April 24, 1934. E. R. SWANSON 1,956,302

RAILWAY CAR

Filed June 30, 1930 4 Sheets-Sheet 1

Fig. 1.

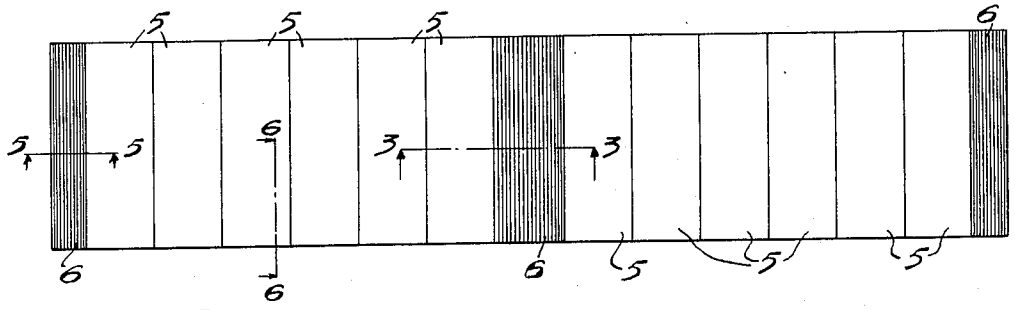


Fig. 2.

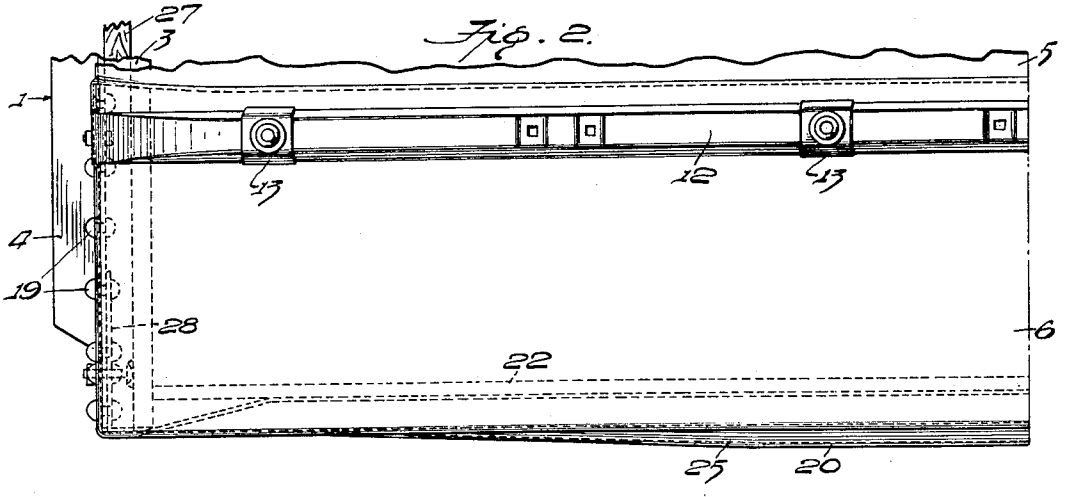


Fig. 3.

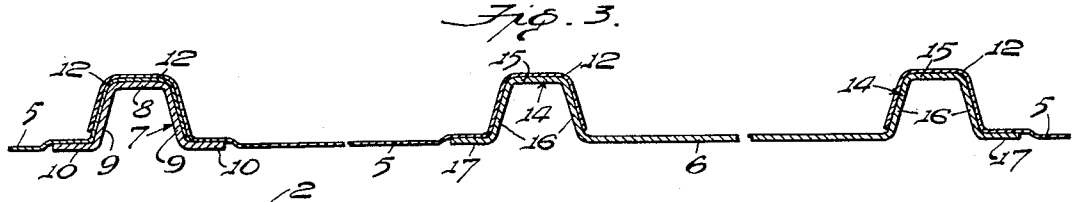


Fig. 7.

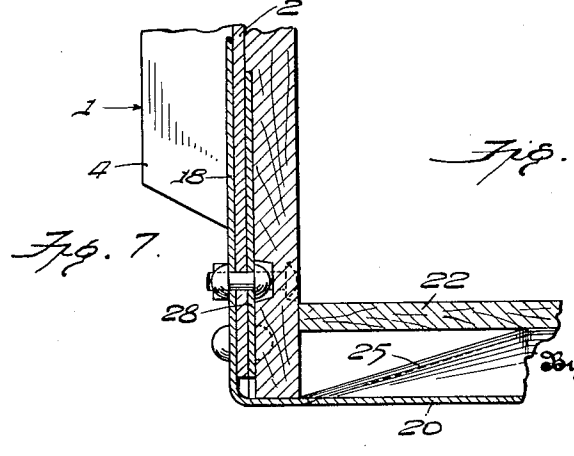
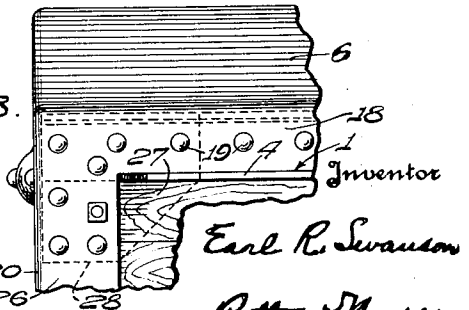


Fig. 8.



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April 24, 1934. E. R. SWANSON 1,956,302

RAILWAY CAR

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Fig. 5.

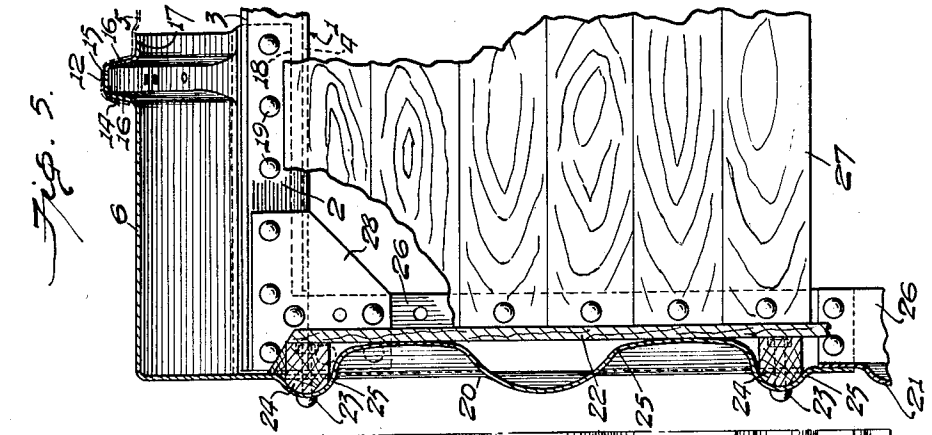


Fig. 6.

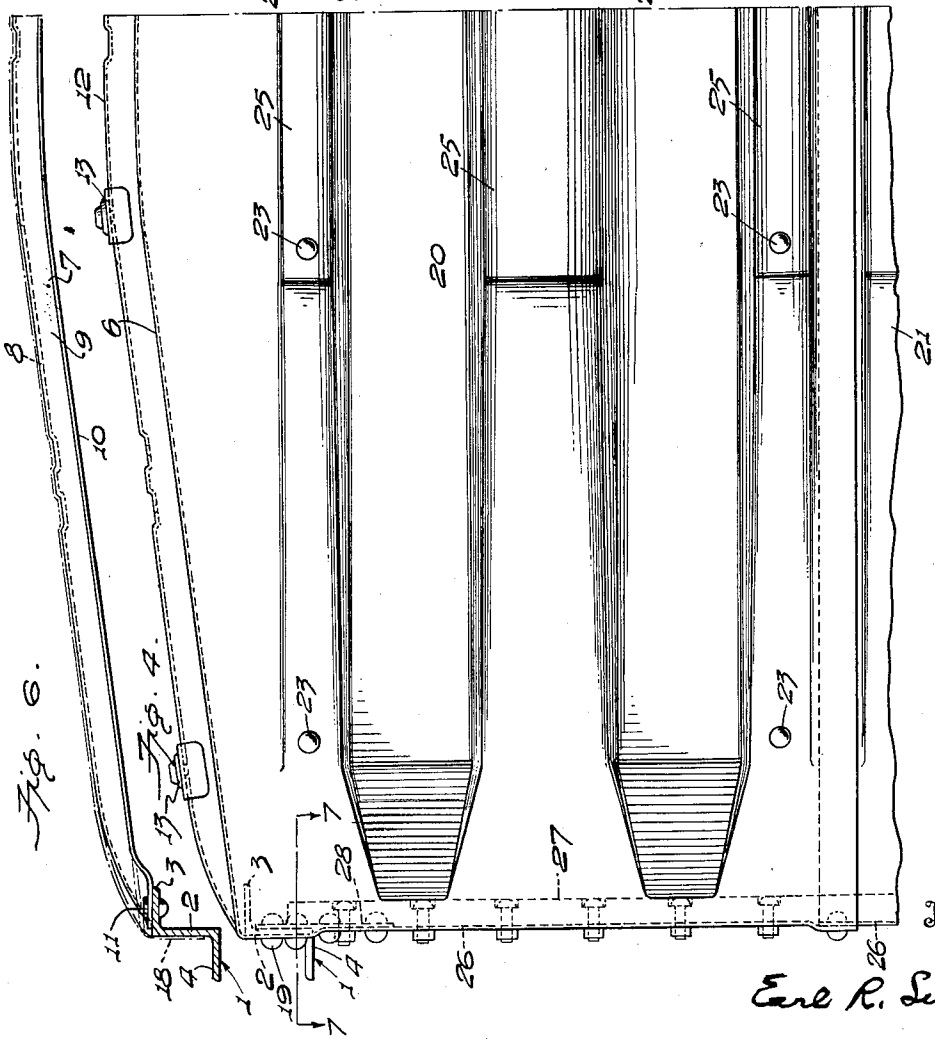


Fig. 4.

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April 24, 1934. E. R. SWANSON 1,956,302

RAILWAY CAR

Filed June 30, 1930 4 Sheets-Sheet 3

Fig. 9

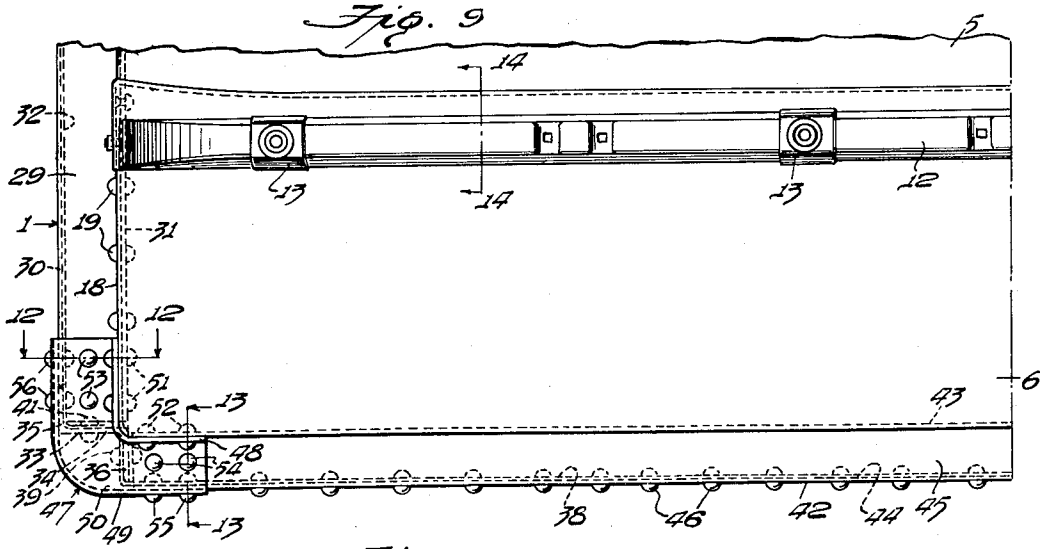


Fig. 10.

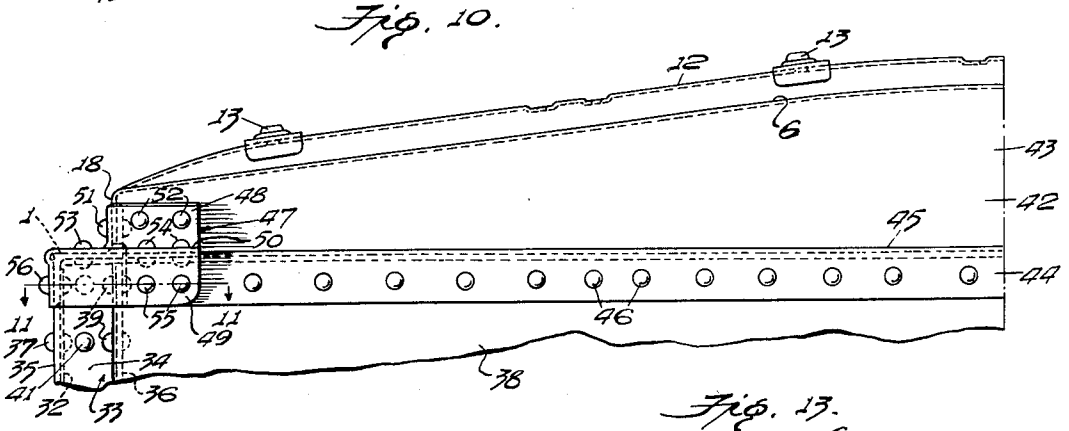


Fig. 11.

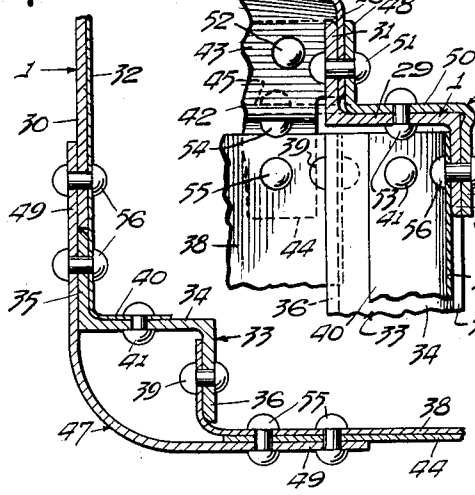


Fig. 12.

Fig. 13.

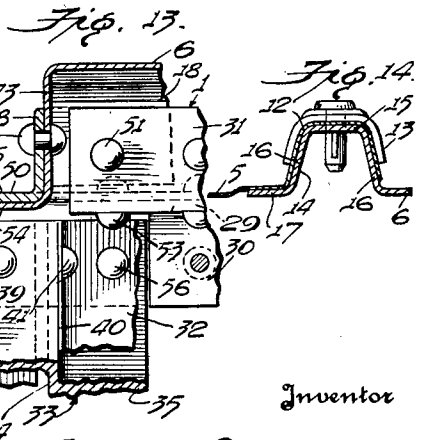


Fig. 14.

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RAILWAY CAR

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Fig. 15.

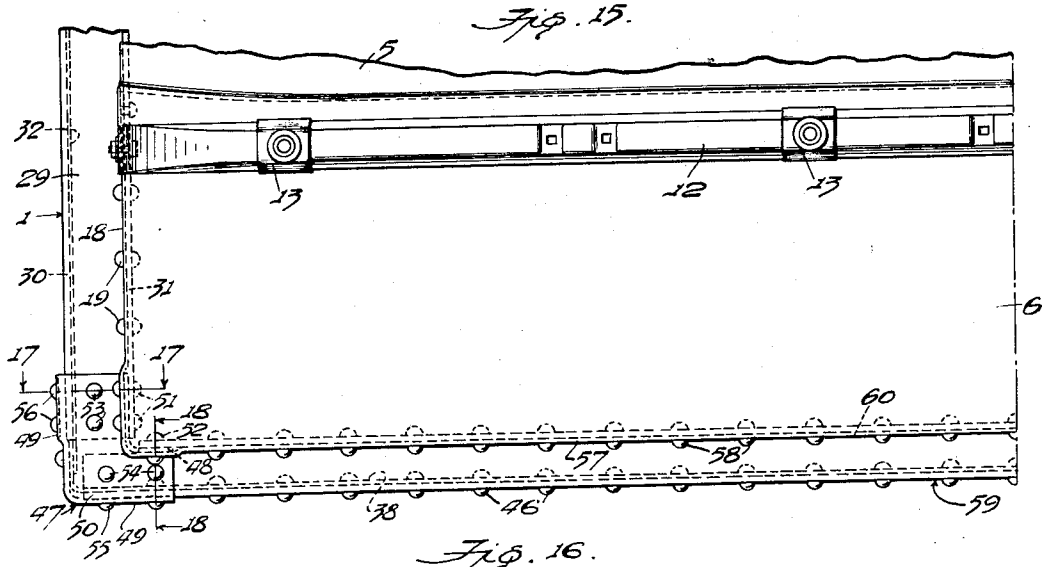


Fig. 16.

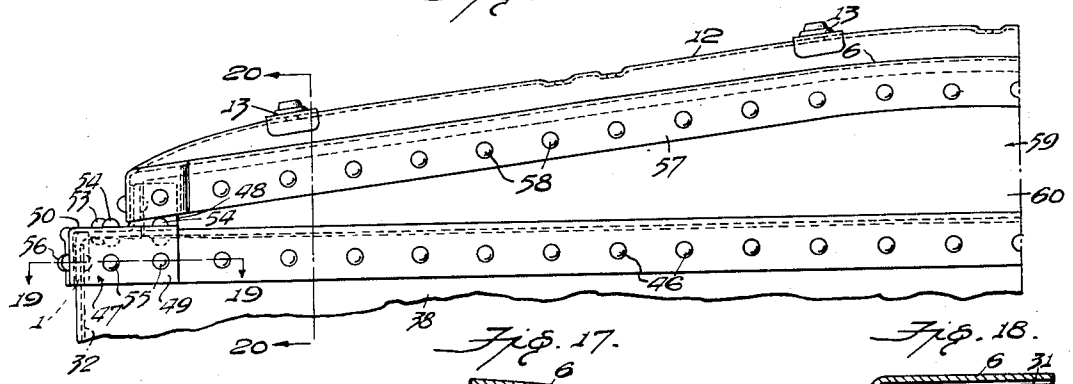


Fig. 17.

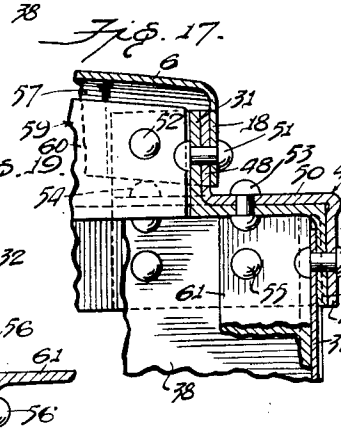


Fig. 18.

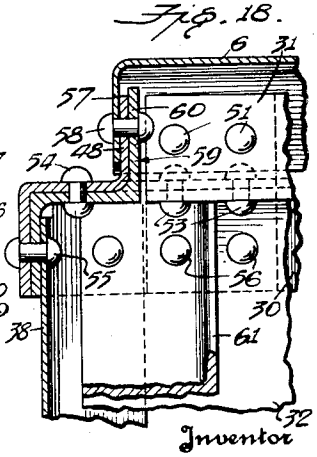


Fig. 20.

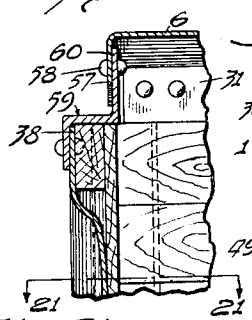


Fig. 19.

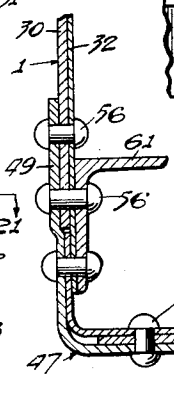
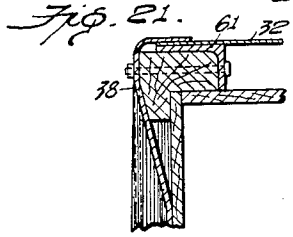


Fig. 21.



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Patented Apr. 24, 1934 1,956,302

UNITED STATES PATENT OFFICE

1,956,302

RAILWAY CAR

Earl R. Swanson, Chicago, Ill.

Application June 30, 1930, Serial No. 465,031

21 Claims. (Cl. 108—5.4)

My invention relates to railway cars and more particularly to improvements in the super-structure and roofs of cars of the box type.

Considerable difficulty has been experienced in constructing the super-structure and roofs of box cars in such manner as to prevent them from weaving and twisting. Especially is this true in box cars which are longer than usual such as those employed for transporting automobiles and the like. To remedy this very undesirable effect it has been proposed that the side plates of the car, in addition to being connected by the usual carlines, be connected by diagonally arranged braces. Inasmuch as these braces would extend horizontally between the side plates they would reduce the clear inside height of the car and thereby impair the revenue earning capacity thereof. The present invention, therefore, has for one of its objects the provision of means for rigidifying and strengthening the car roof which will not effect the normal inside height of the car, as defined either by the carlines or by the roofing itself.

Still another object of the invention is to integrally form the end roof sheets of the car with end plates which may be conveniently attached to adjacent portions of the car structure.

Still another object of the invention is to integrally form the end roof sheets with the adjacent end sheet of the car.

A primary feature of the invention consists in providing, in combination with the side plates of the car, a plurality of rigidly connected roof sheets, one of which is of heavier gauge than others and constitutes diaphragm means connecting the side plates.

A further feature of the invention consists in providing, in combination with the side plates of the car, at least one roof sheet which is of heavier gauge than other roof sheets and is integrally formed with offset portions constituting carlines.

Another feature of the invention consists in forming the roof sheets adjoining the end of the car of heavier gauge than others of the roof sheets and in rigidly joining the end roof sheets to the side plates and the adjacent end plates so as to constitute diaphragm means connecting these plates.

Still another feature of the invention consists in integrally forming the heavy gauge sheets with offset portions of substantially channel shape constituting carlines adapted to be overlappingly embraced by adjacent roof sheets.

Still another feature of the invention consists in providing, in combination with the side plates of the car, a plurality of rigidly connected roof sheets spanning the space between the side plates, said plurality of roof sheets comprising one relatively heavy gauge sheet and a plurality of contiguous relatively light gauge sheets disposed on each side of the latter, the heavy gauge sheet being integrally formed with offset portions constituting carlines to which portions of the adjacent light gauge sheets are secured, the adjoining portions of contiguous light gauge sheets being rigidly secured to separable carlines.

Still another feature of the invention consists in providing a railway car with an integral sheet metal member provided with angularly disposed portions, one of said portions constituting a roof sheet and the other of said portion constituting an end sheet.

Still another feature of the invention consists in integrally forming the end roof sheet with a downwardly extending portion constituting an end plate of the car.

Still another feature of the invention consists in forming the end plate which is formed integrally with the end roof sheet, of substantially Z-shape having a substantially vertical flange to which an adjacent end sheet of the car may be secured.

Other and more specific features of the invention residing in advantageous forms, combinations and relations of parts will hereinafter appear and be pointed out in the claims.

In the drawings illustrating preferred embodiments of the invention:

Figure 1 is a diagrammatic plan view of the car roof.

Figure 2 is a fragmentary plan view of the portion of the roof adjacent the end of the car.

Figure 3 is a fragmentary enlarged sectional view taken on line 3—3, Figure 1.

Figure 4 is a fragmentary end elevational view of the car.

Figure 5 is a sectional view taken on line 5—5. Figure 1.

Figure 6 is an enlarged sectional view taken on line 6—6, Figure 1, the roof sheets being omitted.

Figure 7 is an enlarged sectional view taken on line 7—7, Figure 4.

Figure 8 is a side elevational view of the car adjacent an upper corner thereof.

Figure 9 is a view corresponding to Figure 2 illustrating a modified form of the invention.

Figure 10 is a fragmentary end elevational view of the car construction illustrated in Figure 9.

Figure 11 is an enlarged sectional view taken on line 11—11, Figure 10.

Figures 12, 13 and 14 are enlarged sectional views taken on lines 12—12, 13—13, 14—14, Figure 9, respectively.

Figure 15 is a view corresponding to Figure 2 illustrating still another modified form of the invention.

Figure 16 is a view corresponding to Figure 10 illustrating the car construction shown in Figure 15.

Figures 17 and 18 are enlarged sectional views taken on lines 17—17, 18—18, Figure 15, respectively.

Figure 19 is an enlarged sectional view taken on line 19—19, Figure 16.

Figure 20 is a sectional view taken on line 20—20, Figure 16.

Figure 21 is a sectional view taken on line 21—21, Figure 20.

Although only one half of the car construction is illustrated in the principal figures of the drawings it will be readily appreciated that the other half of the car is of the same construction.

Referring more particularly to the drawings, 1 indicates one of the side plates which may advantageously be of Z-shape, and, as shown in Figures 1 to 8, inclusive, of the drawings, is so arranged that its web 2 is disposed in a substantially vertical plane while its flanges 3 and 4 respectively extending inwardly and outwardly with respect to the car are disposed in substantially horizontal planes.

Spanning the space between the side plates is a plurality of roof sheets which preferably extend continuously from one side of the car to the other. Some of these sheets, such as those designated by the reference numeral 5, are, as usual, of relatively light gauge while others, such as those designated by the reference numeral 6, are of relatively heavy gauge. Although any number of heavy gauge sheets may be employed and while they may be arranged in any desired relation, the roof diagrammatically illustrated in Figure 1 is shown as having only three heavy gauge sheets, one being disposed in substantially the center of the roof while the others are disposed at the ends of the roof. In this manner a plurality of contiguous light gauge sheets separate or are interposed between each of the heavy gauge sheets.

Connecting the side plates adjacent the adjoining edges of contiguous light gauge sheets are carlines 7 each of which is substantially channel shape having a web 8 and downwardly extending slightly diverging legs 9 which terminate in oppositely disposed laterally extending flanges 10. These flanges not only serve to rigidify and strengthen the carlines but they also serve to supportingly engage the undersides of adjoining portions of adjacent roof sheets. At their ends each of the carlines is rigidly secured to the inwardly projecting flanges 3 of the side plates by rivets 11 which pass through the lateral flanges 10 of the carlines.

To easily and conveniently secure the light gauge roof sheets to the carlines each is formed with a channel shaped portion 12 of substantially the same contour as that of the carlines. The adjacent channel shaped portions of each of the roof sheets are arranged in embracing overlapping relation with each other and with the adjoining carline so that they may be rigidly secured to the carline by any suitable means such as clamps 13 of the type fully described in Patent No. 1,619,282, dated March 1, 1927 to T. H. Williams et al.

Although the heavy gauge roof sheets may also be secured to carlines it is preferred to integrally form these sheets with upwardly extending portions 14 which in themselves constitute carlines. These carline portions 14 are also of a shape similar to the carlines 7 and each comprises a web 15, downwardly extending slightly diverging legs 16 and a laterally extending flange 17. Thus the channel portions 12 of the light gauge roof sheets adjoining the heavy gauge ones may be secured to the carline portions 14 of the latter and cooperate therewith in precisely the same manner in which they are secured to and cooperate with the carlines 7.

To rigidly connect the roof sheets to the side plates, each of them may be conveniently formed with down-turned flanges 18 for attachment to the webs 2 of the side plates by rivets 19. It will thus be perceived that not only are all of the roof sheets rigidly secured to the side plates and to each other between the side plates but the light gauge sheets are also secured to the carlines 7 and to the carline portions 14 of the heavy gauge sheets. Due to the relatively heavy gauge of the sheets 6 and to the fact that they are made rigid with the side plates, they constitute diaphragm means connecting the latter whereby the super-structure of the car will be effectively prevented from weaving and racking.

Each end of the car is preferably formed by a plurality of sheet metal sheets 20 and 21, which, as is usual, extend continuously from one side of the car to the other. If desired, an inside wooden lining 22 may be connected to the end sheets by bolts 23 which pass through filler blocks 24 disposed in corrugations 25 with which the end sheets may be advantageously provided. Each of the end sheets is formed with side marginal flanges 26 for attachment to adjacent parts of the car such as the side wooden sheathing 27. These flanges also serve to stiffen the end sheets and in effect constitute with adjoining portions of the latter, corner posts of the car.

Since the end sheets of the car are subjected to forces of considerable magnitude due to buffing and draft shocks to which the car is subjected and due also to shifting of lading within the car, they are of relatively heavy gauge as compared with the gauge of roof sheets usually employed on box cars. However, in view of the fact, that the roof sheets adjoining the end of the car, that is the end roof sheets, are also of relatively heavy gauge as compared with roof sheets commonly employed, the end sheets adjacent the roof may conveniently be formed integrally with the end roof sheets. In this manner each of the upper corners of the car is provided with a sheet metal member or pressing having angularly disposed portions, one of which constitutes an end sheet and the other of which constitutes a roof sheet. The marginal flanges 26 of the end sheet formed integrally with the roof sheet thus constitute integral continuations of the flanges 18 of the latter. To accommodate the flange 26 of the end sheet the lower outwardly projecting flanges 4 of the side plates terminate adjacent the inner edges of the flanges 26 while the webs 2 and the upper inwardly extending flanges 3 of the side plates continue to adjacent the main body portion of the end sheet. To reinforce the integrally formed end and roof sheets gusset plates or brackets 28 may be respectively secured to adjacent portions of the flanges 18 and 26 thereof.

By providing the car with unitary members having end sheet and roof sheet portions formed with flanges for attachment to adjacent parts of the car it will be perceived that not only is the

construction of the car adjacent its upper corners greatly simplified but the rigidity of the car is materially increased.

In the modified form of the invention illustrated in Figures 9 to 14, inclusive, there has been depicted a construction in which, instead of forming the end sheet adjoining the roof integrally with the end roof sheet, only the end plate of the car is formed integral with the end roof sheet. Although it is preferred to integrally form the end sheet with the relatively heavy gauge end roof sheet some difficulty may be encountered in adapting this construction to all of the various and intricate details of car construction. However, it has been found that the construction illustrated in this modification of the invention may be easily adapted to some designs of cars in which difficulty would be experienced in adapting the construction illustrated in the preferred form of the invention.

Referring more particularly to Figures 9 to 14 of the drawings the side plates of the cars which, as in the principal figures of the drawings are designated by the reference numeral 1, is of Z-shape having a substantially horizontal web 29, an outer downwardly extending flange 30 and an inner upwardly extending flange 31. The flanges 18 of the roof sheets are rigidly secured to the flanges 30 of the side plates while the metal side sheets 32 are secured to the flange 31 thereof. Each corner of the car is provided with a post 33 which may advantageously be of Z-shape comprising a web 34 and oppositely projecting flanges 35 and 36. The flanges 35 afford convenient means to which the adjacent side sheets 32 may be secured by rivets 37 while the flanges 36 afford convenient means to which the end sheets 38 of the car may be attached by rivets 39. The side sheets, in addition to being secured to the flanges 35, may be formed with marginal flanges 40 for attachment to the webs 34 of the corner posts by rivets 41.

The end plate 42 which is integrally formed with the end roof sheet may also be of Z-shape having upper and lower substantially vetrical portions 43 and 44, respectively, connected by substantially horizontal web portion 45. The end sheet adjoining the end plate extends, as do the other end sheets, continuously from one side of the car to the other and is secured by rivets 46 to the lower portion 44 of the end plate.

To rigidly connect adjoining ends of the side and end plates angularly shaped corner brackets 47 are preferably employed. Each of these brackets may be of Z-shape having upper and lower substantially vertical flanges 48 and 49, respectively, and a substantially horizontal web 50. The upper flange 48 is secured to the flange portion 18 of the end roof sheet by rivets 51 and to portion 42 of the end plate by rivets 52, these portions constituting integral continuations of each other. The portion of this flange of the bracket secured to the flange of the roof sheet is also secured to the adjacent flange 31 of the side plate by the rivets 51. The end portions of the webs 29 and 45 of the side plate and end plate respectively terminate adjacent the web 34 and flange 36 of the corner post and are rigidly secured to the web 50 of the brackets by rivets 53 and 54, respectively. The lower vertical flange 49 of each bracket is secured to adjoining portions of the end sheet 38 and flange 44 of the end plate by rivets 55 and to the flange 35 of the corner post and the flange 30 of the side plate by rivets 56, this last-named flange terminating adjacent the inner edge of the flange 35.

By connecting adjoining portions of the side and end plates in this manner it will be perceived that not only are they rigidly secured to each other but the upper corners of the car are materially strengthened.

In Figures 15 to 21, inclusive, of the drawings is shown a still further modification of the invention in which the heavy gauge roof sheets are applied to a car having separately made end plates and end sheets. As shown therein the end roof sheets are formed with flanges 57 adapted to be secured by rivets 58 to a vertical flange 59 of a Z-shaped end plate 60. This end plate is similar to the one illustrated in Figures 9 to 14 inclusive of the drawings and is attached to the side plates 1 by brackets similar to those illustrated in those figures. Corresponding parts of these brackets together with other parts illustrated in Figures 15 to 21, inclusive, corresponding to those illustrated in Figures 9 to 14, inclusive, have been designated by similar reference numerals.

Instead of securing the flanges 48 of the brackets to the adjacent roof sheets in overlapping relation to the outer faces of the flanges 18 thereof, as in Figures 9 to 14, inclusive, they are, as shown in Figures 15 to 21, inclusive, interposed between the marginal flanges of the end roof sheets and adjacent portions of the side and end plates. Furthermore, instead of employing corner posts of Z-shape, angle shaped corner posts 61 may be used to which the end and side sheets are attached, as well as the Z-shaped brackets 47.

From the foregoing it will be perceived that simple and rugged means constituting diaphragms are provided whereby the roof structure is rigidified to prevent weaving and racking of the car. Furthermore, by integrally forming the end roof sheets with adjacent end sheets or with the end plates the car construction is not only materially simplified but it is also further rigidified.

I claim:

1. A roof for railway cars comprising, in combination with the side plates and end plates of the car, a plurality of sheet metal roof sheets rigidly connected to the side plates and rigidly connected to each other between the side plates, the roof sheets adjacent the end plates being rigidly connected thereto and being of heavier gauge than others of said sheets, each of said heavier gauge sheets constituting diaphragm means connecting the side plates and the adjacent end plate.

2. A roof for railway cars comprising, in combination with the side plates of the car, a plurality of sheet metal roof sheets rigidly connected to the side plates and rigidly connected to each other between the side plates, the end roof sheets and at least one other of said sheets being of heavier gauge than others of said sheets, each of said heavier gauge roof sheets constituting diaphragm means connecting the side plates.

3. A roof for railway cars comprising, in combination with the side plates of the car, a plurality of sheet metal roof sheets rigidly secured to the side plates, one of said sheets being of heavier gauge than others of said sheets and constituting diaphragm means connecting the side plates, said heavier gauge sheet being integrally formed adjacent its side edges with inverted channel shaped portions constituting car-

lines, said channel shaped portions being provided with laterally extending flanges, the sheets adjoining said heavy gauge sheet being formed with portions overlappingly embracing and rigidly secured to the channel shaped portions thereof.

4. In a railway car, the combination with side plates, of a plurality of rigidly connected roof sheets spanning the space between the side plates, said plurality of roof sheets comprising one relatively heavy gauge sheet and a plurality of contiguous relatively light gauge sheets disposed on each side of the latter, said heavy gauge sheet being integrally formed with offset portions constituting carlines to which portions of the adjacent light gauge sheets are secured, and a plurality of carlines rigidly secured to adjoining portions of contiguous light gauge sheets.

5. In a railway car, the combination with side plates, of a plurality of rigidly connected roof sheets spanning the space between the side plates and secured to the latter, some of said sheets being of relatively heavy gauge and the others of said sheets being of relatively light gauge, each of said heavy gauge sheets being separated by a plurality of light gauge sheets, and carlines connecting the side plates, each of said carlines being rigidly secured to the adjoining portions of contiguous light gauge sheets, said heavy gauge sheets being integrally formed with offset portions constituting carlines rigidly secured to adjoining portions of the adjacent light gauge sheets.

6. In a railway car, the combination with side plates, of a plurality of roof sheets spanning the space between the side plates, some of said sheets being of relatively heavy gauge and the others of said sheets being of relatively light gauge, said light gauge sheets being arranged in overlapping relation to each other and to the heavy gauge sheets, carlines connecting the side plates and rigidly secured to the overlapping portions of contiguous light gauge sheets, said heavy gauge sheets being integrally formed with offset portions constituting carlines rigidly secured to the overlapping portions of the light gauge sheets adjacent thereto.

7. In a railway car, the combination with side plates, of a plurality of rigidly connected roof sheets spanning the space between the side plates, said plurality of roof sheets comprising one relatively heavy gauge sheet and a plurality of contiguous relatively light gauge sheets disposed on each side of the latter, said heavy gauge sheet constituting a diaphragm rigidly connecting the side plates and being integrally formed with offset portions of channel shape constituting carlines, the light gauge sheets adjacent the heavy gauge sheet being respectively secured to the channel portions of the latter in embracing overlapping relation, and carlines of substantially channel shape connecting the side plates, the adjacent portions of contiguous light gauge sheets being secured to the last-named carlines in embracing overlapping relation.

8. In a railway car having side plates, a roof comprising a plurality of metal sheets respectively secured to the side plates, and an end wall comprising a plurality of metal sheets, the roof sheet adjacent the said end wall being integrally formed with the end sheet adjacent the roof, each of said last-named sheets extending continuously from one side of the car to the other and the said end sheet extending downwardly below the side plates and being secured to the side walls of the car.

9. A railway car including, in combination, side plates, a roof comprising a plurality of sheets respectively secured to the side plates, an end wall comprising a plurality of sheets, and an integral sheet metal member provided with angularly disposed portions, one of said portions constituting one of said roof sheets and the other of said portions constituting one of said end wall sheets, said last-named portion extending downwardly below the adjacent ends of said side plates and being secured to the side walls of the car.

10. A railway car including, in combination, side plates, a roof, an end wall, said roof and end wall respectively having a plurality of metal sheets, and an integral sheet metal member provided with angularly disposed portions, one of said portions constituting one of said roof sheets and the other of said portions constituting one of said end wall sheets, said first-named portion being integrally fashioned with an offset portion forming a carline and said second-named portion extending downwardly below the ends of the side plates and being secured to the side walls of the car.

11. A railway car including, in combination, a roof and an end wall respectively having a plurality of metal sheets, and an integral sheet metal member provided with angularly disposed portions, one of said portions constituting one of said roof sheets and the other of said portions constituting one of the sheets of the end wall, said first-named portion being integrally formed with an inverted channel shaped portion having a laterally extending flange and said channel portion constituting a carline, said second-named portion extending downwardly below the eaves edges of the roof sheets and being secured to the side walls of the car.

12. In a railway car, a roof having a plurality of metal sheets, and an end having a plurality of metal sheets, the roof sheet adjacent the said end being integrally formed with the end sheet adjacent the roof, said last-named roof sheet being of heavier gauge than others of the roof sheets and said last-named end sheet extending downwardly below the eaves edges of the roof sheets and being secured to the side walls of the car.

13. In a railway car, a roof having a plurality of metal sheets, and an end having a plurality of metal sheets, the roof sheet adjacent the said end being integrally formed with the end sheet adjacent the roof and each of said sheets extending continuously from one side of the car to the other, the last-named roof sheet being of heavier gauge than others of the roof sheets and being integrally fashioned with an upwardly offset portion constituting a carline, said last-named end sheet extending below the eaves edges of the roof sheets and being secured to the side walls of the car.

14. In a railway car, the combination with side plates respectively having substantially vertically disposed portions, of a roof comprising a plurality of sheets, an end comprising a plurality of sheets, and an integral sheet metal member provided with angularly disposed portions, one of said portions constituting one of said roof sheets and the other of said portions constituting one of the sheets of the end, said first-named portion being provided with flanges respectively secured to adjacent vertical portions of the side plates and said second-named portion extending below the

side plates and being secured to the side walls of the car.

15. In a railway car, the combination with angularly shaped side plates, each of said plates having a substantially vertical portion and an outwardly extending substantially horizontal portion, of a roof comprising a plurality of sheets, an end wall comprising a plurality of sheets, and an integral sheet metal member having angularly arranged portions, one of said portions constituting one of said roof sheets and the other of said portions constituting one of the sheets of the end wall, said end sheet portion being provided with marginal flanges for attachment to adjacent portions of the car structure, the vertical portion of each of said side plates terminating adjacent the main body portion of the end sheet portion and the horizontal portion thereof terminating adjacent the inner edge of the adjacent marginal flange of the latter.

16. In a railway car, the combination with angularly shaped side plates, each of said plates having a substantially vertical portion and an outwardly extending substantially horizontal portion, of a roof comprising a plurality of sheets, an end wall comprising a plurality of sheets, and an integral sheet metal member having angularly arranged portions, one of which constitutes one of said roof sheets and the other of which constitutes one of the sheets of the end wall, the roof sheet portion of said member being provided with marginal flanges for attachment to the vertical portions of the side plates and the end sheet portion thereof being provided with marginal flanges for attachment to adjoining portions of the car, the outwardly extending flanges of the side plates terminating adjacent the inner edges of the marginal flanges of the end sheet portion.

17. In a railway car, the combination with side plates, of end plates, and a plurality of roof sheets spanning the space between the side and end plates, the roof sheets adjoining the end plates being formed integrally therewith and being of heavier gauge than others of said roof sheets, said heavier gauge sheets constituting diaphragms connecting the side plates.

18. In a railway car, the combination with side plates, of end plates, and a plurality of roof sheets spanning the space between the side and end plates, the roof sheets adjoining the end plates being formed integrally therewith and constituting diaphragms connecting the side plates, said last-named roof sheets being of heavier gauge than others of said sheets and being integrally formed with offset portions constituting carlines to which adjacent roof sheets may be secured.

19. In a railway car, the combination with side plates of substantially Z-shape, of end plates of substantially Z-shape, a plurality of roof sheets spanning the space between the end plates and side plates, the roof sheets adjoining the end plates being formed integrally therewith, said last named roof sheet being of heavier gauge than others of said roof sheets and constituting diaphragms connecting the side plates, and substantially Z-shaped brackets rigidly connecting adjacent ends of the side and end plates.

20. In a railway car, the combination with side plates, each of said plates having upwardly and downwardly extending flanges connected by a substantially horizontal web, of an end plate having upper and lower substantially vertical portions connected by a substantially horizontal portion, a plurality of rigidly connected roof sheets, the roof sheet adjacent the end plate being formed integrally therewith and having downturned flanges rigidly secured to the upwardly extending flanges of the side plates, said last named roof sheet being of heavier gauge than others of said roof sheets and constituting diaphragm means connecting the side plates, and angularly shaped brackets respectively connecting the side plates and end plate.

21. In a railway car, the combination with corner posts, of side plates each of which is provided with upwardly and downwardly extending flanges connected by a substantially horizontal web, an end plate having upper and lower substantially vertical portions connected by a horizontal portion, an end sheet rigidly secured to the corner posts and to the said lower portion of the end plate, a plurality of rigidly connected roof sheets, the roof sheet adjacent the end plate being formed integrally therewith and being secured to the upwardly extending flanges of the side plates, and brackets connecting the side plates and end plate and rigidly secured to the corner posts.

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