P. M. BEARD.

CAR END CONSTRUCTION.

APPLICATION FILED MAR. 8, 1915.

1,208,898.

Patented Dec. 19, 1916.

3 SHEETS—SHEET 1.

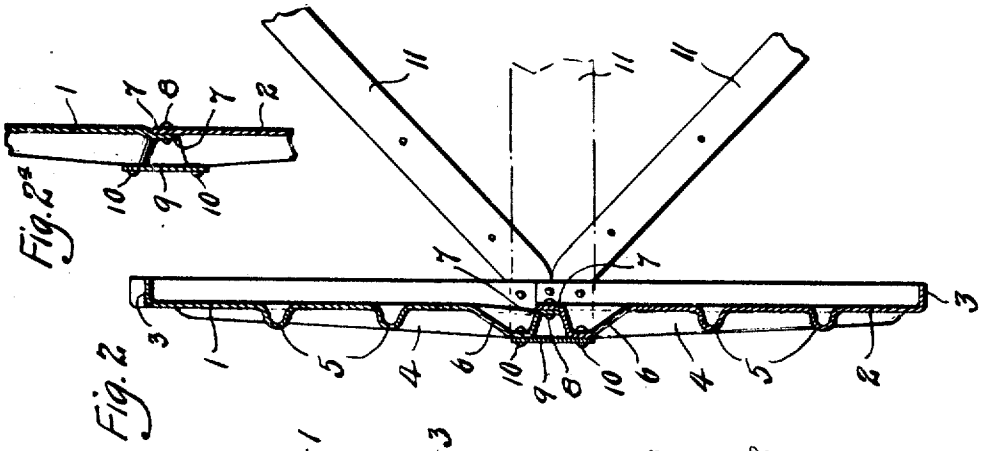


Fig. 2a

Fig. 2

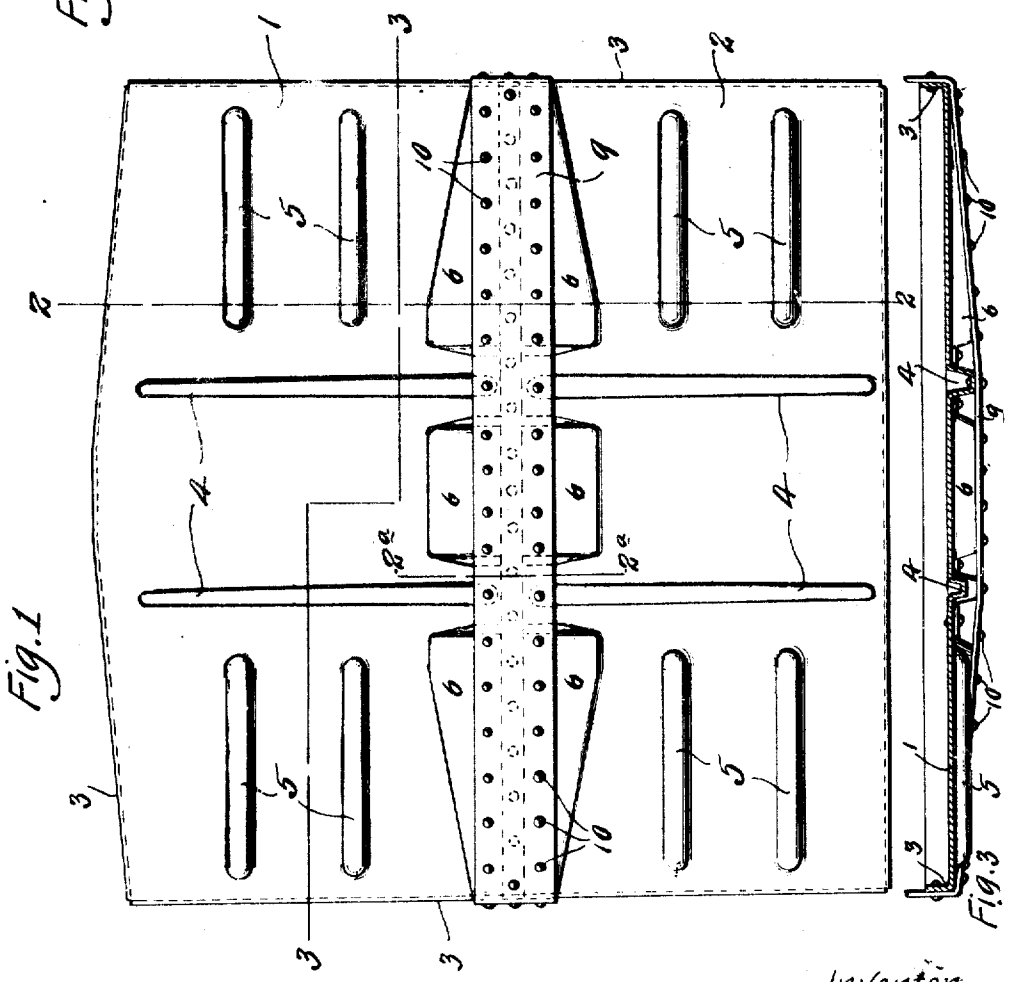


Fig. 1

Fig. 3

Witnesses

Wm. James

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Inventor

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3 SHEETS—SHEET 2.

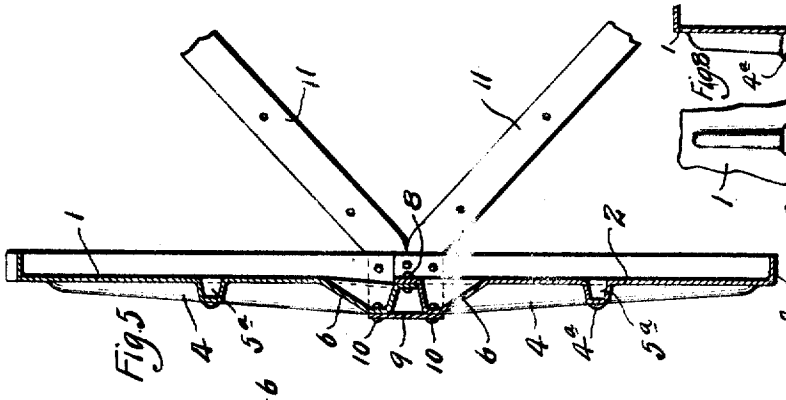


Fig. 5

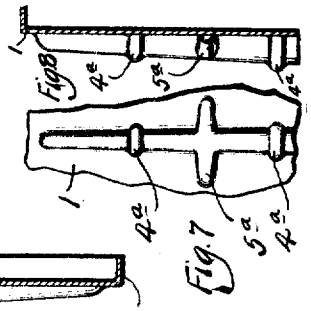


Fig. 7

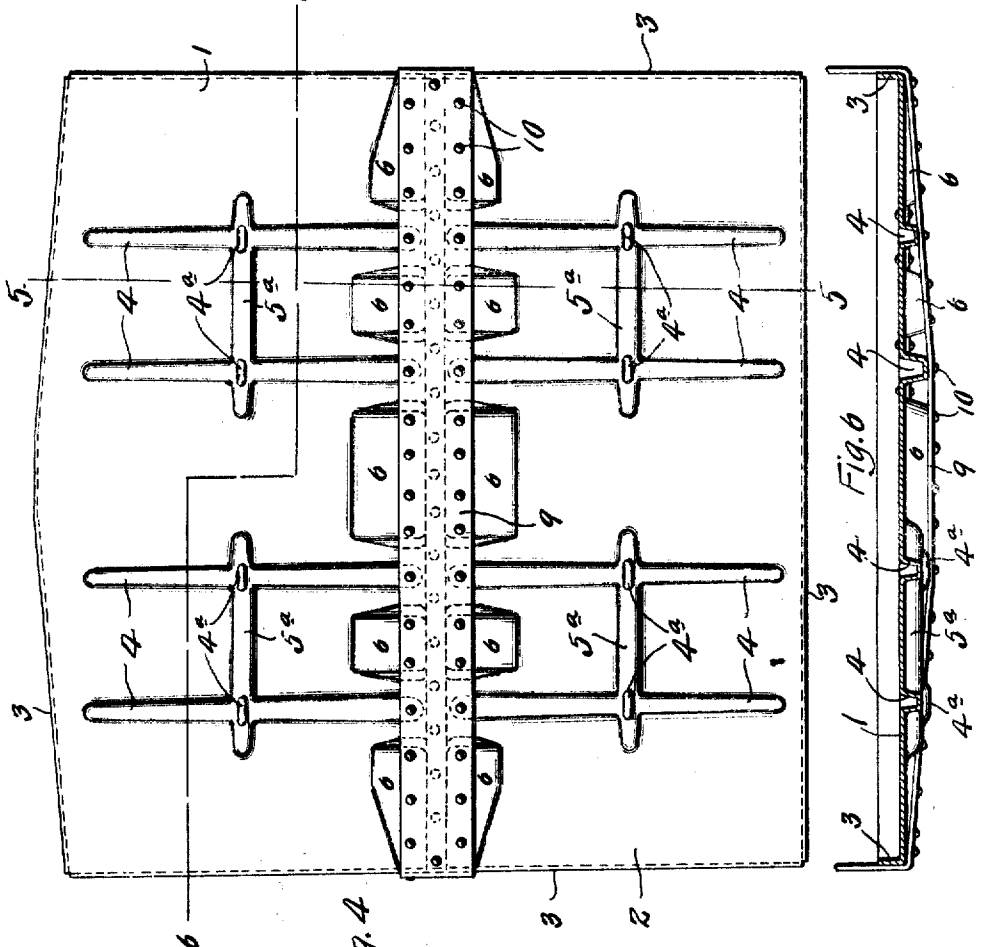


Fig. 4

Fig. 6

Witnesses

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3 SHEETS—SHEET 3.

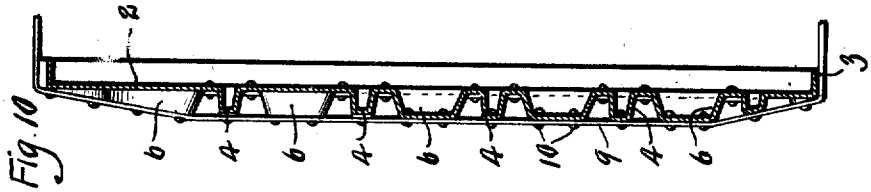


Fig. 10

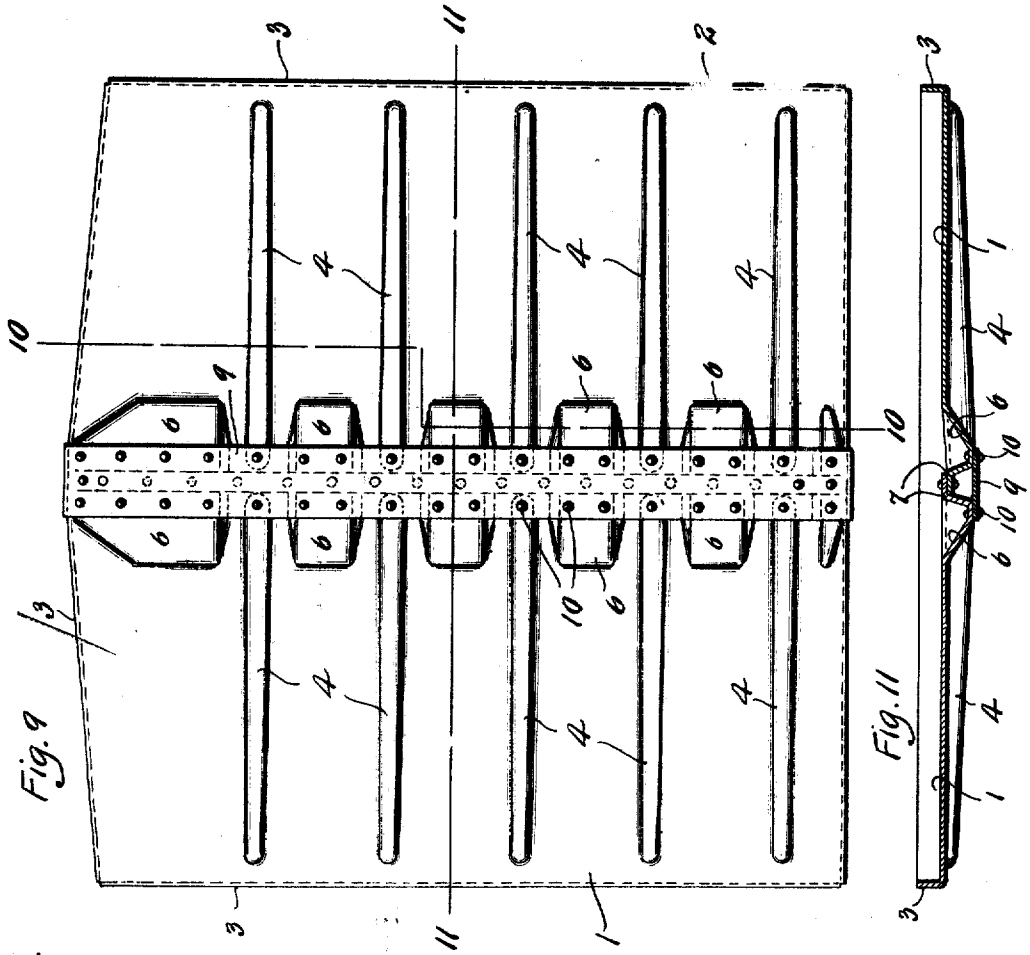


Fig. 9

Fig. 11

Witnesses

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UNITED STATES PATENT OFFICE.

PAUL M. BEARD, OF ST. LOUIS, MISSOURI, ASSIGNOR TO AMERICAN CAR AND FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

CAR END CONSTRUCTION.

1,208,898. Specification of Letters Patent. Patented Dec. 19, 1916.

Application filed March 8, 1915. Serial No. 13,002.

To all whom it may concern:

Be it known that I, PAUL M. BEARD, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Car End Construction, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates generally to railway car structures, and specifically to an end construction for box cars which may form part of the original car structure, or which may be employed as a repair part to replace broken or damaged ends.

The objects of my invention are, to provide a sheet metal end construction which is suitably corrugated or ribbed to stiffen the metal of which the end is formed, and shaped, secured together and reinforced to provide beam members which are disposed to resist the various stresses to which the end structure is subjected in service.

Other objects of my invention will be pointed out hereinafter, or will be obvious upon an understanding of the construction.

In the drawings Figure 1 represents a front view of one form of my invention; Fig. 2 a vertical section taken substantially on line 2—2 of Fig. 1; Fig. 2ª is a vertical section on line 2ª—2ª of Fig. 1; Fig. 3 a horizontal section taken substantially on line 3—3 of Fig. 1; Fig. 4 a front view of modification; Fig. 5 a vertical section thereof taken on line 5—5 of Fig. 4; Fig. 6 a horizontal section taken substantially on line 6—6 of Fig. 4; Fig. 7 a fragmentary detail illustrating a front view of modified form of strengthening rib or corrugation; Fig. 8 a side view of the same; Fig. 9 a front view of a second modification; Fig. 10 a vertical section on line 10—10 of Fig. 9; Fig. 11 a horizontal section on line 11—11 of Fig. 9.

In service the ends of railway cars are subjected to a variety of stresses resulting from various conditions of service. First, there are the ordinary load stresses which the end structure carries as a part of the car construction, the principal ones of which are those incident to the end's function in supporting part of the roof load, and its function in forming a tie or connecting plate between the corner posts. Then, there are the weaving stresses, due to movements in the car superstructure, and which tend to bend or deflect the ends diagonally. Third, there are the various service shocks which may result from the thrusting of the cargo of the car against the end structure consequent upon a shifting of the cargo, and the various stresses resulting from exterior or interior impacts, wrenching tendencies and the like, resulting from collisions, sudden stopping and starting, and the various other service shocks and vibrations.

It has been customary to stiffen the metal sections of which the ends are made up by corrugations or ribs pressed in the metal, which ribs give the metal added stability or stiffness and enable it to resist various bending tendencies. It has been found, however, that merely corrugating the metal in itself is not sufficient for the reason that when the cargo is violently thrust against the end plates, the plates are frequently bent along the longitudinal axes of the corrugations, the result being that the plates are bulged outwardly, the corrugations being flattened and their cross-sectional contour distorted. Furthermore, the shock of the shifting cargo, if sufficient, may tear the end structure loose from its fastenings to the corner posts or the horizontal framing members. Furthermore, these or other service shocks frequently operate to spring the sections apart from the joints where they are connected together, thus rendering the end structure leaky.

In my present invention, I have devised a construction in which the sheet metal is so corrugated as to give the structure not only the requisite stiffness and stability, but also so as to prevent flattening out or bending of the metal on the longitudinal axes of the corrugations. Furthermore, the meeting portions of the sections are so formed and connected as to provide a very strong and rigid beam member extending transversely of the end structure and operating as a brace to prevent bulging, and also to tie the opposite framing members of the car together. Furthermore, the meeting edges are corrugated to give the necessary longitudinal rigidity to the plates, and are so formed and connected as to prevent bulging or distortion of the corrugated portions.

As illustrated in Figs. 1, 2 and 3, it will

be seen that I have provided a first section of sheet metal 1, and a second section 2, said sections being formed with duplicate stampings so that both may be pressed in the same dies. These duplicate stampings include the transverse corrugations 4, local stiffening corrugations 5, and marginal deflected portions or corrugations 6. All of these corrugations are preferably pressed outwardly from the general plane of the sections. The marginal corrugations 6 extend longitudinally of the sections, and are spaced apart longitudinally of the sections by uncorrugated areas. These corrugations 6 are formed by displacing portions of the metal outwardly adjacent the meeting edges of the sections, leaving marginal connecting flanges 7 in the general plane of the sections. The marginal corrugations 6 have their inner sides merging gradually back into the plane of the sections from the apex or crown of the corrugations which is adjacent the connecting flanges. As is best seen in Fig. 3, the end ones of the marginal corrugations 6 taper toward the attaching flanges 3, and merge back into the plane of the sections as they approach the outer margins thereof. The transverse corrugations 4 start adjacent the connecting flanges 7 and extend transversely of the sections approximately to the opposite margins, decreasing gradually in depth from the flanges 7 to the outer margins. The stiffening corrugations 5 are disposed in the intervals between the other corrugations for the purpose of stiffening the metal.

The connecting flanges 7 on the juxtaposed sections are overlapped and secured together by a row of fastenings 8, the transverse corrugations 4 of the different sections being in alinement, and the marginal corrugations 6 of the different sections being adjacent each other. A tie plate 9 is then applied over the juxtaposed marginal corrugations 6 and the adjacent ends of the transverse corrugations 4 of both sections, and is connected to the crown portions of these corrugations by the rows of fastenings 10. The ends of the tie plate are bent rearwardly to form attaching members 11 which may extend to the transom post, or the upper and lower framing members of the car, and by being attached thereto provide a very firm and well-anchored attachment for the end structure.

The tie plate 9, with the corrugations 6 and flanges 7 acting in coöperation, forms a beam extending across the end structure and operating to greatly strengthen and reinforce it longitudinally of the sections. The overlapped flanges 7 which are substantially in the plane of the sections, form the inner member, and the tie plate 9 and crown portions of the corrugations 6, form the outer member of this beam. The transverse corrugations 4 form continuous transverse beams across the entire end structure and intersecting the beam formed by the tie plate 9 and its coöperating portions. It will be seen that the beams formed by the corrugations 4 and tie plate 9 intersect the beam formed by the tie plate 9, corrugations 6, and flanges 7, the flanges 7 forming the inner members of the transverse beam intermediate the ends of the corrugations 4, and the tie plate 9 forming the outer members of the transverse beam intermediate the corrugations 4, said tie plate forming in effect a continuation of the crest or crown portion of the corrugations 4 lying outside the plane of the sections. As a result of this construction, I have a construction which is very stiff across the joint both longitudinally and transversely. Furthermore, I have a construction in which there is but slight possibility of the corrugations being bent on their longitudinal axes. The tie plate 9, being secured to the marginal corrugations 6 of the two sections, will operate to prevent the intermediate portions of the sections including the connecting flanges 7, being driven outwardly by pressure within the car. The marginal corrugations 6 and stiffening corrugations 5 coöperate with the transverse corrugations 4 so that they counteract tendencies which would cause one another to be bent on their longitudinal axes.

This construction in which I have a beam member running longitudinally of the plates across the entire width of the end structure, and another beam member extending across the end structure from margain to margin transversely to and intersecting the first beam member, limits the areas in which weaving tendencies can be effective to the corner portions of the sections intermediate the adjacent arms of the beam members. The stiffening corrugations 5 being disposed in these corner portions effectively stiffen the metal so that the weaving tendencies are resisted with the result that I have a very stable end structure well adapted to carry the various structural loads as well as sustain the shocks of service.

In Figs. 4, 5 and 6, I show a modified form in which the number of transverse corrugations 4 is increased forming substantially two composite beam members. In this form the marginal corrugations 6 are necessarily shorter to provide room for the intersection of increased number of transverse ribs 4. The pair of ribs forming each of the composite transverse beam members is tied together by stiffening rib 5^a which intersects both of the corrugations of the pair merging into the latter at the line where the metal departs from the plane of the section. Besides operating to stiffen the section, these ribs 5^a also reinforce the ribs 4, as they tend to prevent the spreading or flat-

tening out of the ribs by a bend on the line at which the metal forming the corrugation departs from the plane of the section. The ribs 4 are here shown further provided with beads 4^a which are simply small portions struck up transversely in the top or crown of the rib. These beads resist any tendency which would bend the corrugations in the line of the latter's longitudinal axis. and hence coöperate with the corrugations 5^c to prevent spreading or flattening out of the ribs 4.

In Figs. 7 and 8, I have shown a modification in which the stiffening corrugations 5^a are not continuous between the ribs 4, and the beads 4^a are spaced apart from the stiffening corrugations 5^a.

It is obvious that the joined edges of the sections in the forms above described may be disposed either horizontally or vertically in the end structure.

In Figs. 9, 10 and 11, I show a second modified form in which the sections are joined on a vertical line, the tie plate 9, of course, being disposed vertically and provided with the flanges 11^a adapted for attachment to the end sill and the ridge pole. In this form, the number of transverse corrugations 4 is increased and the stiffening corrugations 5 are omitted, although, of course, the structure could be supplied with stiffening corrugations disposed transversely of the corrugations 4 if desired, or the corrugations 4 may be provided with the stiffening beads as illustrated in Figs. 7 and 8.

I am aware that the structure is capable of various changes and modifications not herein illustrated and described, without departing from the spirit and scope of the invention.

What I claim is:

1. In a car end, a pair of sheet metal sections provided with corrugations extending in transverse directions, the meeting edges of the sections being secured together, and protuberant portions of the corrugations adjacent the meeting edges being secured together to provide continuous beam members extending at right angles to each other substantially between the opposite sides of the sections.

2. In an end structure, a pair of sheet metal sections having portions adjacent their meeting edges secured together substantially in the plane of the sections, and protuberant portions adjacent their meeting edges secured together across said edges in a plane removed from the plane of the sections to provide a continuous beam member extending along the line of jointure and between opposite margins of the sections.

3. In an end structure, a pair of conjoined sheet metal sections formed with corrugations extending at an angle from their meeting edges, the meeting edges of the sections being secured together in one plane and corrugations in the separate sections being secured together in another plane to form beam members crossing the joint.

4. In an end structure, a pair of sheet metal sections having their meeting edges secured together and provided with corrugations adjacent thereto, and a tie plate extending longitudinally of the sections and secured to the tops of the corrugations in the respective sections adjacent the joined edges of the sections.

5. In an end structure, a pair of sheet metal sections having their meeting edges joined together, said sections being provided with corrugations spaced apart from their meeting edges, and a member spaced apart from the body of the sections and extending across the meeting edges and secured to outstanding portions of the corrugations on opposite sides of the joint.

6. In a car end, a pair of sheet metal sections having their meeting edges secured together and provided adjacent their meeting edges with out-pressed portions spaced apart from the meeting edges, and a tie member extending longitudinally of said sections and secured to said out-pressed portions thereof.

7. In an end structure, a pair of sheet metal sections formed with alined transversely extending displaced portions terminating adjacent their meeting edges, and connecting flanges adjacent said displaced portions, the connecting flanges of the different sections being secured together, and the alined displaced portions of the different sections being secured together across the connecting flanges.

8. In a car end, a sheet metal section having a rib formed therein, and having formed therein a stiffening corrugation intersecting the rib at its line of departure from the plane of the section, said rib being provided with a bead struck up in its crown portion and extending transversely thereof for the purpose described.

9. In an end structure, a pair of sheet metal sections having their meeting edges secured together, said sections being provided adjacent their meeting edges with longitudinally extending corrugations, and a tie member connecting outwardly pressed portions of said corrugations to form a beam member extending longitudinally of the sections at their meeting edges.

10. In a car end, a pair of sheet metal sections having their meeting edges secured together, said sections being provided with transversely disposed corrugations terminating adjacent their meeting edges, and a tie member secured to out-pressed portions of said corrugations to provide a beam member across the line of jointure of the sections.

11. In an end structure, a pair of sheet

metal corrugations having their meeting edges secured together and provided with corrugations adjacent thereto, and a tie plate extending longitudinally of the sections and secured to the tops of the corrugations adjacent the joined edges of the sections, the ends of said tie plate being adapted for attachment to the superstructure of a car.

12. In an end structure, a pair of sheet metal sections having their meeting edges joined together, said sections being provided with corrugations adjacent their meeting edges, a member spaced apart from and extending across the meeting edges and secured to the corrugations at both sides of the joint, and means for securing the ends of said member to the superstructure of a car.

13. In a car end, a pair of sheet metal sections having their meeting edges secured together and provided adjacent their meeting edges with out-pressed portions, and a tie member extending longitudinally of said sections and secured to said out-pressed portions thereof and provided with means at its end whereby it may be attached to the superstructure of a car.

14. In an end structure, a pair of sheet metal sections having their meeting edges secured together, said sections being provided adjacent their meeting edges with longitudinally extending corrugations, a tie member connecting outwardly pressed portions of said corrugations to form a beam member extending longitudinally of the sections along the joint at their meeting edges, and means whereby the beam member so formed may be secured to the superstructure of a car.

15. In a car end, a pair of sheet metal sections having their meeting edges secured together, said sections being provided with transversely disposed corrugations terminating adjacent their meeting edges, and a tie member secured to out-pressed portions of said corrugations to provide a beam member across the line of jointure of the sections, said tie member being provided with means at its ends whereby it may be secured to the superstructure of a car.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this first day of March, 1915.

PAUL M. BEARD.

Witnesses:
OSCAR HOCHBERG,
RODNEY BEDELL.