 229. The horizontal flange 72 of the angle is secured in the same manner to the top flange 225 of the side sill by a line of rivets 226. The mode of attachment at the top of the panels to the side plate is the

same as that described in connection with the first modification.

By necking-in the corrugations, we are enabled to set the attaching angle 70 farther outwardly than in the form of the invention shown in Figs. 1 to 5, thus leaving a wider ledge or shelf for supporting the floor boards 230, than is left in the construction of the first modification.

Between the corrugations 14, ample space is left for the use of clips that may be secured to the flat portions of the sheets, and by which clips nailing strips can be secured so that the usual inner sheathing may be applied to the car, if desired.

The combined attaching and fender angle C prevents moisture from reaching the panel sheets at the side sill level, as hereinbefore indicated, and this is of extreme importance, inasmuch as it eliminates any question of the thickness or gauge of the sheets from a corrosion standpoint, that is, the sheets may be made thinner than heretofore, without danger of excessive corrosion occurring at this point. Further, the panel sheets may be made thinner than those heretofore, since they are securely braced or rigidified by the post-forming corrugations and the corrugations are so arranged that vibration is practically entirely eliminated, with its attendant disadvantage of loosening the paint and starting of corrosion, disadvantages present in prior types of sheet metal car walls.

We have herein shown and described our improvements particularly with reference to the side walls of a box car, but it will be understood that the same may be employed in the end walls of a box car and also that certain of our improvements may be incorporated in wall structures of other types of cars and housing structures generally. We are aware also that many changes and variations may be made in the details of construction without departure from the spirit of the invention and all such changes and modifications are contemplated that come within the scope of the claims appended hereto.

We claim:

1. In a wall construction, the combination with a floor-framing element having sections at right angles to each other; of a wall-forming metal sheet having strengthening indentations incorporated therein and provided with a lower flat margin; means securing said margin to one of said sections; and a metal element having one section secured to the other section of said framing element and another section sescured at spaced intervals to said sheet in a plane offset from the plane of said flat margin.

2. In car construction, the combination with a floor-framing element having sections at right angles to each other; of a wall-forming metal sheet having strengthening indentations incorporated therein and provided with a lower flat margin; means securing said margin to one of said sections; and a metal element having one section secured to the other section of said framing element and another section secured to said sheet in a plane offset from the plane of said flat margin, said metal element extending continuously across the sheet.

3. In a wall construction, the combination with a car framing beam having sections arranged at an angle to each other, of a panel sheet having a margin secured to one of said beam sections, the sheet having integral strengthening indentations therein offset inwardly from said margin; and an attaching element having sections at an angle to each other, one section thereof being secured at intervals to said other section of the framing beam and the other section thereof secured at intervals to said inwardly offset indentations.

4. In car construction, the combination with a car framing beam having sections arranged at an angle to each other; of a panel sheet having a margin secured to one of said beam sections, the sheet having integral strengthening indentations therein offset inwardly from said margin; and an attaching element having sections at an angle to each other, one section thereof being secured at intervals to said other section of the framing beam and the other section thereof secured at intervals to said inwardly offset indentations, said attaching element comprising an angle iron.

5. In car construction, the combination with spaced upper and lower framing elements, each having sections arranged at right angles to each other; of a wall-forming metal sheet extending between said elements, said sheet having strengthening indentations incorporated therein and provided with top and bottom margins secured to one section of each of said elements, respectively; and an additional attachment element at both the top and bottom of the sheet, each said element having one section secured at spaced intervals to said sheet in a plane offset from the margin thereof and another section secured to the corresponding framing element.

6. In car construction, the combination with spaced upper and lower framing elements, each having sections arranged at right angles to each other; of a wall-forming metal sheet extending between said elements, said sheet having strengthening indentations incorporated therein and provided with top and bottom margins secured to one section of each of said elements, respectively; and an additional attachment element at both the top and bottom of the sheet, each said element having one section secured at spaced intervals to said sheet in a plane offset from the margin thereof and another section secured to the corresponding framing element,

the lower of said attaching elements extending continuously across the sheet.

7. In car construction, the combination with spaced upper and lower car framing elements each having a vertical section and a horizontal section; of a wall-forming metal sheet extending between said elements and having the upper and lower margins thereof secured to said vertical sections, said sheets having inwardly offset indentations; and upper and lower attaching elements, each having a section secured at spaced intervals to said offset indentations and a section secured to said horizontal section of the corresponding framing element.

8. In car construction, the combination with spaced upper and lower car framing elements each having a vertical section and a horizontal section; of a wall-forming metal sheet extending between said elements and having the upper and lower margins thereof secured to said vertical sections, said sheets having inwardly offset indentations; and upper and lower attaching elements, each having a section secured at spaced intervals to said offset indentations and a section secured to said horizontal section of the corresponding framing element, each said attaching element comprising an angle iron.

9. In car construction, the combination with a side sill having vertical and horizontal sections; of a side wall metal sheet having strengthening indentations incorporated therein and having its lower margin secured to the vertical section of said side sill; and an attaching member having one section secured at spaced intervals to said horizontal section of the side sill and another section secured to said sheet in a plane inwardly offset from said margin.

10. In car construction, the combination with a side plate; of a side sill; a sheet metal panel extending between said side plate and side sill; means for attaching the top edge of said panel to the side plate; means for attaching the lower margin of said panel to one section of the side sill; and an attaching member having one section secured to a different section of said side sill and secured also to the panel in a plane inwardly offset from said margin thereof, said member extending continuously along the bottom of the panel.

11. In car construction, the combination with a side plate; of a side sill; a sheet metal panel extending vertically between said side plate and sill, said panel having inwardly offset indentations therein, the upper and lower margins of the panel being directly secured to the side plate and side sill, respectively; and upper and lower angles, each having a flange secured to inwardly offset portions of the panel and another flange secured to the respective side plate or side sill.

12. In car construction, an underframe beam having a vertical section and a top horizontal section extending toward the interior of the car; of a wall-forming metal sheet having its lower margin secured to the vertical section of said beam; and a continuous combined attaching member and fender on the inner side of said sheet extending along the bottom thereof and secured to the inwardly extending section of the side sill and to the sheet, the upper edge of said attaching member being above the floor line whereby to prevent seepage to the joints between the sheet and side sill.

13. In car construction, the combination with a side sill having a vertical section and a top flange extending inwardly; of a side wall metal sheet having the lower margin thereof secured to the vertical section of the side sill and provided with inwardly offset indentations above the side sill; and an attaching element extending across the sheet, said element having one flange secured to the top flange of the side sill and another upwardly extending flange secured to the offset portions of the sheet, said upwardly extending flange being of greater height than the thickness of the floor.

14. In car construction, an underframe beam having a vertical section and a top horizontal section extending toward the interior of the car; of a wall-forming metal sheet having its lower margin secured to the vertical section of said beam; and a continuous combined attaching member and fender on the inner side of said sheet extending along the bottom thereof and secured to the inwardly extending section of the side sill and to the sheet, the upper edge of the latter being above the floor line whereby to prevent seepage to the joints between the sheet and side sill, said attaching member and fender comprising an angle iron.

15. In car construction, the combination with a side sill having a vertical section and a top flange extending inwardly; of a side wall metal sheet having the lower margin thereof secured to the vertical section of the side sill and provided with inwardly offset indentations above the side sill; and an attaching element extending across the sheet, said element having one flange secured to the top flange of the side sill and another upwardly extending flange secured to the offset portions of the sheet, said upwardly extending flange being of greater height than the thickness of the floor, said attaching member consisting of an angle iron.

16. In car construction, the combination with a wall-forming metal sheet having a flat attaching margin and integral strengthening indentations offset from the plane of said margin; a floor beam having a horizontal top and a vertical section; means securing said margin to said vertical section; and means extending along and secured at intervals to said horizontal section, said means

having an upstanding portion extending along the inner side of said sheet and secured at intervals thereto in a plane inwardly offset from the plane of the margin and above the top of said floor beam whereby to provide a relatively wide base attachment for the sheet.

17. In car construction, the combination with a top plate having a horizontal section and a vertical section; of a wall-forming metal sheet having a flat upper margin secured to said vertical section of the top plate and provided with integral strengthening indentations offset from the plane of said margin; and means extending along and secured at intervals to said horizontal section of the top plate, said means having a downwardly extending portion positioned on the inner side of the sheet and secured at intervals thereto in a plane inwardly offset from said margin.

18. In car construction, the combination with a side sill having a horizontal top flange and an outer vertical section; of a wall-forming metal sheet having a lower flat margin secured to the vertical section of the side sill, said sheet being provided with strengthening indentations; and means extending along and secured at intervals to said top flange of the side sill, said means having an upstanding flange extending continuously along the inner side of said sheet and secured at intervals thereto in a plane inwardly offset from said margin and above the top of the side sill whereby to provide a relatively wide footing for the sheet.

19. In car construction, the combination with a car side plate having a horizontal section and a depending flange; of a plurality of metal sheets secured together along adjacent vertical edges and having their top margins secured to said vertical flange, said sheets being provided with integral strengthening indentations; and means extending along and secured at intervals to said horizontal section of the side plate, said means having a downwardly extending portion extending along the inner faces of said sheets and secured thereto at intervals in a plane inwardly offset from the margins.

20. In car construction, the combination with a floor beam having vertical and horizontal sections; of a wall-forming sheet having the lower margin secured to said vertical section and having other portions immediately above said top section sloping inwardly and upwardly, and an angular member having a flange secured to said top section and to said sheet above said sloping portions.

21. In car construction, the combination with a top plate having a horizontal section and a depending vertical section; of a wall-forming sheet having portions secured to said vertical section and other portions sloping downwardly and inwardly; and an angular member having a flange secured to said horizontal section and a depending flange secured to said sheet below the sloping portions thereof.

22. In car construction, the combination with a floor beam having vertical and horizontal sections; wall-forming metal sheets having integral vertically extending corrugations above the bottom margins thereof, said margins being secured to the vertical section of the floor beam; and means on the inner side of said sheets secured to the tops of said corrugations and to the top section of the floor beam.

23. In car construction, the combination with a top plate having horizontal and vertical sections; of a plurality of wall-forming metal sheets having integral vertically extending corrugations, the upper edges of said sheets being secured to the vertical section of the top plate; and means on the inner side of said sheets secured to the horizontal section of said top plate and also to the crests of said corrugations.

24. In car construction, the combination of a side sill and a side plate each having a horizontal and a vertical section; of a plurality of wall-forming metal sheets having vertically extending corrugations therein terminating above the bottom margins of the sheets, said margins being secured to the vertical section of the side sill and the top portions of the sheets being secured to the vertical section of the top plate; and means on the inner sides of said sheets at the top and bottom thereof, each said means being secured to the horizontal section of the side plate or sill and secured also to the crests of the corrugations.

25. In car construction, the combination with a rolled side sill and a rolled side plate; of a plurality of metal sheets having vertically extending inwardly offset corrugations therein, the lower portions of said sheets being secured to the side sill and the upper portions to a flange of the side plate; an upper angle iron extending along the inner face of the sheets and having one flange secured to the side plate and another flange to the crests of the corrugations; and an angle iron extending continuously along the bottom of the sheets, said angle iron having a flange secured to the top flange of the side sill and another flange secured to the crest of the sheet corrugations.

26. In car construction, the combination with a sill having horizontal and vertical sections; of wall-forming metal sheets having their lower portions secured to the vertical section of said sill; and a combined fender and attaching member extending continuously along the bottom of the sheets on the inner side thereof and having one portion secured to said sheets and another portions secured to the top section of the sill.

27. In car construction, the combination with a sill having horizontal and vertical sections; of wall-forming metal sheets having their lower portions secured to the vertical section of said sill; and a combined fender and attaching member extending continuously along the bottom of the sheets on the inner side thereof, said member having a base flange secured to the top section of the sill and an upstanding flange secured to the sheets, said sill top section, upstanding flange of said member, and a portion of the sheets lying between the top of the sill and the line of attachment to said member, being so arranged as to form a hollow tubular section at the base of the car wall.

28. In car construction, the combination with a car top plate having horizontal and vertical sections; of wall-forming metal sheets having their upper portions secured to the vertical section of said plate; and an attaching member extending continuously along the tops of the sheets on the inner side thereof, said member having one portion secured to said sheets and another portion secured to the horizontal section of said plate and spaced inwardly from the vertical section thereof.

29. In car construction, a side sill having a vertical section and a top flange section; of wall-forming metal sheets having their lower portions secured to said vertical section of the side sill; and a combined fender and attaching member extending continuously along the bottom of the sheets on the inner side thereof, said member having a base flange secured to the top flange of the sill and an upstanding flange secured to said sheets, the sill top flange, upstanding flange of said member, and the portions of the sheets lying between the top of the sill and the line of attachment of said member thereto being so arranged as to form a hollow tubular section of which the sill flange forms the base.

30. In car construction, the combination with a side sill having horizontal and vertical sections; of a side plate having horizontal and vertical sections; of wall-forming metal sheets having their lower and upper portions respectively secured to the vertical sections of the side sill and plate; means for bracing said sheets; an angular member extending along the inner side of the sheets at the bottom thereof and having one flange secured to the horizontal section of the sill and an upstanding flange secured to the sheets above the sill, said upstanding flange section of the angular member and adjacent portions of the wall sheets defining a hollow tubular section; and an angular member extending along the inner side of the sheets at the top thereof, said member having a flange secured to the horizontal section of the side plate and a depending flange secured to the sheets, said angular member, horizontal section of the plate, and adjacent portions of the sheets being formed to provide a tubular section.

31. In car construction, lapped wall-forming sheets, one of said sheets having a relatively narrow corrugation extending parallel to but spaced from the lapping edge thereof, and a relatively wider parallel corrugation, thereby leaving a longitudinally extending portion between the corrugations in the original plane of the sheet and a marginal flange in the original plane of the sheet, the other sheet having a relative wide flange at the lapping edge extending over said relatively narrow corrugation and secured to the first named sheet along both sides of said narrow corrugation, said second named sheet having also a relatively wide corrugation paralleling the relatively wide flange thereof, all said corrugations extending to the same side of the original plane of the sheet.

32. In car construction, lapped wall-forming sheets, the lapped joint extending vertically and being formed by a corrugation extending parallel to but spaced from the edge of the inner sheet of the lapped joint, and a relatively wide flange on the outer overlapping sheet, said wide flange being secured to the first named sheet along both sides of said corrugation and said wide flange having an opening opposite the bottom of the corrugation whereby to provide drainage for any moisture collecting within the corrugation, each of the sheets having also a relatively wide vertically extending corrugation adjacent the lapped joint, all said corrugations extending to the same side of the original plane of the sheet.

33. In car construction, the combination with a side plate and a side sill; of a panel sheet attached along its upper edge to said side plate, said panel sheet having strengthening indentations therein; and means for attaching the panel sheet along its lower edge to the side sill, said means including a member extending lengthwise of the top of the side sill and secured to the sill, said member having an upstanding section secured to the panel sheet.

In witness that we claim the foregoing we have hereunto subscribed our names this 27 day of April, 1928.

JOHN P. McWILLIAMS.
FRANK DITCHFIELD.