Oct. 20, 1931. W. H. MUSSEY 1,827,997

RAILWAY DUMP CAR

Filed April 22, 1929 3 Sheets-Sheet 1

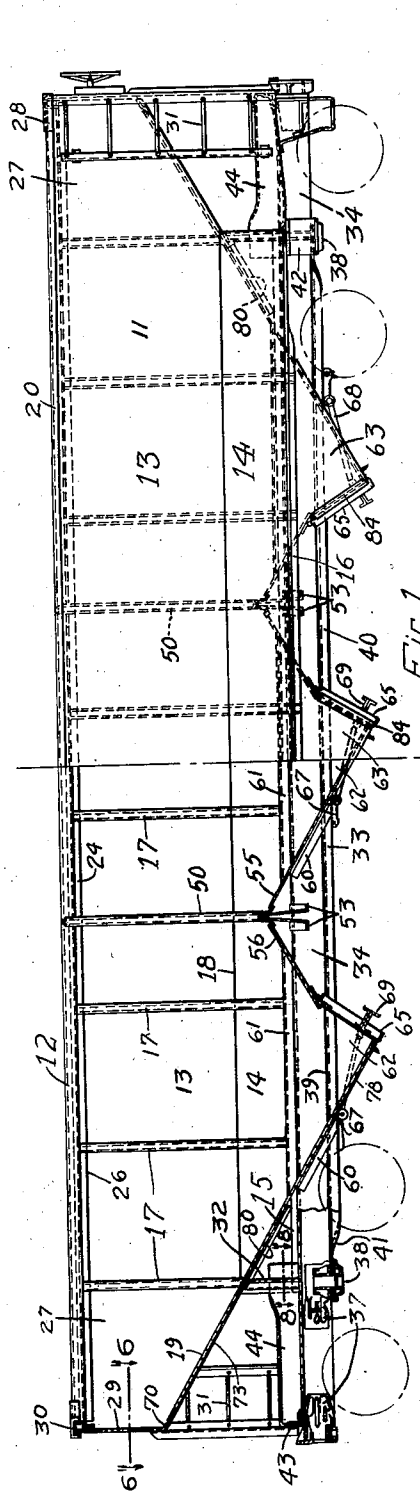


FIG. 1.

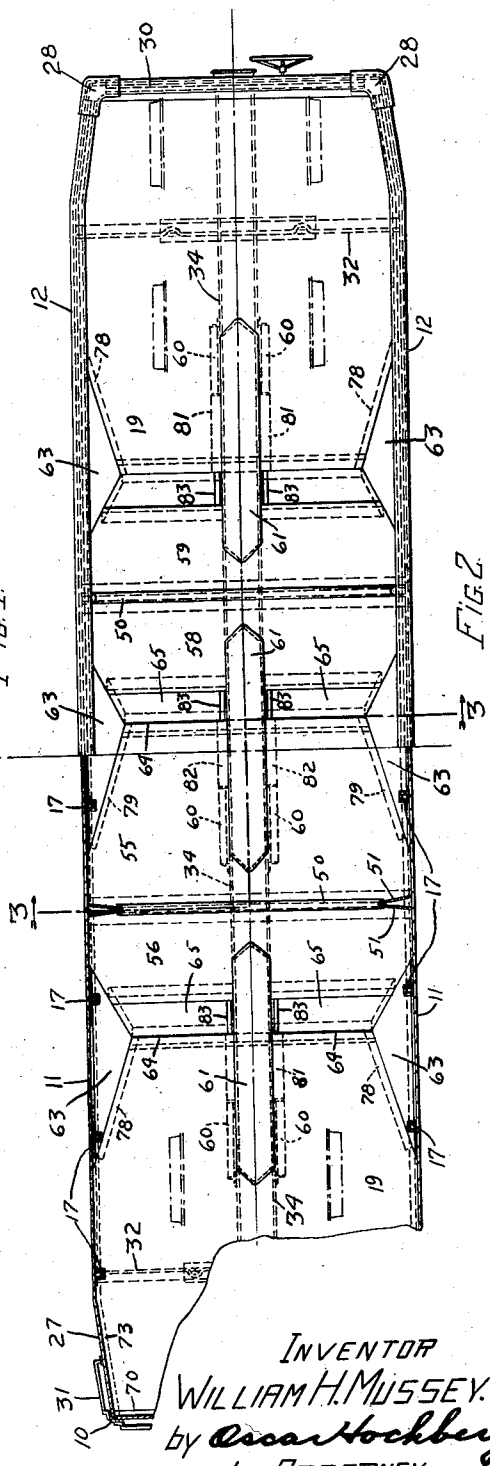


FIG. 2.

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RAILWAY DUMP CAR

Filed April 22, 1929 3 Sheets-Sheet 2

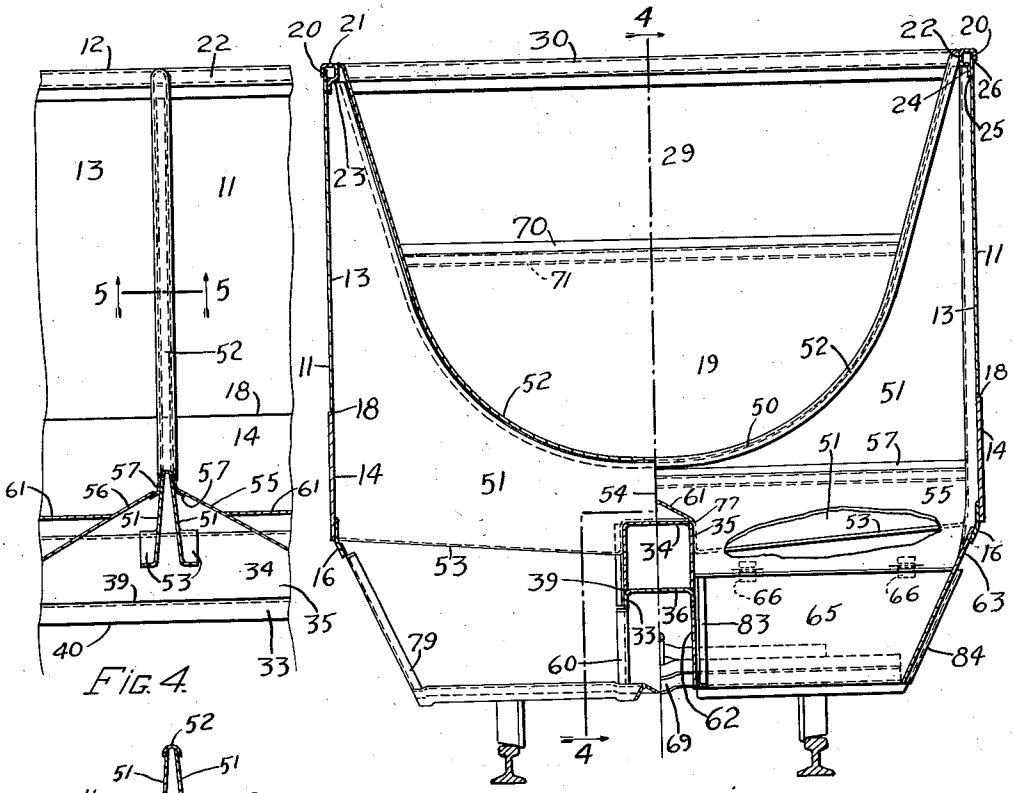


Fig. 4.

Fig. 3.

Fig. 5.

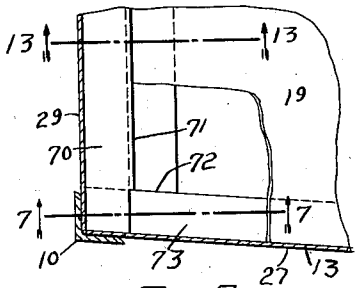


Fig. 6.

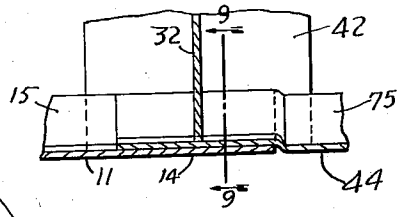


Fig. 8.

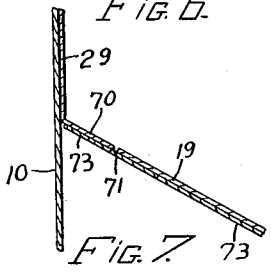


Fig. 7.

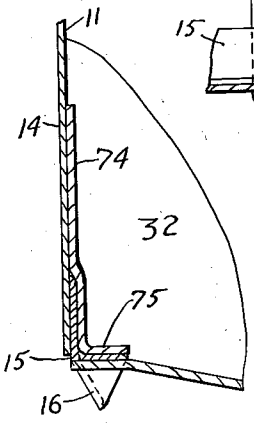


Fig. 9.

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RAILWAY DUMP CAR

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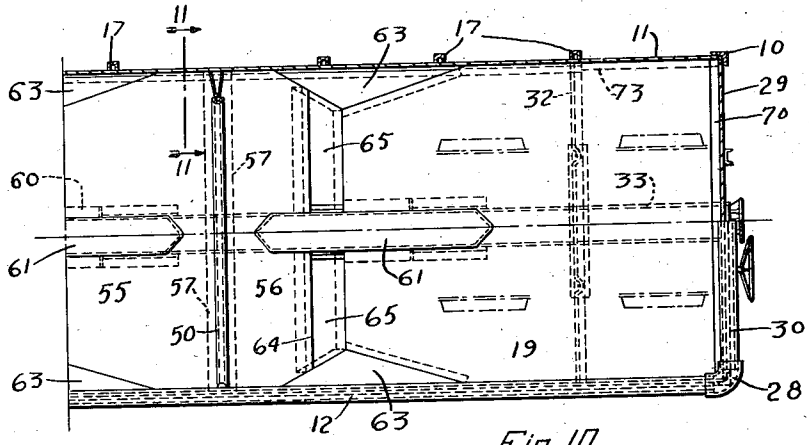


Fig. 10.

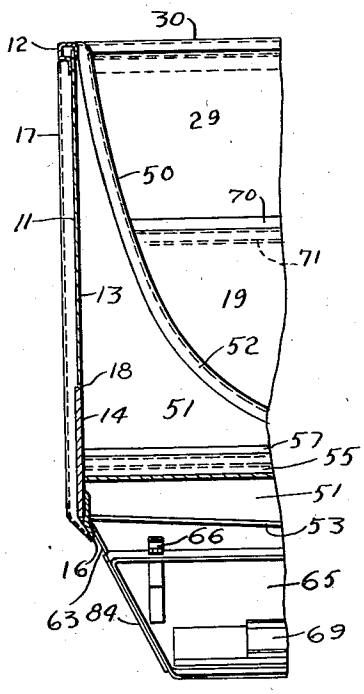


Fig. 11.

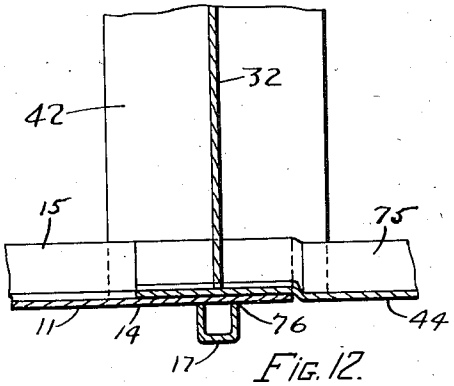


Fig. 12.

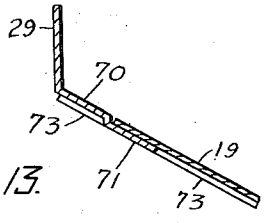


Fig. 13.

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UNITED STATES PATENT OFFICE

WILLIAM H. MUSSEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO PULLMAN CAR AND MANUFACTURING CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

RAILWAY DUMP CAR

Application filed April 22, 1929. Serial No. 357,095.

My invention relates to dump cars of the type generally known as hopper cars in which the floors are all inclined to facilitate the discharge of the lading and insure complete evacuation of the material in the car.

While I have shown the invention adapted in the present embodiment to hopper cars having inclined floors and doors, several of the features peculiar to the design may readily be used in cars having flat bottom floors with or without drop doors in the plane of the floor and in which it has been customary to load long materials and heavy machinery, as well as materials of a comminuted nature.

The invention has particular reference to dump cars having their several parts disposed and adapted for welding purposes, and the parts so formed and distributed throughout the car as to permit the use of arc welding at joints wherever they occur. The invention also contemplates the elimination of riveted parts at all positions on the car whereat such parts have heretofore been overlapped or connected by metal parts having adequate riveting areas, whereby such parts may be adapted for and secured by welding.

The principal object of the invention is to provide a dump car of minimum weight and number of parts and of maximum load carrying and buffing capacity wherein the joints between the several parts exposed to moisture and corrosive action of acids present in and liberated by the lading, are protected.

Another object is to materially simplify the construction of such cars and incidentally to improve their appearance and substantially strengthen the structure to withstand the blows of material loaded from buckets, and impact of such buckets during unloading operations.

The foregoing and other objects are attained by the mechanism illustrated in the accompanying drawings, in which

Fig. 1 is a dual view showing one-half of the car in side elevation and the remaining portion in vertical section;

Fig. 2 is a plan view of one-half the car, the remaining half being shown in horizontal section;

Fig. 3 is a staggered section taken virtually on line 3—3 of Figure 2 showing at the left a section through one of the transverse gusset members and at the right a side elevational view of the gusset;

Fig. 4 is a vertical section taken on staggered line 4—4 of Figure 3 showing the contour of the gusset member and the method of assembling with the center sill of the car;

Fig. 5 is a horizontal section through the gusset taken on line 5—5 of Figure 4;

Fig. 6 is a horizontal view in section taken on line 6—6 of Fig. 1, through the hopper end wall and side, showing the method of assembling the flanged wall side plate, end plate, and sloping floor of the car;

Fig. 7 is a vertical section taken on line 7—7 of Figure 6 through the end wall plate, its flanged portion, and the flange of the hopper side wall at the end of the car body;

Fig. 8 is a horizontal section taken on line 8—8 of Figure 1 showing the method of assembling the car side wall, the bolster, and the sub-side sill at the bolster line of the car;

Fig. 9 is a vertical section taken on line 9—9 of Figure 8, immediately before the bolster web plate showing the girder side, bottom chord angle, and flattened end portion of the channel sub-side sill;

Fig. 10 illustrates a modification of the design shown in Figure 1 in that the top chord and side stake elements are shown disposed along the outer face of the side girder instead of within the car as in the previous embodiment;

Fig. 11 is a vertical section taken on line 11—11 of Figure 10 showing the disposition relatively of the top chord and sides stake members with respect to the gusset member within the car;

Fig. 12 is a section similar to Figure 8 showing the application of the side stake at the bolster position, and

Fig. 13 is a view similar to Figure 7 taken on line 13—13 of Figure 6 showing the stepped flange of the end wall;

In the drawings, 11 represents the side

girder wall having a superposed top girder element 12, upper wall plate 13, a lower wall plate 14, and an associated side sill 15 having its horizontal flange deflected for the greater portion of its length as indicated at 16, and side wall stiffener elements 17 extending from the top chord along the inner face of the side wall to connect the upper wall plates 13 and lower wall plates 14 with the bottom chord angles 15 to form a girder having a depth equal to the height of the assembled wall plates and top and bottom chords. The top and bottom wall plates are assembled with their longitudinal meeting edges 18 in abutting relation to adapt them for arc welding connection. For this purpose, the lower wall plate is preferably of heavier material than the upper and arranged to extend from bolster to bolster. The superposed wall plate 13 extends preferably the full length of the car with its lower edges at points beyond the bolster being cut away and flanged to support the hopper floor sheet 19 sloping from the end wall to a point below the under frame.

In the embodiment illustrated in Figures 1 to 9 inclusive, the top chord is shown of tubular cross section having an outer lip 20 hooked over the upper edge of the side wall plate 13 and a horizontal portion 21, thence extending downwardly at 22, with a portion 23 flanged toward the side wall, and a depending flange 24 resting against the inner face of the side wall, both the inner and outer flanges of the upper chord member being arc welded along their longitudinal meeting edges to the inner and outer faces of the side wall member as indicated at 25—26. In the same manner, the end top chord members 30 are secured to the end wall sheets 29 and connected to the side chords 12 by suitable gusset plates 28 connecting the side and end wall portions of the car. In this embodiment of the construction, the portions of the side walls 27 lying between approximately the bolster position and the end of the car, are sloped inwardly a distance sufficient to permit the application of grab irons 31 within the outer planes of the car to prevent them from being crushed when the car is dumped by machine. Supplementing top gusset plates 28 are corner post uprights 10 extending upwardly from end sill 43 for connecting side and end wall plates 13 and 29 to further rigidify the corner of the car.

The side wall girders above noted are supported upon bolsters comprising web plates 32 extending from side to side of the car and recessed at their lower central portion to accommodate the center sill of an under frame extending from end to end of the car and composed of a plurality of channel shaped members having web and depending flange portions arranged in box like formation when assembled as shown in Figures 1, 3 and 4 of the drawing. The main channel member 34 is preferably a pressing in one piece extending from end to end of the car and proportioned at its ends to accommodate the usual draft gear elements 37 and bolster and center plate filler 38.

The principal channel element 34 of the center sill is arranged to rest with its depending leg portions 35 upon the web 36 of the supplementary channel shaped member 40 extending below the principal member from bolster to bolster. The legs of the main channel member 34 are arc welded at their meeting edges 39 where they rest upon the web of the supplementary member 40. Thus welded the members 34—40 provide a box girder center sill of great strength and rigidity to withstand buffing shocks under car impact. It will be noted that the supplemental channel member 40 of the center sill is also arranged with its flanges 33 depending and it is therefore necessary to flare out the end flange portions 41 of this channel to provide a flattened bottom at the bolster to permit the application of the bolster bottom cover plate 42 and body center plate 38 to the under side of said channel. This supplementary center sill channel member 40 terminates at the bolster position and serves to tie the center plates together.

The under-frame further consists of the end sill member 43 and associated sub-side sill channels 44 connecting the ends of the end sill with the bolsters and side wall girders of the car. As best shown in Figure 1, the bolster members comprise preferably a single web plate 32 flanged along its upper margin to support adjacent sloping end floor sheets 19 of the hopper to transmit the load imposed on the hopper floor from the side girders to the center plate. That portion of the load between the bolsters imposed on the center sill is transferred to the side girders 11 by a plurality of transverse gusset members 50 comprising each a pair of plates 51 flared inwardly from the side walls and upwardly from their respective bottom edges and welded together at their upper marginal edges to one-piece connecting cap members 52 extending in a catenary from top chord to top chord as best shown in Figures 3, 4 and 5.

The web plates 51 of the gussets are flanged at their lower edges as indicated at 53 and arranged at their central portions to rest upon the center sill at which points the plates are joined by arc welding at their meeting edges 54 at approximately the center line position of the car. The plates 51 are also arc welded to the girder plates 13 and 14 and to the gusset cap members 52 to form a powerful hollow transverse girder member adapted to support the under frame and the imposed load from the girder sides. By this arrangement, a center sill of relatively light but rigid

construction may be employed since it is required only to transmit the load carried thereon to the gussets and through them to the girders. Thus arranged in association with the transverse gusset girders, the center sill is held from lateral distortion and at all times in perfect alignment to transmit buffing shocks from one end of the car to the other.

By reference to Figures 1 to 4 inclusive, it will be noted that the sloping floor sheets 55 and 56 are connected to the gussets by angle clip pieces 57 extending from girder to girder and arc welded along their upper margins as best shown in Figure 4. The longer sloping floor plates 19 and 55 are also secured at the girder and center sill positions by arc welding along their edges, that portion of the plates traversing the sides of the center sill being preferably reinforced by small angle pieces 60 to supplement the arc welding of the edges at that point. The flanges 53 along the lower margins of the gusset plates 51 are preferably continuous from the side girders to the center of the car where the plates are welded along their vertical meeting edges as previously described. These flanges prevent distortion of the gusset plates and hold them rigid against load pressures imposed by the sloping floor sheets resting upon the angle clips 57 secured to their side wall faces.

Between the gussets 50, and the gussets and the sloping end floors 19, the center sill is covered by crown sheet sections 61 terminating at the sloping floor sheets between the points mentioned. These crown sheets do not transmit any of the buffing but serve to increase the radius of gyration of the sill as a column since they are secured at their terminals by arc welding to contiguous floor sheets 19, 55, 56, 58 and 59, and along their longitudinal edges 77 to the corners of the box girder center sill, making of them a single bitubular member extending between the sloping floor sheets of the car and adding measurably to its load transmitting capacity, as will be obvious. As arranged, the sloping floor sheets 55, 56, 58 and 59 on opposite sides of the gussets 50 find positive support from side to side of the car under loads transmitted through the tapered side wall portions 51 of the gussets to the side girders.

The hoppers of the car are formed by inner hopper plates 62 and outer wall sheets 63 secured by arc welding to the depending flanges 33 of the supplementary center sill member 40 and to the deflected angle portions 16 of the bottom chord 15 of the side girders respectively. In like manner, the sloping end floor sheets 19 are secured to the end wall 29 by arc welding along their upper marginal edges to the downwardly and inwardly extending flange of the end wall sheet. These plates and sloping floor sheets before noted, define discharge openings 64 closed by suitable doors 65 hinged respectively along their upper edges to contiguous edges of the adjacent sloping floor sheets by hinges 66 and arranged to swing from the sloping floor sheets to discharge the load. The doors 65 are held closed and simultaneously operated by means of connecting beams 69 secured to the doors in pairs and connected to the door operating mechanism by toggle links 68 or other means customarily employed in equipment of this type. These doors are held closed by suitable door operating mechanism 67 mounted at convenient intervals along the center sill as best shown in Figures 1 and 3.

As indicated in Figures 7 and 13, the end wall flange 70 is stepped downwardly at 71 a distance sufficient to accommodate the thickness of the sloping end floor sheet 19 to present a continuous and flush load supporting surface to insure an uninterrupted flow of the lading in its course towards the door opening. This arrangement is effected by cutting away a section of the stepped portion 71 of the flange 70 as indicated at 72 to accommodate the inwardly extending supporting flange 73 of the side wall sheet 13, a portion of the side wall flange being overlapped by the remaining portion of the end wall plate flange 70 as best shown in Figure 6. The sloping end floors 19 at the sides within the area of side girder lower plates 14 are supported by arc welding at the side edges of the floor sheets supplemented preferably by angle pieces 80 welded to floor sheets and girder plates to stiffen the floor portion between the bolsters and angle supports 60 at the center sill. The angle pieces 80 support the sloping end floor sheets at the side girder plates 14 only. The area of that portion of the floor sheets between said angle pieces, is regarded as rigid enough to support the load imposed if the connection at the side girder plate 14 is properly made, therefore no reinforcement has been applied to the floor between the bolster and angle supports 60 at the center sill, although supports 60 could be extended to the bolster should it be found necessary to provide additional support for the floor at that point. At points below the girder areas the floors 19 and 55 are supported by the respectively adjacent outside hopper sheet flanges 78 and 79 and corresponding flanges 81 and 82 along the lower margins of inside hopper sheets 62, as best shown in Figures 1, 2 and 3. Angle pieces 83 may be secured to the inside hopper sheets at the door openings to provide suitable load seal and door abutments and similar provision may be made for the doors at the outside hopper sheets by offsetting contiguous margins of the sheets as indicated at 84.

At the bolster, the side wall girder plates 14 are connected by arc welding to the edges of the respective bolster webs and by arc or spot

welding to the adjacent sub-side sill channels 44. The bottom chord angle 15 of the side girder 11 terminates at the bolster position with its lower flange horizontal and underlying a flange 75 along the lower margins of the sub-side sill, the vertical flanges of the bottom chord angle being interposed between the side girder wall plate 14 and the web 74 of the end of adjacent sub-side sill and there welded together as best shown in Figures 8 and 9.

It may be deemed advisable at times to arrange the car side and end walls with their respective top chord members 12 and 30, and side stakes 17 upon the exterior of the car as shown in Figures 10, 11 and 12 of the drawings. As shown in these figures, the side stakes are formed preferably as channels arranged with their edges 76 in contact with the side wall girder sheets 13 and 14 as in the first embodiment, and arc welded along their meeting edges from top chord 12 to the bottom chord angle 15, forming in each case a side wall stiffener of tubular formation throughout the height of the girder.

From the foregoing, it will be apparent that there has been provided a car construction re-inforced by tubular members longitudinally, vertically and laterally of the car welded intimately into the structure of the car itself. The hollow and flared transverse gusset members 50 provide a rigid connection between the side girder walls to prevent bulging, the rigidifying longitudinal hollow top chord members holding rigid the upper margins of the respective side girder walls, and the associated vertical tubular side stake members stiffening the wall areas between the gussets and bolster members. These features, with the bitubular formation of the relatively rigid center sill construction provide a car of maximum pay load capacity, and involving in building, a minimum expenditure of time, labor and materials. In either of the hollow top chord embodiments indicated, whether the top chord be arranged along the inner faces of the side and end walls as indicated in Figs. 1 to 4 or on outer sides thereof as in Figs. 10 and 11, the vertical flanges 20 and 24 are spaced apart in horizontal planes to admit the wall plates between them and disposed and secured in vertical planes to lend stability to the structure against bulging.

What I claim is:—

1. In a railway car having side and end load retaining walls, hollow top chord members surmounting said walls and comprising plates of substantial rectilinear configuration having a pair of depending wall engaging flanges in vertically and horizontally spaced planes and laterally extending portions connecting said flanges, said portions forming with the respective wall plates a tubular stress member.

2. In a railway car having side and end load retaining walls and hollow top chord members surmounting said walls, a tubular center sill between said walls extending longitudinally of the car, hollow transverse members of substantial catenary formation suspended from and connecting said side walls and top chords, and vertical tubular side wall stiffeners extending downwardly from adjacent top chords upon opposite sides of said transverse members.

3. In a railway dump car having side and end load retaining walls and sloping floor sheets connecting said walls, bolsters supporting said walls and adajacent floor sheets, a plurality of hollow transverse members of substantial catenary formation supported by and connecting the side walls intermediate their ends, sloping floor sheets supported upon said members, and a continuous hollow center sill connecting said bolsters, floor sheets, and transverse members.

4. In a railway dump car having side and end load retaining walls and sloping floor sheets connecting said walls, bolsters supporting said walls and adjacent floor sheets, a plurality of hollow transverse members supported by and connecting the side walls intermediate their ends, and a continuous hollow center sill connecting said bolsters, floor sheets, and transverse members and comprising a main channel shaped member opening downwardly with its side leg portions depending and secured to a relatively short supplemental member to form a tubular portion from bolster to bolster.

5. In a railway dump car having side and end load retaining walls, sloping floor sheets connecting said walls, bolsters supporting said walls and adjacent floor sheets, a continuous center sill extending longitudinally of the car between said walls and penetrating said floor sheets and bolsters, a relatively short supplemental center sill portion forming with said continuous sill a tubular buffing member extending between and terminating at the bolsters, said bolsters, floor sheets, end sill members being secured together by welding.

6. In a railway dump car having side and end load retaining walls, sloping floor sheets connecting said walls, bolsters supporting said walls and adjacent floor sheets, a continuous hollow center sill member having a relatively short tubular portion terminating at said bolsters, and draft gear elements within said hollow sill portions between said bolsters and respective car ends.

7. In a railway car having side and end load retaining walls, floor sheets connecting said walls, transverse hollow members supported by and connecting said side walls intermediate their ends, bolsters supporting said walls and adjacent floor sheets, a channel shaped center sill portion adapted at its terminals for assembly with said bolsters,

bolster bottom cover plates underlying said end portions, and a relatively continuous channel shaped sill portion supported upon and secured to said first mentioned sill and forming therewith an integral tubular column from bolster to bolster.

8. In a railway car having plate girder sides, supporting bolsters, and a center sill, a plurality of transverse hollow members supported upon and connecting said girder sides and comprising pairs of web plates spaced apart and connected by a surmounting cap piece extending in substantial catenary formation from girder to girder, said web plates being arranged to converge from said girders and center sill towards said cap piece.

9. In a railway dump car having load retaining end walls, bolsters, a hollow continuous center sill, and sloping floor sheets connecting said parts, side wall girders comprising lower wall plates terminating at said bolsters and relatively longer and lighter superposed plates connecting said end walls, transversely extending hollow connecting members supported by said girders at points intermediate their ends, inner and outer hopper sheets respectively secured to the center sill and side girder members and forming with said floor sheets a plurality of hoppers on opposite sides of the center sill, and doors closing said hoppers pivotally supported between said hopper sheets.

10. In a railway dump car having a pair of bolsters and end load retaining walls, upper and lower girder wall plates terminating respectively at said end walls and bolsters and butt-welded along their horizontal meeting edges, hollow top chords surmounting said upper plates and relatively short angle chords extending along the lower margins of said lower plates, and channel shaped stiffener members extending between said chords and forming with said plates a plurality of tubular side wall reinforcements.

11. In a railway dump car having a pair of bolsters and end load retaining walls, upper and lower girder wall plates terminating respectively at said end walls and bolsters and welded along their horizontal meeting edges, hollow top chords surmounting said upper plates and relatively short angle chords having downwardly and inwardly deflected flanges extending along the lower margins of said lower plates, outer hopper sheets secured to the deflected flange lower chord portions and inner hopper sheets to said center sill, and sloping floor plates connecting said hopper sheets and side and end walls.

12. In a railway dump car having side load retaining walls with inwardly directed flanges at their lower edges, sloping floor sheets supported upon and connecting said flanges, an end wall connecting said walls and formed with a lower marginal flange supprted at its ends upon adjacent side wall flanges and having an extension thereof between said flanges offset downwardly to the plane of adjacent flanges and in supporting position beneath said floor sheets.

13. In a railway dump car having side load retaining walls having flanges inwardly directed at their lower edges, sloping floor sheets supported upon and connecting said flanges, a connecting end wall having a flange resting with its ends upon and overlapping said adjacent flanges with portions thereof between said floor sheets and other flanges cut away, the remaining portion thereof being stepped down to the plane of said other flanges in supporting position beneath said floor sheets.

14. In a railway car having side and end load retaining walls, hollow top chord members surmounting said walls and comprising plates of substantial rectilinear configuration having portions forming with said walls tubular stress members having the major portion of their respective sections below the tops of said walls.

In witness whereof I have hereto set my hand this 11th day of April, 1929.

WILLIAM H. MUSSEY.