May 24, 1927. 1,630,001

K. C. GARDNER

CAR CONSTRUCTION

Filed Jan. 12, 1927 3 Sheets-Sheet 1

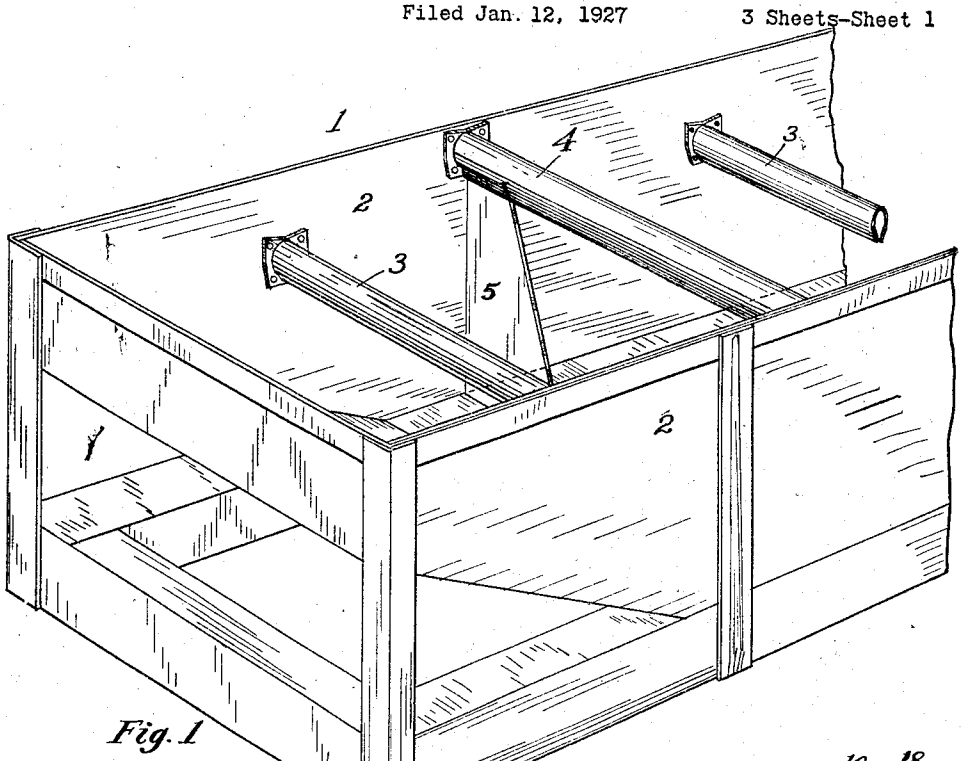


Fig. 1

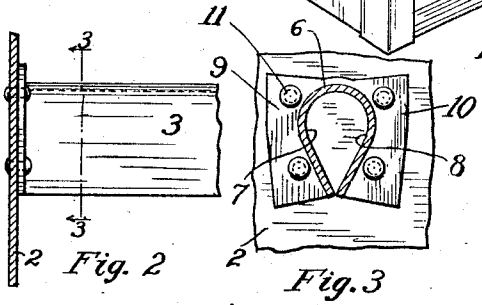


Fig. 2

Fig. 3

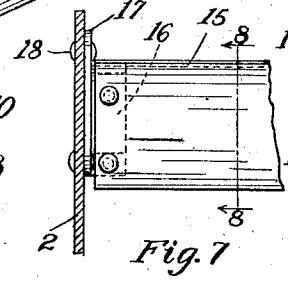


Fig. 7

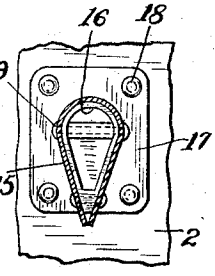


Fig. 8

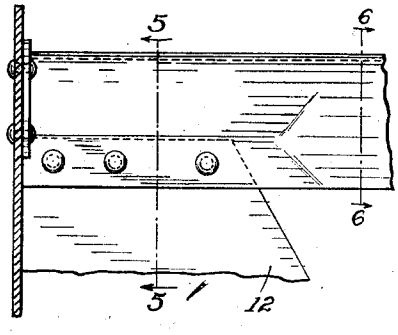


Fig. 4

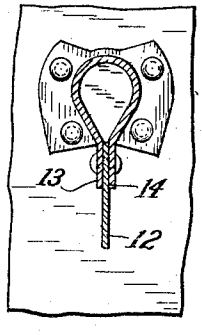


Fig. 5



Fig. 6

INVENTOR.
Kenneth C. Gardner
BY
Day, Oberlin & Day
ATTORNEYS

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K. C. GARDNER

CAR CONSTRUCTION

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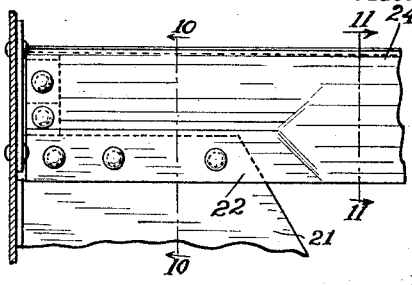


Fig. 9

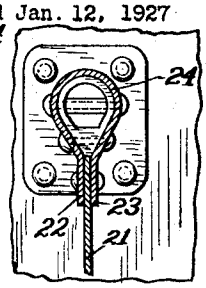


Fig. 10

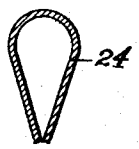


Fig. 11

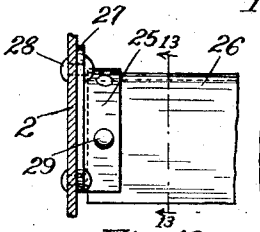


Fig. 12

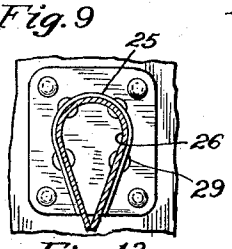


Fig. 13

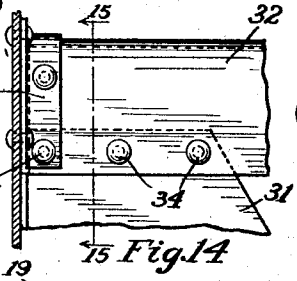


Fig. 14

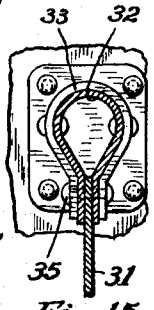


Fig. 15

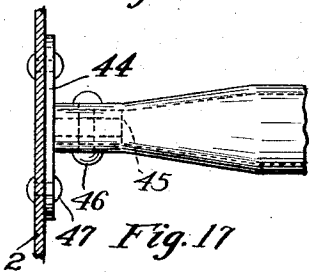


Fig. 17

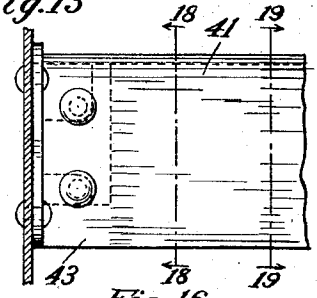


Fig. 16

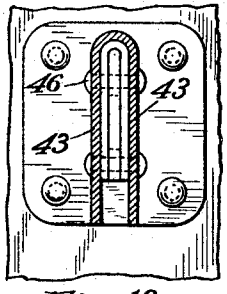


Fig. 18

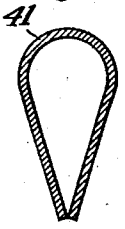


Fig. 19

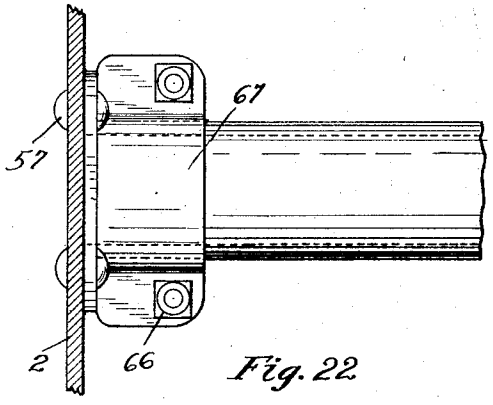


Fig. 22

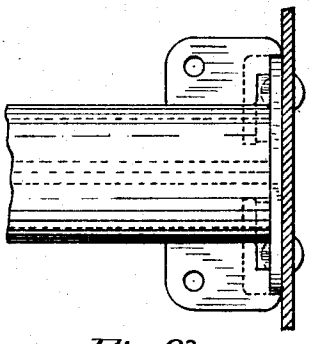


Fig. 23

INVENTOR.

Kenneth C. Gardner

BY

Fay, Oberlin & Fay

ATTORNEYS

May 24, 1927. 1,630,001

K. C. GARDNER

CAR CONSTRUCTION

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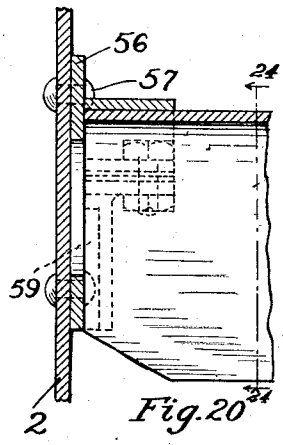


Fig. 20

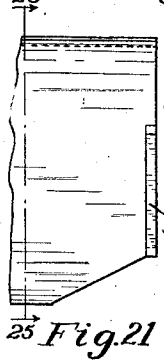


Fig. 21

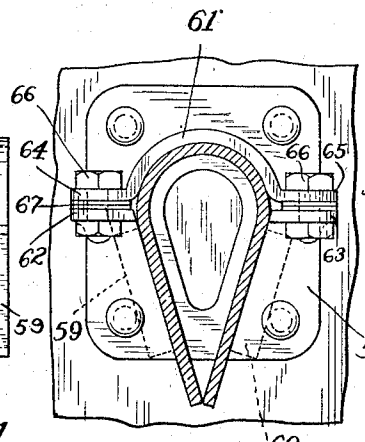


Fig. 24

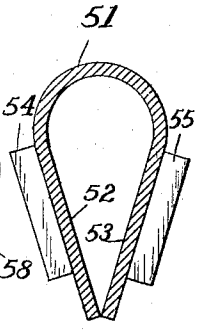


Fig. 25

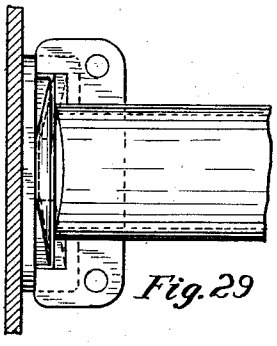


Fig. 29

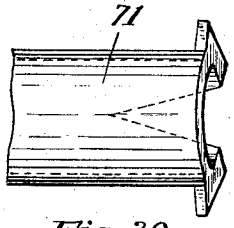


Fig. 30

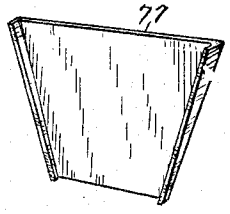


Fig. 31

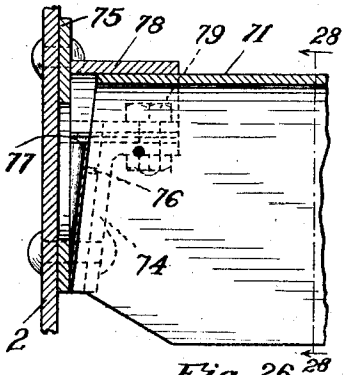


Fig. 26

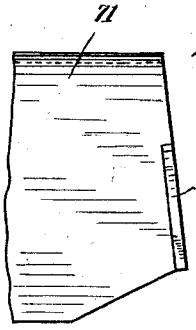


Fig. 27

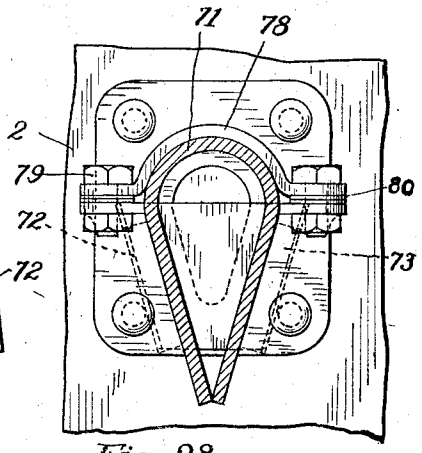


Fig. 28

INVENTOR.

Kenneth C. Gardner

BY

Fay, Oberlin & Fay.

ATTORNEYS

Patented May 24, 1927. 1,630,001

UNITED STATES PATENT OFFICE.

KENNETH C. GARDNER, OF GREENVILLE, PENNSYLVANIA, ASSIGNOR TO THE GREENVILLE STEEL CAR COMPANY, OF GREENVILLE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CAR CONSTRUCTION.

Application filed January 12, 1927. Serial No. 160,615.

This invention as indicated relates to car construction. More particularly it comprises structural elements adapted to form parts of railroad cars especially those of the gondola and hopper type. It includes cross braces or cross ties for such structures and parts associated therewith such as bulk heads and gussets and securing and adjusting elements. The invention is particularly adapted for metal car constructions but may be found desirable in connection with car bodies of other material such as composition sheets or wood combined with metal or other combinations thereof.

Heretofore it has been the usual practice to brace gondola and other types of railway cars by means of cross plates or angle or channel bars which are riveted or otherwise secured to the sides. Such bracing members are necessarily of large size when made of sufficient strength and thus interfere with proper loading and unloading operations as well as lessen to some extent the effective load capacity of the cars. They are also subject to injury under conditions of severe usage and are especially subject to corrosion.

The principal object of the present invention is to obviate the difficulties referred to and to provide a car construction of improved form and which will have a longer term of service than those ordinarily employed. Another object of the invention is to provide a cross brace and associated parts for railway cars of the high side open type which may be economically manufactured and easily installed, and which also may be readily replaced when necessary. A further object of the invention is to provide a cross tie which may be made in standard sizes and readily adapted for use to brace the sides of railway cars which vary in spacing from each other slightly from such standard lengths, without loss of structural strength and without deforming the sides of such car bodies and placing an undue strain thereon. Another object of the invention is to form a cross tie of a folded sheet of meal of uniform gauge which will have a high degree of strength due to its cross sectional form and which will prevent the accumulation of dirt and moisture thereon with attendant lessening of the life of the structure. Another object of the invention is to provide a cross tie which will not require riveting across its lower edge because of its having sufficient strength due to the gauge of the material and its cross sectional form as well as its method of attachment to the car sides at its respective ends. A still further object of the invention is to provide a cross tie adapted to engage separable supporting members rigidly connected with the the car sides and from which it may readily be removed with a minimum of labor. Another object of the invention is to provide a cross tie and end supports which will embody adjustments for firmly holding the same against the end plate as well as making the same readily replaceable. Other and further objects of the invention will appear in the course of the following description. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain structure embodying the invention, such disclosed means constituting, however, but several of various structural forms in which the principle of the invention may be used.

In said annexed drawing:

Fig. 1 is a perspective view showing a hopper type car provided with a cross tie construction embodying the principles of the invention; Fig. 2 is a side elevation of one end of one form of cross tie made in accordance with the principles of the invention; Fig. 3 is a cross section of the structure shown in Fig. 2 taken along the line 3—3 looking in the direction of the arrows; Fig. 4 is an elevation of an end portion of a cross tie of the type shown in Figs. 2 and 3 as modified adjacent the end to support the upper edge of a gusset plate; Figs. 5 and 6 are sectional views taken on the lines 5—5 and 6—6 respectively of Fig. 4; looking in the direction of the arrows; Fig. 7 is a side elevation of an end of a cross tie provided with an internal support in place of integral flanges as in Fig. 2; Fig. 8 is a sectional view of the structure shown in Fig. 7 taken along the line 8—8, looking in the direction of the arrows; Fig. 9 is a view of the structure shown in Fig. 7 as modified to support the upper edge of a gusset plate; Figs. 10 and 11 are sectional views taken along the lines 10—10 and 11—11, looking

in the direction of the arrows; Fig. 12 is a side elevation of an end of a cross tie showing an external supporting member for the same; Fig. 13 is a sectional view taken along the line 13—13 of Fig. 12; Fig. 14 is a side elevation of one end of a cross tie of the type shown in Fig. 12, as modified to support the upper edge of a gusset plate; Fig. 15 is a sectional view taken along the line 15—15 shown in Fig. 14; Fig. 16 is a side elevation showing a still further modified form of end support for a cross tie; Fig. 17 is a top plan view of the construction shown in Fig. 16; Figs. 18 and 19 are sectional views taken along the lines 18—18 and 19—19 respectively shown in Fig. 16, looking in the direction of the arrows; Fig. 20 is a central vertical sectional view of one end of a cross tie and a supporting plate therefor with which it is adapted to be removably engaged; Fig. 21 is a side elevation of the cross tie shown in Fig. 20 illustrating the position of one of the side flanges; Fig. 22 is a top plan view of the construction illustrated in Fig. 20; Fig. 23 is a view similar to Fig. 22 but showing the top clamping plate removed; Fig. 24 is a sectional view taken along the line 24—24 indicated in Fig. 20, looking in the direction of the arrows; Fig. 25 is a sectional view taken along the line 25—25 shown in Fig. 21 looking in the direction of the arrows; Fig. 26 is a central vertical sectional view of a modified form of cross tie and supporting member adapted to endwise adjustment as well as for ready replacement; Fig. 27 is a side elevation of the end of the cross tie shown in Fig. 26 indicating the position of one of the side flanges; Fig. 28 is a sectional view taken along the line 28—28—shown in Fig. 26 looking in the direction of the arrows; Fig. 29 is a top plan view of the construction shown in Fig. 26 with the strap omitted; Fig. 30 is a top plan view of the construction shown in Fig. 27; and Fig. 31 is a perspective view of one of the wedge blocks employed in the modified form of construction shown in Figs. 26, 28 and 29.

As is clearly shown in Fig. 1 of the drawing, the high car sides 2 of a hopper car 1 are braced transversely by means of a plurality of cross ties. The cross ties 3 are inserted centrally of their respective hopper compartments spaced a short distance below the top edge of the car sides and the cross tie 4 at its ends is engaged over and secured to the upper edge of a gusset plate or partition 5, and is secured at its ends closely adjacent the upper edges of the respective car sides.

The form of construction illustrated in Fig. 1 is shown in detail in Figs. 2 to 6. In said figures the cross tie is shown to be formed of a plate of heavy gauge sheet metal bent along its longitudinal median line to form an upper edge 6 substantially semi-circular in cross section and a pair of downwardly extending substantially flat sides 7, 8 which closely approach and preferably touch adjacent their lower inner edges. No rivets or other fastening means are applied to the lower edges of the plate, the gauge of the sheet being sufficient to maintain said edges in the position stated when the ends of the cross tie are secured to the respective car sides.

The means of connecting the cross tie to the car sides comprises as shown, a pair of flanges 9, 10, formed integrally by slitting or punching the ends of the plate at a central point before forming the cross tie. The end flanges are bent outwardly and are provided with holes for rivets 11, or other fastening means which serve to connect the flanges to the adjacent car side.

When it is desired to connect a cross tie of the form shown in Figs. 2 and 3 with a gusset plate such as is shown in Figs. 1 and 4, it is found desirable to flatten the lower edges of the depending side members of the cross tie adjacent the ends and place the rivets therethrough which will also pass through the upper edge of the gusset plate. In the construction illustrated a gusset plate 12 is clamped between the pair of parallel lower edges 13 of the cross tie adjacent each of its outer ends. The central portion of the cross tie will be of the same cross section as that heretofore described which is illustrated in Fig. 6. The gusset plates may be reversed to have their broader portions at their upper edges, the extent of the connection with cross tie being correspondingly increased.

Instead of forming integral flanges upon the cross tie, it may be found desirable to provide a supporting plate with a projecting boss or flange with which a cross tie with plain ends may be engaged. In the form of construction shown in Figs. 7 and 8, a cross tie 15 of the cross sectional form shown in Figs. 2 and 3 is engaged over a suitably shaped flange 16 formed integrally with a supporting plate 17 which is secured by rivets 18 or other fastening means to the side wall 2 of the car. The respective ends of the cross tie 15 may be secured to the flanges 16 by means of rivets 19 or similar fastening devices. The construction illustrated in Figs. 7 and 8 is also adapted for supporting a gusset plate as is clearly shown in Figs. 9 and 10, the gusset plate 21 being engaged between the parallel lower edges 22, 23 at the outer ends of the cross tie 24.

In Figs. 12 and 13 in place of a flange upon the supporting plate over which the cross tie is adapted to engage, a suitably shaped flange 25 is provided which is adapted to engage externally around the cross tie 26 such flange being mounted upon a sup-

porting plate 27 secured by rivets 28 or other suitable fastening means to the adjacent car side. Rivets 29 may be engaged through each of the flanges and the respective ends of the cross tie.

In Figs. 14 and 15 the method of supporting a gusset 31 in a cross tie 32 engaged within an external supporting flange 33 is shown. The lower edges of the cross tie are pressed to parallel relation and the upper edge of the gusset is inserted between them and engaged by a plurality of rivets 34. The end rivet 35 preferably will also extend through the depending edges of the supporting flange 33 as is clearly shown in Fig. 15.

A still further modified form of cross tie support is shown in Figs. 16–19, the cross tie 41 being of the above described cross section across its central part as shown in Fig. 19, but being flattened to provide a pair of parallel sides 42, 43 adjacent each of its ends. A supporting plate 44 is provided with an outwardly extending inverted U-shaped boss 45 over which the folded flattened end portion of the cross tie is adapted to engage. Rivets 46 or other fastening means may be engaged through suitable apertures through the flattened sides of the cross tie and the supporting boss. The plate may be secured to the car side by means of rivets or other fastening devices 47.

The cross ties heretofore described are adapted to be permanently secured to the car sides by means of rivets passing through the integral flanges of said cross ties or through flanges formed on supporting members which are riveted to the ends of the cross ties. In the construction illustrated in Figs. 22–31, the cross tie is adapted to be detachably supported at each of its ends. In addition to the provision for the ready removal of the cross tie, the form of construction shown in Figs. 26 to 31 illustrates means for securing the cross tie in rigid adjustment with the respective car sides, and eliminating endwise motion thereon.

The cross tie, when intended for removable connection with the car sides 51 is provided with a cross sectional shape similar to that originally described and illustrated in Fig. 3 with an upper edge of substantially semi-circular cross section and depending flattened portions 52, 53 which approach each other at an angle and preferably meet at their inner lower edges, but which are unsecured by rivets or other fastening elements at any point along the lower edge. Integral side flanges 54, 55 are formed adjacent each of the ends of said inclined flattened portions of the cross tie as is clearly shown in Fig. 25. A supporting plate 56 is adapted to be secured to the adjacent side wall of the car body by means of rivets 57 or other suitable attaching devices. The lower portion of the plate 56 is provided with an integral enlargement 58 at either side which is channeled at its inner edge to provide a pair of inclined grooves 59, 60, which are inclined toward each other to form a V-shaped groove within which the respective flanges 54, 55 at the end of the cross tie 51 are adapted to be engaged. A plate or strap 61 having flattened ends and a semi-circular central portion is adapted to engage over the curved upper edge of the cross tie to hold the same with its lateral flanges firmly engaged in the V-shaped groove of the supporting plate.

A pair of projecting ears 62, 63 are formed on the enlarged lower portions of the supporting plate. The flattened ends 64, 65 of the strap 61 are provided with perforations in alignment with similar perforations through said ears, and bolts 66 or other suitable securing devices are engaged therethrough to draw said straps downwardly against the upper edge of the cross tie. Washers 67 may be positioned between flattened portions of the strap and the adjacent ears so that the degree of clamping to be exerted upon the cross tie may be varied as desired.

The construction just described does not provide for endwise adjustment of the cross tie. It is found, however, that many cars vary slightly in transverse dimension and in order to attach a cross tie to the same, it is necessary to move said car sides apart or draw them together as the case may be. This practice is undesirable where the degree of adjustment is considerable for the reason that a permanent strain will be placed upon the car sides and throw all associated parts out of alignment. It has, therefore, been found desirable to provide for an endwise adjustment for the cross tie. This is accomplished by means of the construction illustrated in Figs. 26 to 31 inclusive. In said construction, the cross tie 71 at its ends is beveled downwardly at its lateral edges and upwardly at each of its end faces so that the flanges 72, 73 set at an angle as viewed from the side as well as when viewed from the end. The enlarged portions 74 of the supporting plate 75 are likewise provided with inclined forward faces, for each of the grooves 76, against which the adjacent faces of the inclined flanges may be engaged. The remaining portion of each groove is adapted to receive a wedge plate 77 which has bent portions at each lateral edge which are tapered downwardly, said plate is also of lesser transverse dimension adjacent its lower edge than at its upper edge. The wedge plates thus are adapted to prevent endwise motion of the cross tie and will firmly hold the same in rigid relation with the car sides. A strap 78 similar to the strap 61 heretofore described will serve to hold the cross tie firmly

within the V-shaped groove at the lower portion of the supporting plate, being secured thereto by bolts 79. Shims or washers 80 may be inserted over said bolts between the strap and the plate and may be of sufficient size to press upon the upper edge of the wedge plate to force the same downwardly. In order to remove a cross tie of the character just described, it is merely required that the bolts 79 securing the cross strap to the lower portion of the supporting plate be removed, the wedge plate forced upwardly and the cross tie removed upwardly from each of the V-shaped recesses at its opposite ends.

As has been indicated, the use of a sheet of metal of suitable gauge not only provides a structure of great strength but one which may be manufactured at a minimum cost. If tubing of like weight were used with sockets or other securing means at each of its ends, the cost of the same would be greatly increased, and the strength of the structure less. By using standard plates as the stock from which the cross ties are made and cutting them to suitable lengths and bending them in the manner heretofore described, the manufacture of the cross tie is one which may be readily carried out by quantity production methods and without the employment of highly skilled labor. The end supporting plates last described may be formed of simple castings which likewise may be most economically produced. Thus a construction is provided which is superior to those in common use in the matter of strength and safety, and which at the same time may be manufactured and installed, or replaced, with one of the type last described, at a cost much less than that of constructions heretofore used.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. An article of the character described, comprising an elongated sheet metal member formed with an edge of substantially semi-circular cross section and having substantially flat side portions over the greater portion of its length approaching each other at their lower edges, flanges formed at the respective ends of said member and means for securing said member to opposite parts of a structure to be supported.

2. An article of the character described, comprising an elongated sheet metal member having an upper edge of substantially semi-circular cross section and substantially flat depending side portions approaching each other adjacent their lower edges, means for securing said member to opposite structural parts, means for adjustably spacing said member between said structural parts and means for firmly securing the ends of said member to said structural parts.

3. An article of the character described, comprising an elongated sheet metal member bent along a central median line which has free edges approaching each other, attaching means provided at the respective ends of said member, means for fitting said member in endwise engagement with the opposite structural elements, and means for securing said member to said opposite structural elements.

4. An article of the character described, comprising an elongated sheet metal member bent along a central median line which has free edges approaching each other, flanges provided at the respective ends of said member, means for fitting said member in endwise engagement with the opposite structural elements, and means adapted to be secured to said structural elements for detachably clamping said flanges.

5. A bracing member for objects having opposite structural elements to be supported in spaced relation which comprises an elongated sheet metal member bent along a central median line which has free edges approaching each other, flanges provided at the respective ends of said member, wedges for fitting said member in endwise engagement with the opposite structural elements, and means adapted to be secured to said structural elements for detachably clamping said flanges and wedges.

6. A cross tie construction for open type railway cars having in combination a brace member formed of a single sheet of metal folded to provide an upper edge of substantially semi-circular cross section and having substantially flat side portions closely approaching their lower edges centrally of said brace member, and means provided at the respective ends of said brace member for attachment to the opposite sides of said car structure.

7. A cross tie construction for open type railway cars having in combination a brace member formed of a single sheet of metal folded to provide an upper edge of substantially semi-circular cross section and having substantially flat side portions closely approaching their lower edges centrally of said brace member, flanges at the respective ends of said brace member and means for firmly securing said flanges to the opposite sides of said car structure.

8. A cross tie construction for open type railway cars having in combination a brace member formed of a single sheet of metal folded to provide an upper edge of substantially semi-circular cross section and having

substantially flat side portions closely approaching at their lower edges centrally of said brace member, a pair of integral flanges at each of the respective ends of said brace member, and means for firmly securing said flanges to the opposite sides of the car structure.

9. A cross tie construction for open type railway cars having in combination a brace member formed of a single sheet of metal folded to provide an upper edge of substantially semi-circular cross section and having substantially flat side portions closely approaching at their lower edges centrally of said brace member, a pair of integral flanges at each of the respective ends of said brace member, and means for detachably clamping said flanges to the opposite sides of the car structure.

10. A cross tie construction for open type railway cars having in combination a brace member formed of a single sheet of metal folded to provide an upper edge of substantially semi-circular cross section and having substantially flat side portions closely approaching at their lower edges centrally of said brace member, a pair of integral flanges at each of the respective ends of said brace member, means for firmly securing said flanges to the opposite sides of the car structure, and adjustably spacing said brace member with respect to the car sides.

11. A brace member formed of an elongated section of uniform gauge bent along its central median line to form an edge of substantially semi-circular cross section, having substantially flat side portions angularly disposed and closely approaching each other adjacent their inner longitudinal edges, and integral flanges formed at the respective ends of said brace member for securing the same to the adjacent car sides.

Signed by me this 4th day of January, 1927.

KENNETH C. GARDNER.