

F. S. INGOLDSBY,
CAR.
APPLICATION FILED APR. 19, 1907.

1,000,176.

Patented Aug. 8, 1911.

3 SHEETS-SHEET 1.

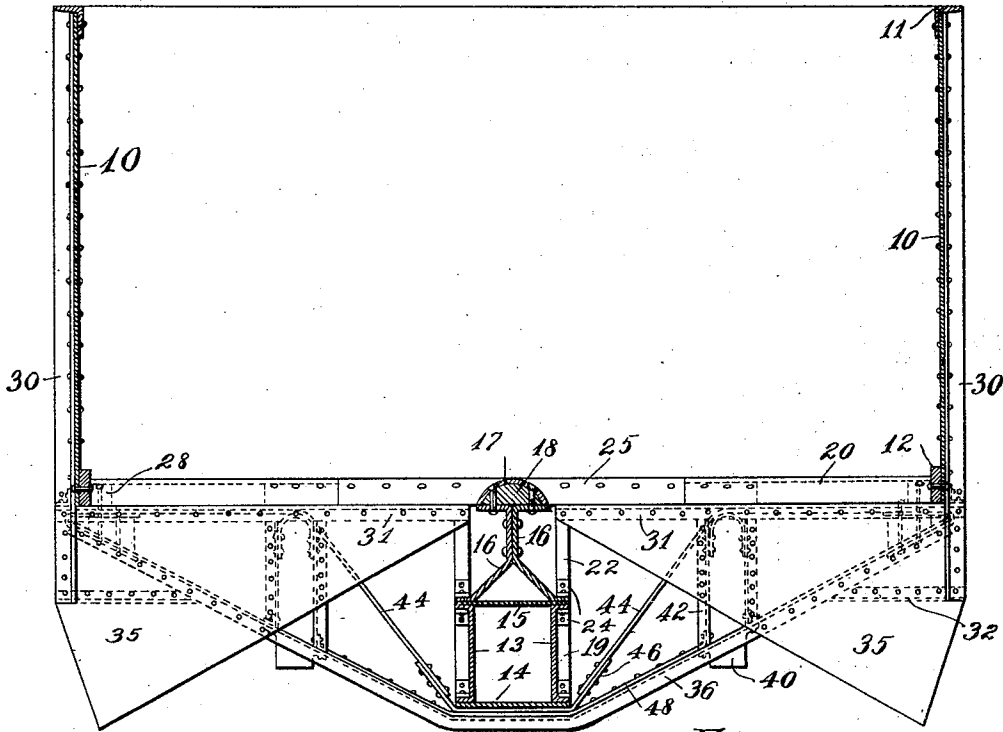


Fig. 1

Fig. 3.

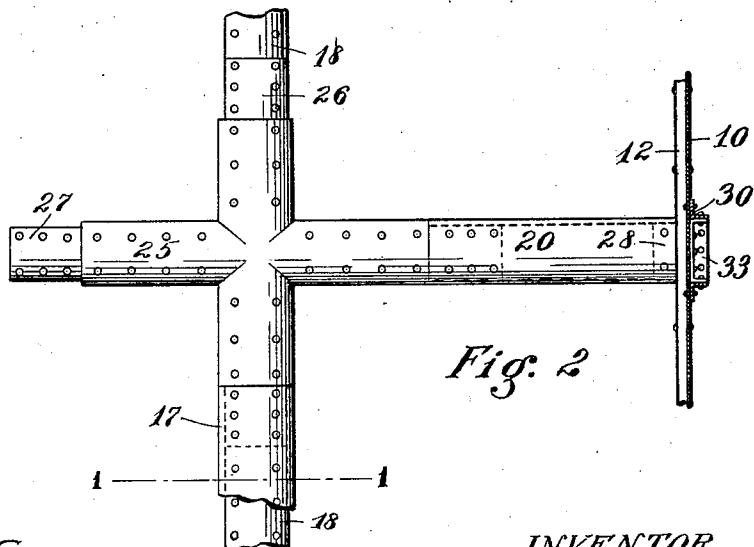
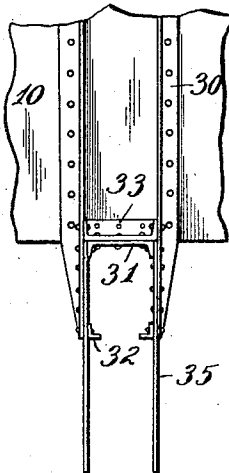


Fig. 2

WITNESSES:

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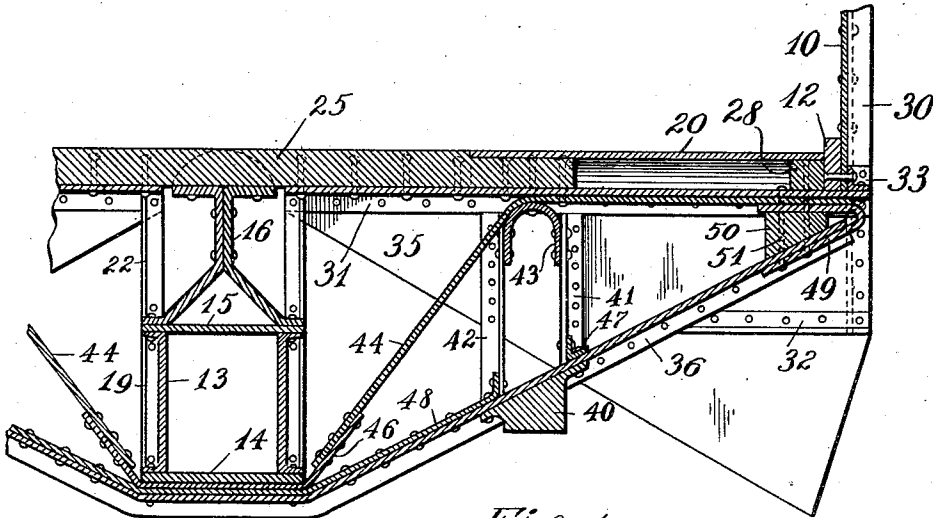


Fig. 4

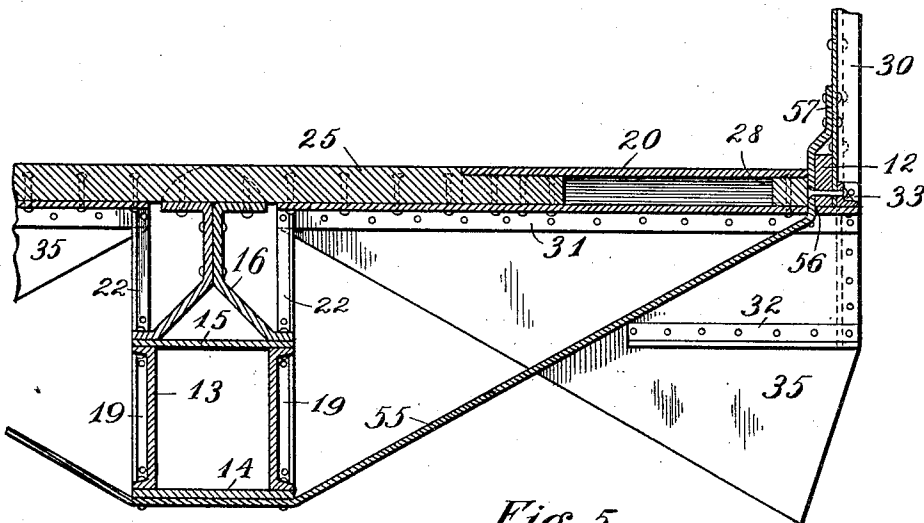


Fig. 5

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3 SHEETS—SHEET 3.

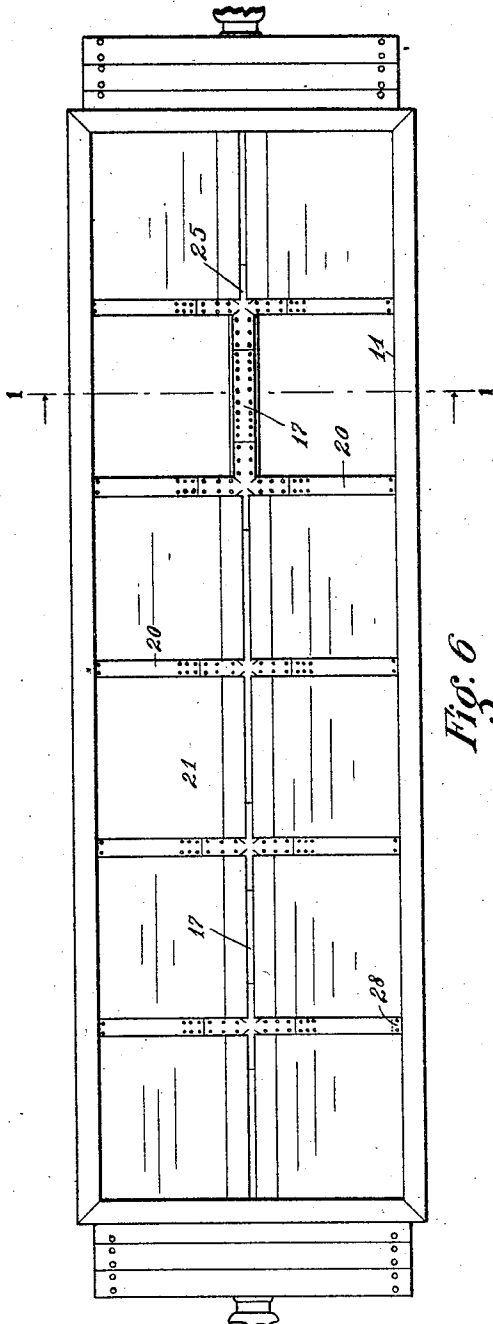


Fig. 6

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Brennan B. West.

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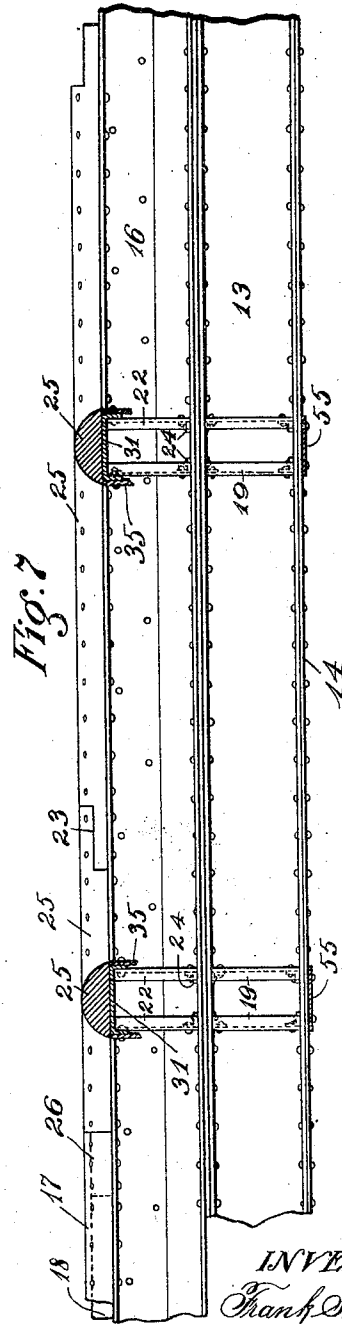


Fig. 7

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UNITED STATES PATENT OFFICE.

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CAR.

1,000,176.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed April 19, 1907. Serial No. 369,058.

To all whom it may concern:

Be it known that I, FRANK S. INGOLDSBY, residing at St. Louis and State of Missouri, have invented a certain new and useful Improvement in Cars, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

One of the objects of this invention is to provide a very efficient floor frame for cars. The invention is especially well adapted for cars having level floor dumping doors.

My invention provides a cross-shaped member having arms in compression and other arms at right angles thereto which are in tension or compression according to the location of the member, all of the arms being in substantially the same plane at the crossing. With such a structure, two of the arms may form a part of the upper chord or compression member of the central longitudinal beam or truss of a dump car of the Ingoldsby type, while the other members may form part of the tension member of the body bolster or the compression member of cross beams located at intermediate points thereof. Such construction enables the attainment of the new and very desirable result of having a longitudinal member of a car, the top member of which is coincident with the top member of cross members. The strain in the upper member of any cross member is transmitted coincidentally with the upper member of the longitudinal member. The cross members and the longitudinal member are thus adapted to be on the same level, instead of either having to pass under or over the other. This provides for a very efficient and simple flat bottom dump car. The various members may be crowned or ridged, whereby they provide shedding surfaces discharging into openings between them, which openings may be closed by dumping doors.

Another object of the invention is to provide efficient means for resisting the outward bulging of the car side due to the load,—such means being also arranged to act as posts to transmit the strains between the upper and lower chords.

In the drawings, Figure 1 is a cross section through a car embodying my invention, taken adjacent to the bolster and looking toward such bolster. The plane of the sec-

tion is indicated by the lines 1—1 of Figs. 2 and 6. Fig. 2 is a plan of my cross-shaped member, showing also its relation to the side of the car. Fig. 3 is a side elevation of a portion of the car side looking toward one of my cross members. Fig. 4 is a vertical section through a portion of the bolster, the section being transverse of the car. Fig. 5 is a similar cross section of one of the cross members intermediate of the bolsters. Fig. 6 is a plan of a level floor dump car having my invention. Fig. 7 is a side elevation of the longitudinal beam at and near the center of the car,—the transverse members being shown in section.

The sides of the car may be plate girders, as shown in the drawings, having the plates 10, the upper chords 11, and lower chords 12. Extending lengthwise of the car and centrally located is a longitudinal beam of composite construction which is shown as composed of a girder, the lower portion of which is shaped like a box and the upper portion like a triangle terminating in a head. The lower portion has outwardly facing channels 13, a bottom plate 14, and a top plate 15, and the upper portion has plates 16 bent and flanged outwardly as shown and secured to the lower portion and rising therefrom, and the composite ridge or crown made of the parts 17, 18, and 25 riveted to the upper outward flanges of the plates 16; said ridge or crown forming the top and main portion of the compression member of the longitudinal beam, while the plate 14 forms the bottom and main tension member of the longitudinal beam; the plate 15, coming as it does near the neutral axis of this composite longitudinal beam, being mainly intended as a transverse stiffener to the composite structure. This longitudinal beam construction differs from that shown in my prior application No. 349,104, filed December 22nd, 1906, in this important particular, namely; the plates 16 shown in this invention, extend from end to end of the car without being cut through or intersected by cross members, whereas, in my prior application they were cut at the bolster and other crossing points by the top channels of said cross members. Extending from the crown or main compression portion of the central beam to the car sides, in both the present in-

vention and the former construction mentioned, are transverse members surmounted by crowns 20, and between these composite transverse members are dumping doors 21 which may be hinged to the longitudinal beam and are horizontal when closed and form a portion of the level floor.

In the present invention, I provide a unitary cross-shaped member at the upper surface of the crossing of the central longitudinal beam and the cross member,—this unitary member may act as a shedding crown at this point and form a portion of both the cross member and the longitudinal member. This member is shown in plan in Figs. 2 and 6 and designated 25. It may be a steel casting or wrought iron forging, or it may be made in other manner or of other material so it acts practically as one piece in substantially the same plane. It is riveted to the upper flanges of the longitudinal plates 16, and its arms, which extend along the longitudinal beam, may meet and interlock with the next adjacent arms, or said arms may stop short of meeting and the space between be filled with appropriate abutting filling blocks 18.

As shown in Figs. 6 and 7, that one of the unitary members 25 which is at the center of the car has its longitudinal arms extending to and abutting against the longitudinal arms of the next cross members. This is to make the longitudinal compression member very stiff at the center of the car where the greatest bending moment comes. In this case, the adjacent longitudinal arms may be cut off or rabbeted to overlap and underlap each other, as shown at 23 in Fig. 7. Nearer the ends of the car, I prefer to make the longitudinal arms of the cross shorter and place filling blocks 18 between such arms, and in this case there may be a reduced extension 26 of the longitudinal arm abutting and alining with the filling block, and the filling block and this extension may be covered by the sheet metal crown 17.

It will be seen from the above description that the composite longitudinal member may extend throughout the dumping portion of the car; that it is very rigid and is of considerable depth so as to provide a very strong and stiff structure against downward strains. At the same time, it is well adapted for carrying the buffing and tugging and other strains to which it is subjected.

The upper portion of the cross member includes the transverse arms of the members 25 and the channels 31. These channels extend inwardly from the car side and have their webs horizontal and their flanges projecting downward. The web lies against the under side of the transverse arms of the member 25, being suitably riveted there-

to. This construction is clearly shown in Figs. 4 and 5, and applies both to the upper member at the bolster and at the intermediate cross beams. The result is to make a very strong cross member in tension or compression, which, without rising above the longitudinal beam, transmits the cross strain through the top of the longitudinal beam.

To provide a proper shedding surface on the transverse beams, both at the bolsters and intermediately, I supply the crowns 20, which at their inner ends extend over the reduced extension 27 of the transverse arms and at their outer ends lie over filling blocks 28, being held to the channel 31 by rivets passing through the extensions 27 in the filling blocks.

As compression members for the bolsters, I provide the channels 36 having their flanges facing downwardly, these flanges extending beneath the box girder of the central beam and diagonally upward to points adjacent to the car side, where they are secured as hereinafter explained. Rising from the upper side of the channel 36 are angle bars 41 and 42. Between these bars is a saddle plate 43 and extending over this saddle is a tension strap 44, whose upper portion extends along the under side of the channel 31, being riveted to it, and whose diagonal portion is connected at its lower end with a strap 46 which extends beneath the longitudinal beam, which at this point constitutes the central frame of the bolster.

The compression member 36 of the bolster is connected with the tension strap 44 and the channel 31 by a U-shaped strap and rivets, best shown in Fig. 4. The U-shaped strap is designated 49. It lies on the underside of the tension strap 44 and extends around the end of a filler block 50 and onto the underside of the web of a channel 36. Suitable rivets 51 pass through the web of the channel 31, thence through the tension strap 44, the upper arm of the U-shaped strap 49, the follower block, the web of the channel 36 and the lower arm of the U-shaped strap. This effectively binds the parts together at this point.

Located beneath the channel beam 36 opposite the struts 41 and 42 is the side bearing 40. It will be seen that I have provided on each side of the central beam within the body bolster an individual truss to resist the strain when the side bearing engages the side bearing of the truck bolster,—this truss comprising the compression chord 36, the tension chord 44 and the struts 41 and 42. The angle bars 41 are connected with the channel 36 by the angle clip 47. The bars 42 are connected with the channel by the reinforcing plate 48. This reinforcing plate lies on the upper side of the channel and is riveted to it and passes intermediately

beneath the central beam and has its ends bent up and riveted to the angles 42. This plate thus acts as a reinforce for the compression member of the bolster, and may be
 5 made wide enough (being extended beyond the sides of the channel 36) to give great lateral stiffness to the structure.

At the intermediate cross members of the car where the transverse arms 25 and channels 31 are in compression, I provide a tension strap 55, (Fig. 5) which extends beneath the central longitudinal beam diagonally upward, and at 56 passes through an opening in the web of the channel 31, between the filling block 28 and the lower chord 12, and is then bent outwardly and riveted to the car side at 57.

As the tension in the strap 55 in the intermediate cross members and in the strap 44, 46 in the bolster tends to bend upward the outer edges of the longitudinal beam, I stiffen the longitudinal structure at this point by vertical angle bars 19 located between the flanges of the channels 13 and
 25 vertical angle bars 22, located between the outer lower flanges of the member 16 and the inner ends of the channels 31. The bars 22 are riveted at their upper ends to the flanges of the channels 31, while suitable angle clips as 24 (Figs. 1 and 7) enable
 30 these reinforcing struts to be otherwise secured in place.

Vertical depending plates 35 are riveted to the outer sides of the channels 31 and constitute end guards for the dumping doors. In the case of the bolster, these end guards act also as stiffening members, being secured by rivets to the flanges of the channels 36 and to the struts 41 and 42.

Extending vertically on the outer side of the car sides and riveted to these sides are the angle bars or posts 30 arranged in pairs and continuing below the sides. Between these angle bars below the side are the horizontal channel beams 31. The door end guards on their adjacent sides engage the outer sides of the channel flanges and on their outer sides engage and are riveted to the lower portions of the posts 30. These
 50 door end guards are stiffened by angle bars 32, riveted to them and to the lower ends of the posts 30, and extend horizontally inward to the diagonal member 35 or 55, as the case may be. A suitable flanged plate or a casting 33 lies between the flanges of the bars 30 and above the projecting end of the channel 31 and is riveted to these parts and also to the plate 10 of the car side. The
 55 posts 30, it will be seen, perform a triple function of acting as struts or stiffeners for the downward strains in the side structure; acting as cantalivers, preventing the outward bulging of the car sides due to the load, and finally bracing and holding in,
 65 place the door end guards, which in turn,

brace the posts and fix them at their lower ends, enabling them to have their cantaliver action.

Having described my invention, I claim:

1. In a car, the combination with intersecting beams in the level bottom floor of the car, of a cross-shaped member secured to and forming a part of both beams. 70

2. In a dump car, the combination with intersecting beams, of a load-shedding cross-shaped member secured to and forming a part of both beams and forming a part of the floor of the car. 75

3. The combination of a central longitudinal beam and cross beams, and load-shedding cross-shaped members secured to and forming a part of both beams respectively. 80

4. The combination in a dump car, of a central longitudinal beam and cross beams, load-shedding cross-shaped members secured to and forming a part of both beams, respectively, and dumping doors in the spaces between the cross-beams, the longitudinal beam and the sides of the car. 85

5. The combination with the longitudinal and transverse floor beams of a car, of a member located at the crossing of such floor beams having arms at right angles to each other which form portions of the respective beams. 90 95

6. The combination with the longitudinal and transverse floor members of a car, of a unitary member at the crossing of such floor members, said member having arms at right angles to each other, and dumping doors forming when closed a portion of the load-carrying floor. 100

7. In a car, the combination of longitudinal and transverse floor members, including a unitary member at the crossing having tension and compression portions at an angle to each other and in substantially the same horizontal plane. 105

8. In a dump car, the combination of longitudinal and transverse members, including a unitary member at the crossing having shedding surfaces and tension and compression portions at an angle to each other and in substantially the same horizontal plane, and dumping doors cooperating with such shedding surfaces. 110 115

9. In a car, the combination with a longitudinal beam and a bolster, of a member at the crossing of the beam and bolster having portions at right angles to each other and in the same plane and in tension and compression respectively. 120

10. In a car, the combination with a longitudinal beam and a cross-member between the bolsters, of a member at the crossing of such beam and member having portions at right angles to each other and in the same plane and both in compression. 125

11. The combination with the longitudinal and transverse floor members of a car, of 130

a unitary member at the crossing of such floor members, said member having arms at right angles to each other, the upper surfaces of which arms are crowned or ridged.

5 12. The combination with the longitudinal and transverse floor members of a car, of a unitary member at the crossing of such floor members, said member having arms at right angles to each other, the upper surfaces of which arms are crowned or ridged,
10 and dumping doors forming when closed a portion of the horizontal floor of the car.

13. The combination in a level bottom dump car, of a central longitudinal beam
15 and transverse beams, and unitary load-shedding members located at the crossings of such longitudinal and transverse beams and forming a portion of the load-carrying floor.

20 14. The combination in a level bottom dump car, of a central longitudinal beam and transverse beams, load-shedding members located at the crossings of such longitudinal and transverse beams and forming a
25 portion of the load-carrying floor, dumping doors adapted to form also a portion of the load-carrying floor, and end-guards for such doors carried by the cross beams.

15. In a dump car, the combination with
30 longitudinal and transverse beams, of a cross shaped member secured to both beams at the crossing, said member having a shedding surface and reduced extensions, and plates continuing such shedding surfaces
35 and surmounting such extensions.

16. In a dump car, the combination with longitudinal and transverse beams, of a cross shaped member secured to both beams at the crossing, said members having a
40 crowned surface and reduced extensions, curved horizontal plates surmounting such extensions and secured to them, and filling blocks beneath such curved plates.

17. In a car, the combination of a longitudinal central beam, with projecting transverse members, transverse channel beams extending inwardly from the sides of the car and secured to such projecting members and having vertical flanges, and vertical
50 plates riveted to such flanges.

18. In a car, the combination of a longitudinal central beam, transverse channel beams extending inwardly from the sides of the car and having vertical flanges, vertical
55 plates riveted to such flanges, and a cross-member extending beneath the longitudinal beam and riveted to such plates.

19. In a car, the combination of a longitudinal central beam, transverse channel beams extending inwardly from the sides of the car, a connection through the top of the longitudinal beam for the channels on opposite sides thereof, vertical plates riveted to such channels, a cross member extending
65 beneath the longitudinal beam and riveted

to such plates, and struts between the cross-member and the channel mentioned.

20. In a car, the combination of a longitudinal central beam, transverse channel beams extending inwardly from the side of
70 the car and having vertical flanges, vertical plates riveted to such flanges, a compression member extending beneath the longitudinal beam and riveted to such plates, struts between the compression member and the
75 channel mentioned, and side bearings on the under side of the compression member opposite said struts.

21. In a car, the combination of a longitudinal central beam, transverse channel
80 beams extending inwardly from the side of the car, vertical plates riveted to such channel, a compression member extending beneath the longitudinal beam and riveted to such plates, struts between the compression
85 member and the channel mentioned, side bearings on the under side of the compression member opposite said struts, and a tension strap extending over the upper end of the strut and having one end connected
90 with the channel and the other near the central beam structure.

22. In a car, the combination of a longitudinal central beam, transverse channel beams extending inwardly from the side of
95 the car, a cross member forming a portion of the compression chord of the longitudinal beam and riveted to such channel beams, and a member extending beneath the longitudinal beam and secured at its ends adjacent to the outer ends of the channels.
100

23. In a car, the combination of a longitudinal central beam, transverse channel beams extending inwardly from the sides of the car and secured to members projecting
105 laterally from the longitudinal beam, and a tension strap passing beneath the longitudinal beam and secured at its ends to the car sides.

24. The combination in a car, of plate
110 girder sides having on their outer sides vertical angle bars arranged in pairs and extending below the car side, a channel with vertical flanges extending crosswise of the car and between such projecting portions
115 of the vertical angles, and vertical plates secured to the channel flanges and to such projecting portions of the angles.

25. The combination in a dump car, of dumping doors, posts on the outer side of
120 the car sides which extend below the car side, a member extending crosswise and secured to adjacent posts, and vertical plates constituting end guards for the doors and secured to said member and to the projecting portions of said posts.
125

26. The combination in a dump car, of dumping doors, posts on the outer side of the car sides which extend below the car side, a channel extending crosswise and hav-

ing its flanges vertical and secured to adjacent posts, and vertical plates constituting end guards for the doors and secured to the flanges of said channel and to the projecting portions of said posts.

27. The combination with a plate girder side, of posts secured thereto and extending below the side, a transverse channel beam with vertical flanges located between such posts and below the car side and having its flanges riveted to the flanges of said posts, and a block adjacent to the projecting end of the channel and riveted to it and to the car side and to the vertical posts.

28. The combination with a plate girder side, of posts secured thereto and extending below the side, a transverse channel beam with its flanges facing downwardly located between such posts and below the car side and having its flanges riveted to the flanges of said posts, a block above the projecting end of the channel and riveted to it and to the car side and to the vertical posts, and vertical plates riveted to said flanges and said posts.

29. The combination in a car, of sides having vertical angle bars arranged in pairs and extending below the car side, a channel with vertical flanges extending crosswise of the car and between such projecting portions of the vertical angles and secured thereto.

30. The combination in a car, of a longitudinal beam having along its top a series of crosses with longitudinal arms forming a portion of the compression member, and with laterally projecting arms, and transverse channels extending beneath such lateral arms and riveted to them, door end guards riveted to such channels, dumping doors coöperating with such end guards, and vertical posts on the sides of the car riveted to and supporting the outer portions of such end guards.

31. The combination in a car, of a longitudinal beam having along its top a series of crosses with longitudinal arms forming a portion of the compression member, and with laterally projecting arms, and transverse channels extending beneath such lateral arms and riveted to them, such channels having their flanges facing downwardly, door end guards riveted to such downward flanges, and dumping doors coöperating with such end guards.

32. In a car, the combination of a central longitudinal beam having in its compression member a series of crosses with longitudinal arms in the compression member and transverse arms, the longitudinal arms of the cross at the center of the car extending to and engaging the longitudinal arms of the adjacent crosses.

33. The combination of a longitudinal beam having a series of cross-shaped mem-

bers whose longitudinal portions comprise a part of the compression member of the longitudinal beam, there being filling blocks between the longitudinal portions of the adjacent crosses at intermediate parts of the car, and crowns surmounting such filling blocks and overlapping the adjacent portions of the adjacent crosses.

34. The combination of a longitudinal beam having a series of cross-shaped members whose longitudinal portions comprise a part of the compression member of the longitudinal beam, the longitudinal arms of the cross at the center of the car extending to and engaging the longitudinal arms of the adjacent crosses, there being filling blocks between the longitudinal portions of the adjacent crosses at intermediate parts of the car, and transverse members riveted to the transverse arms of the crosses.

35. In a car, the combination of a central longitudinal beam having in its compression member a series of crosses with longitudinal arms in the compression member and transverse arms, the longitudinal arms of the crosses, together with filling blocks, making a continuous structure from end to end of the car, and transverse members riveted to the undersides of said transverse arms.

36. The combination in a car, of a longitudinal beam having along its top a series of crosses with longitudinal arms forming a portion of the compression member, and with laterally projecting arms, and transverse channels extending beneath such lateral arms and riveted to them.

37. In a car, the combination of a longitudinal beam including, in its compression member, crosses having longitudinal portions and transverse portions, through members giving depth to the beam and extending continuously beneath the longitudinal portion of the crosses, and cross beams riveted to the transverse portions of the crosses.

38. In a car, the combination of a longitudinal floor member including, in its compression member, members having longitudinal portions and transverse portions, and cross floor members riveted to such transverse portions.

39. In a car, the combination of a longitudinal member having a structure with laterally projecting arms, and transverse channels with horizontal web engaging and secured to said arms.

40. In a car, the combination of a central longitudinal floor member having a structure with longitudinal and laterally projecting arms and transverse floor members engaging and secured to said arms.

41. In a car, the combination of a longitudinal floor structure, a transverse floor structure whose strains are carried through the top of the longitudinal structure, the

- tops of both of said structures being on the same level at the crossing, and there being at the crossing a unitary member which forms a portion of both structures.
42. In a car, the combination of a longitudinal floor member, a transverse floor member which forms a portion thereof and whose strain at the center thereof is carried coincident with the top portion of the longitudinal member, the tops of both of said members being on the same level.
43. The combination with a longitudinal and transverse beam, of a member located at the crossing of such beams having arms at right angles to each other, the upper surfaces of which arms are curved.
44. In a car, the combination with intersecting beams, of a member located at the crossing of such beams, said member having arms at right angles to each other, and dumping doors cooperating with said member and being substantially even with the top thereof when in closed position.
45. The combination, in a car, of a pair of crossing floor beams and a cross-shaped member at the crossing having its top on the same level with the top of said beams.
46. The combination, in a car floor, of a central longitudinal member, a transverse member, and a Greek cross at their crossing connected with and stiffening both members mentioned, said three members having their tops on the same level.
47. In a car, the combination of a longitudinal rounded-top floor member and a transverse rounded-top floor member having an integral intersection.
48. In a car, the combination of a longitudinal rounded-top member, a transverse rounded-top member having an integral intersection, and dumping doors cooperating therewith and adapted to have its closed surface in a plane substantially tangent to such curves.
49. In a car, the combination of two members at right angles each having a rounded top, an integral member at the junction having projecting arms with rounded tops, and a dumping door having a top surface adapted to be substantially tangent to the curve of the top.
50. In a car, the combination of a longitudinal rounded top member and a transverse rounded top member, an integral rounded top member at the junction of the members mentioned, and a dumping door whose surface when closed is in a plane substantially tangent to all of said members.
51. In a car, the combination of a longitudinal central beam having a rounded top and transverse members extending inwardly from the sides of the car and rounded at their tops, an integral rounded top member at the junction of the members mentioned, and dumping doors the top surfaces of which when closed are as high as said tops.
52. In a car, the combination of a longitudinal central beam, transverse channel beams extending inwardly from the sides of the car, and a connection through the top of the longitudinal beam for the channels on opposite sides thereof.
53. In a car, the combination of a longitudinal central beam and transverse channel beams extending inwardly from the sides of the car, and shedding members mounted upon both the longitudinal and transverse beams and having at their crossing an integral member with projecting arms.
54. In a car, the combination of a longitudinal central rounded-top member, transverse rounded-top members extending inwardly from the sides of the car, and a connection through the top of the longitudinal member for the transverse members on opposite sides thereof.
55. In a car, the combination of a central longitudinal floor member having laterally projecting arms, and transverse floor members extending from said arms to the car sides and secured at their outer ends to the sides and at their inner ends to said arms.
56. In a car, the combination of two floor beams, one of which is formed to extend from the opposite sides of the other, and a cross-shaped member located at the junction and forming a portion of both beams.
57. In a car floor, the combination of mutually joined floor beams extending in four directions and a member at the junction having four arms, said arms being connected with the respective portions of the beams.
58. In a car floor, the combination of mutually joined floor beams extending in four directions at right angles, and an integral cross-shaped member at the junction having four arms at right angles, said arms being connected with the respective portions of the beams.
59. In a car, the combination of crossing floor beams and a member having arms which are at an angle to each other and are secured to such beams, respectively, the tops of said beams and member being on substantially the same level.
60. In a level bottom dump car, the combination with longitudinal and transverse members forming a portion of the level floor, of a four-armed member at the crossing also forming a portion of such level floor.
61. In a level bottom dump car, the combination of a longitudinal floor beam, a transverse floor beam, a member having projecting arms and located in the level floor at the crossing of such beams, and a dumping door cooperating with the longitudinal and transverse beam.

62. In a dump car, the combination of longitudinal and transverse members, including a unitary member at the crossing having shedding surfaces and four projecting equi-distant arms in substantially the same horizontal plane, and dumping doors coöperating with such shedding surfaces.

63. In a car, the combination with a longitudinal beam and a bolster, of a member at the crossing of the beam and bolster having four portions at right angles to each other and in the same plane.

64. The combination with the longitudinal and transverse floor beams of a car, of a unitary member at the crossing of such floor beams, said member having four arms at right angles to each other forming a continuation of said longitudinal and transverse members.

65. The combination in a level bottom dump car, of a longitudinal beam and transverse beams, and unitary members located at the crossings of such longitudinal and transverse beams and forming a portion of both beams and of the load-carrying floor.

66. In a car, the combination of a central longitudinal beam having in its compression member a series of crosses with longitudinal arms in the compression member and transverse arms, and transverse beams connected with the transverse arms.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

FRANK S. INGOLDSBY.

Witnesses:

J. R. BOWLING,
MARY D. WHITCOMB.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."