Aug. 11, 1953 G. B. DOREY 2,648,293

CONVERTIBLE RAILWAY CAR

Filed Dec. 3, 1948 4 Sheets-Sheet 1

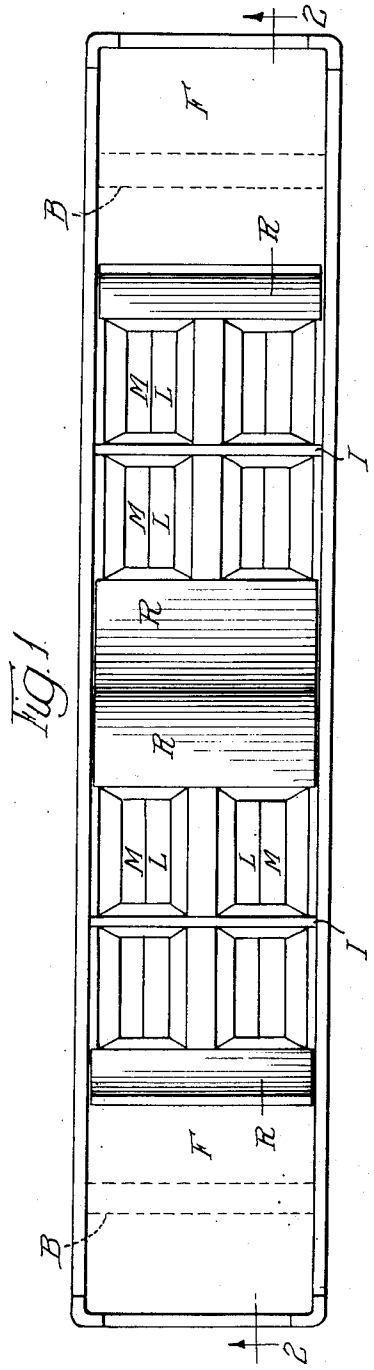


Fig. 1

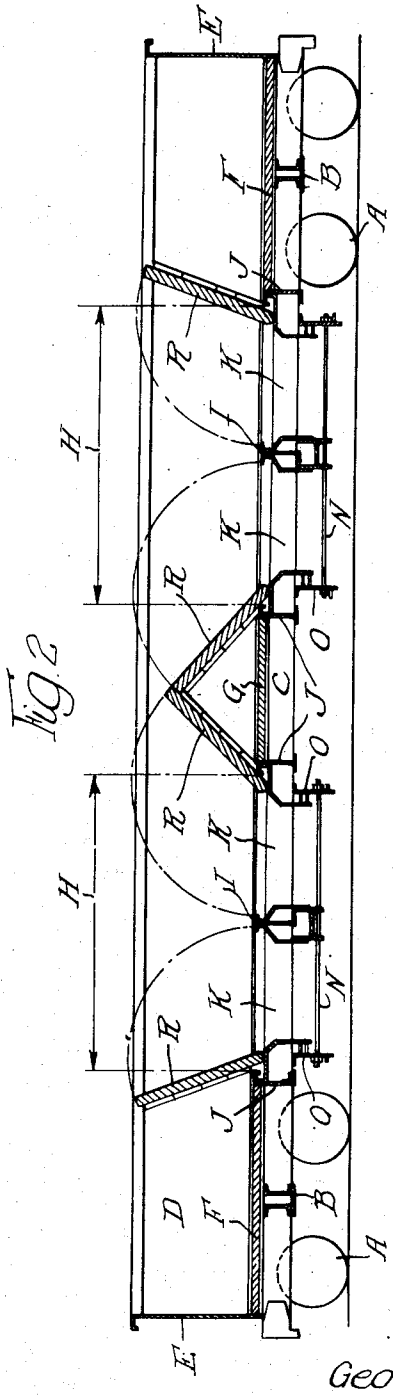


Fig. 2

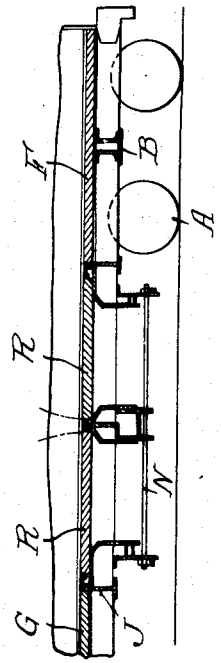


Fig. 3

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CONVERTIBLE RAILWAY CAR

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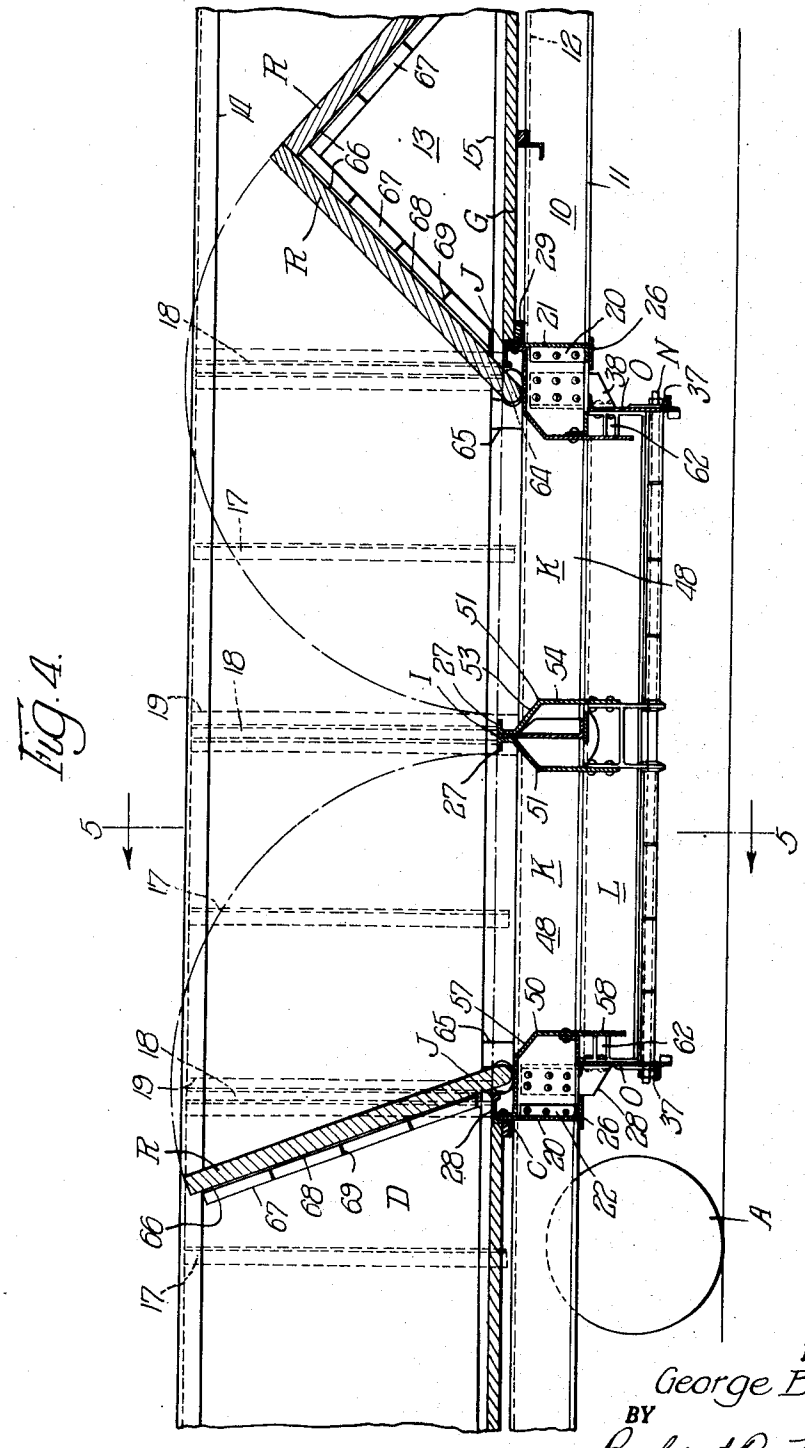


Fig. 4.

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CONVERTIBLE RAILWAY CAR

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Fig. 5.

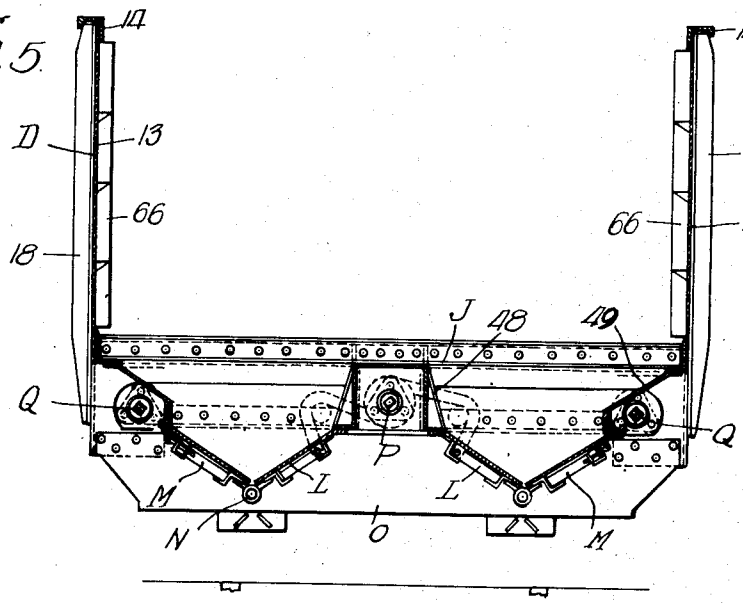


Fig. 6.

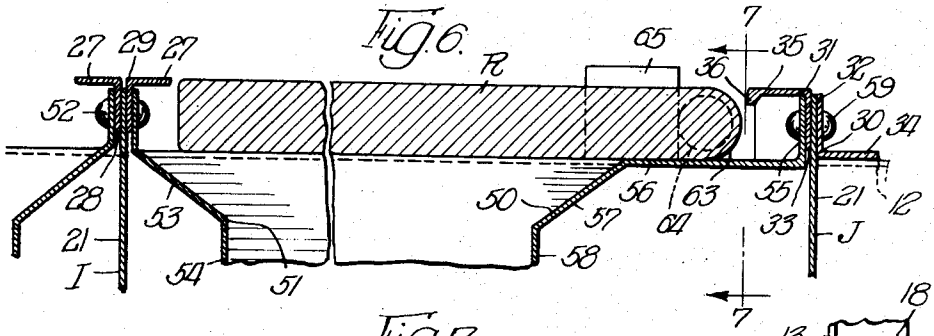
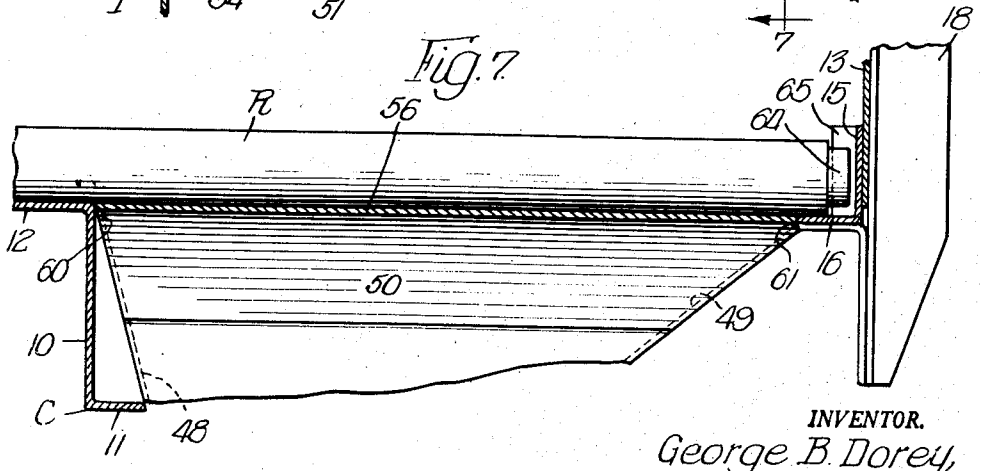


Fig. 7.



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CONVERTIBLE RAILWAY CAR

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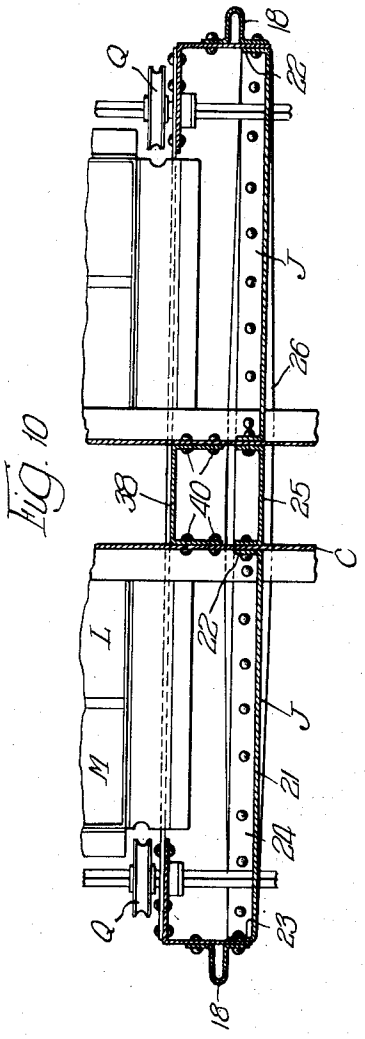


Fig. 10

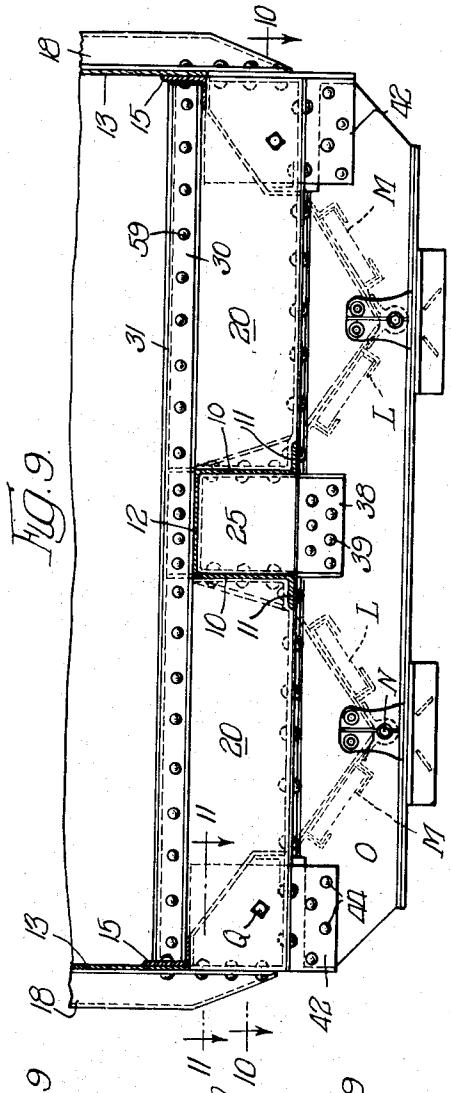


Fig. 9

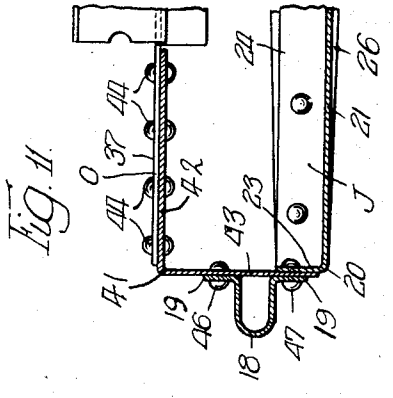


Fig. 11

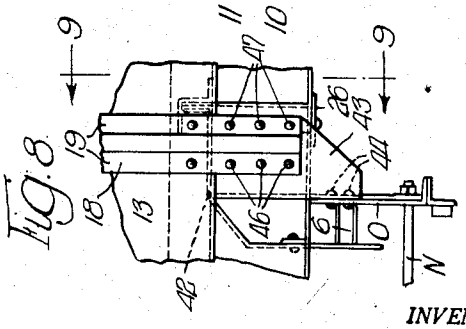


Fig. 8

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UNITED STATES PATENT OFFICE

2,648,293

CONVERTIBLE RAILWAY CAR

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Application December 3, 1948, Serial No. 63,360

7 Claims. (Cl. 105—243)

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My invention relates, generally, to railway cars, and it has particular relation to convertible railway cars.

An object of my invention is to provide a car convertible from a flat bottomed type of car to a hopper car type or vice versa and for this purpose movable floor sections are provided which are adapted to occupy a horizontal position and are movable in alternative positions to form the end walls of hopper sections.

Another object of my invention is to provide a convertible car having the movable floor sections arranged to swing on axes extending transversely of the car whereby the car is divided into separate longitudinally extending compartments each having bottom discharge doors for directing lading either to the center or the sides of the car.

A further object of my invention is to provide a convertible dump car of the character described with the parts so arranged as to permit the use of a standardized form of center sill, side wall, stakes and other parts generally in accordance with American Association of Railroad requirements.

My invention is an improvement on the conventional type of convertible car now widely used and which is predicated on a design employing a longitudinally extending central hopper with movable floor sections arranged to swing on longitudinally extending axes. In this type of car having a centrally disposed longitudinally extending hopper it is customary to employ heavy girders instead of the usual center sill. This results in a heavy and cumbersome construction having an extremely limited load carrying capacity. It is therefore a special feature of my invention to overcome the limitations of the existing type of car by providing a construction wherein transversely extending members are located near the ends of the hopper sections for transmitting the major portion of the load applied thereto to the body bolsters of the car through the employment of the car sides as girders.

Still another object of my invention is the provision of special construction for uniting the center sills and side walls with transversely extending members associated with the discharge hoppers.

My invention further resides in the novel arrangements of parts and in the disposition of the movable floor sections in such a manner as to provide a car having an efficient distribution of load calculated to relieve the load carrying members of the car of excessive strains.

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For further comprehension of my invention reference may be had to the accompanying drawings wherein:

Figure 1 is a longitudinal plan view of a car having my improvements incorporated therein;

Figure 2 is a vertical, sectional longitudinal view of the car shown in Figure 1 as taken on a line 2—2 of said Figure 1, said view illustrating the car as converted to function as a hopper car;

Figure 3 is a fragmentary sectional view of the car, similar to the view shown in Figure 2, except that the movable floor sections are shown as positioned to form the floor of the car as a flat bottomed car;

Figure 4 is a fragmentary view on an enlarged scale of a portion of Figure 2, showing as much of the car as necessary to illustrate one of the hopper sections and its related construction;

Figure 5 is a vertical, transverse sectional view taken through the car and on a line corresponding substantially to a line 5—5 of Figure 4;

Figure 6 is a broken vertical sectional detail view of a portion of the structure illustrated in Figure 4 on an enlarged scale with the movable floor shown in position as a portion of the floor of the car;

Figure 7 is a broken vertical sectional view showing the convertible floor in position as related to the center sill and crossbeam of the car, said view being taken on a line 7—7 of Figure 6;

Figure 8 is a vertical elevational view of a portion of the side of the car showing as much of the car as necessary to illustrate the structure uniting one of the side stakes with one of the transversely extending members of the car;

Figure 9 is a vertical elevational sectional view taken through the car and as viewed on a line corresponding substantially to a line 9—9 of Figure 8;

Figure 10 is a plan sectional view taken through the car and as taken on a line 10—10 of Figure 9; and

Figure 11 is a sectional plan view on an enlarged scale taken through the outer end of the transverse beam structure and corresponding to a line 11—11 of Figure 9.

In said drawings, the improved car is shown as having the usual trucks A adjacent the ends of the car, body bolsters B, center sill C, vertical side walls D, and vertical end walls E. Fixed floor sections F are disposed at each end of the car and an intermediate fixed floor section G is disposed midway between the said end floor sections and spaced therefrom to provide two hopper openings H lying between said fixed end

floors F and the intermediate fixed floor G. Each hopper opening H below the floor level is divided transversely of the car by a crossbeam member I and adjacent the faces of the outer edges of the respective floor sections F and G there are disposed transversely extending crossbeams or upper beam members J—J. The crossbeam I in cooperation with the longitudinal center sill results in the formation of four pockets K and beneath these pockets there is a V-shaped arrangement of doors, Figure 5, including inner doors L for discharging to the center of the car and outer doors M for discharging outwardly to the sides of the car. The doors L and M are pivotally mounted on a pivot rod N which in turn is supported by transversely extending baffle members or lower beam members O spaced inwardly from the crossbeams J. The doors are raised and lowered and supported in closed position by means of chain and shaft winding mechanism as indicated conventionally at P for the center doors and Q for the side doors.

The car is arranged to function either as a flat bottomed car or as a hopper car arranged for discharging either to the ecnter or to the sides of the car and this conversion from one type of car to another is made possible by the use of swingingly mounted floor sections R. The floor sections R are arranged in pairs to cover each length of hopper opening H when the car is operative as a flat car and are mounted to swing on axes extending transversely of the car adjacent each fixed floor section F and G to assume sloping positions above the level thereof.

I do not make any claim to the arrangement of a V-shaped hopper with baffle plates and door operating mechanisms as I am aware that this is old in the art broadly but in my particular embodiment I incorporate the baffle plates in the car structure in such a manner as to employ them as beams for assisting in supporting the center sills and hoppers from the sides of the car.

The center sill C is preferably the American Railroad Association standard consisting of a pair of webs 10—10, Figure 9, outstanding lower flanges 11—11 and an upper horizontally disposed wall 12.

Each side wall includes a vertically disposed web plate 13, Figure 5, and upper and lower chords 14 and 15, respectively, the latter being in the form of an angle member having an inwardly extending horizontally disposed flange 16, Figure 7, with its upper surface lying substantially in alignment with the upper surface of wall 12 of the center sill. Outwardly of the web plate 13 the side walls are reinforced by a number of stiffeners 17, Figure 4, and side stakes 18, the latter being preferably of U-shape section with flanges 19—19, Figure 11, overlying the side wall and secured thereto. The respective stakes 18 are disposed adjacent the ends of the transverse members I and J and united therewith in a manner as will be pointed out. The crossbeams I and J each include a pair of diaphragms 20—20 each having a vertical web plate 21 extending appreciably above the top of the center sill and flanged at the inner and outer ends and at the bottom as indicated at 22, 23 and 24 respectively. Continuity of reinforcement across the plane of the center sill is maintained by a spacer 25 lying between the center sills in alignment with the diaphragms 20. The respective members 20—20 and 25 are further tied together by a bottom cover plate 26.

The upwardly projecting web portions of the diaphragms of the dividing crossbeam I are tied together transversely of the center sill by a pair of angle shaped members 27—27 placed back to back with the vertically disposed flanges 28 riveted to the webs 21 and the horizontally disposed flanges 29 disposed with their upper surfaces substantially in alignment with the floor surface of the fixed floor sections.

The upper member of the crossbeams J consists of an angle shaped member 30 and an angle shaped bulb member 31, said members being arranged in inverted relation to present a Z-shaped formation with the web 21 sandwiched between the vertically disposed flanges 32 and 33 of the respective members 30 and 31 and riveted thereto. The horizontally disposed flange 34 of the angle member rests upon the center sill and the horizontally disposed flange 16 of the side bottom angles 15. The horizontally disposed flange 35 of the bulb angle member 30 is disposed to form a portion of the floor of the car and the bulb portion 36 lies adjacent the fixed floor and forms a strong marginal reinforcement for the extreme outer margin of the fixed floor section. In carrying out my improvements I employ channel members 37 for the transverse baffle plates O and connection with the center sill is effected through the medium of a flanged bracket plate 38 riveted to the channel at 39 and to the webs of the center sill at 40.

At each side of the car a connecting plate 41 is formed with angularly related walls 42 and 43 to respectively overlie and be secured to the vertical web of the channel member 37 at 44 and to the end flanges 23 of the diaphragm 20.

The U-shape side stakes 18 at the crossbeams through the medium of flanges 19—19 are secured to the connecting plate 41 by being directly riveted to the walls 43 by rivets 46 and also by rivets 47 which extend through the side stake flange 19, the wall 43 and the end flange 23 of the crossbeam.

The method of supporting the respective hopper sections from the car sides by the use of transverse baffle plates in cooperation with the usual crossbeams and stakes is conducive to the attainment of strength and rigidity with light weight.

The pockets K include inner and outer longitudinally extending wall plates as at 48 and 49 respectively and transversely extending plates as at 50 and 51 respectively, the latter being secured to the crossbeam I as at 52 and leading downwardly at an incline at 53 and thence vertically downwardly at 54.

Each of the end plates 50 includes an upper vertical flange section 55, a flat floor section 56, a downwardly inclined floor section 57 and vertically disposed end plate portion 58. The upper vertical flange section 55 is riveted to the upper portion of the crossbeam at 59 and the flat floor section 56 lies intermediate the center sill and lower side bottom angle and is welded to both of said members as at 60 and 61. The respective vertical end plates 54 and 58 are braced relatively to the associated baffle members by means of braces 62.

The pair of movable floor sections R extend transversely of the car and adjacent the fixed floor sections. They are formed of semi-circular shape at 63, Figure 6, and at each end include laterally projecting trunnions 64, said trunnions being arranged to cooperate with fixed stops 65 to limit longitudinal sliding motion of the floor

sections when moved to overbalanced position to form the end walls of the hopper sections.

The movable floor sections when positioned as the end walls of hopper sections H rest upon shelves indicated at **66**, said shelves being preferably in the form of angle shaped members with one flange **67** secured to the car side and the adjacent flange **68** extending beneath the floor members. The respective flanges **67** and **68** are braced relatively to each other by gussets **69**.

As shown in Figure 2, with the car converted to a hopper car, my improved construction provides that one of the sections R forming the transverse apex will rest upon the edge of the companion section and thus a self contained transverse ridge structure is provided. The disposition of the convertible floors to swing on axes extending transversely of the cars with a center ridge midway between the bolsters thus virtually divides the car into two distinct sections and has the effect of relieving the car from having excessive concentration of load midway between the bolsters.

The floor sections R when positioned to form the floor of a flat bottomed car are adequately protected at each end by the adjacent metallic rails formed by the upper chord members of crossbeams I and J.

The feature of combining the crossbeam members I and J into boxlike girder structures and further connecting them with the side stakes **18** of the car for transmitting loading to the car sides is of importance in a hopper car of this type in which highly concentrated loading is involved. The employment of the transversely disposed baffle members O, which are disposed at the respective ends of the doors M and L, to serve as beam members for supporting the center sill C and associated structure from the car sides is a novel departure from accepted practice and presents advantages making for strength and rigidity combined with light weight.

The arrangement of crossbeams J, which provides a strongly reinforced beam adjacent the edge of each fixed floor section F with an intermediately disposed beam I of lighter construction midway of the opening H, provides for uniformity of spacing between the various beams in conformity with sound engineering principles.

In view of the fact that the movable floor members R serve in a dual capacity either as part of the floor or as end wall members, it will be appreciated that the lengthwise spacing of the beams I and J must be related necessarily to the height of the car walls D and E. In carrying out my invention, I have arranged for a spacing between the crossbeams I and J which will receive movable floor sections R of a width suitable for incorporation as end walls or as the longitudinally sloping walls of the transversely extending ridge.

My improvements may be readily applied to existing types of cars with but little modification inasmuch as I have adhered to standardized construction with uniformity in spacing of cross-members.

What I claim is:

1. In a convertible car of the character described, a center sill, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extending underneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, side stakes secured to said side walls at the ends of said cross beam members, lower beam members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, means interconnecting the respective ends of said lower beam members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower beam members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, and a pair of rockably mounted floor sections for each of said pairs of hopper openings disposed in one position so as to close said hopper openings from above and provide a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections.

2. In a convertible car of the character described, a center sill, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extending underneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, additional cross beam members dividing said two pairs of hopper openings into eight openings and extending between the car sides and said center sill and secured to opposite sides of the latter, side stakes secured to said side walls at the ends of said cross beam members, lower beam members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, means interconnecting the respective ends of said lower beam members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower beam members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, and a pair of rockably mounted floor sections for each of said pairs of hopper openings disposed in one position so as to close said hopper openings from above and provide a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections.

3. In a convertible car of the character described, a center sill, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extend-

ing underneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, additional cross beam members dividing said two pairs of hopper openings into eight openings and extending between the car sides and said center sill and secured to opposite sides of the latter, the upper edges of said cross beam members being substantially coplanar with the upper surfaces of said floor sections, side stakes secured to said side walls at the ends of said cross beam members, lower beam members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, means interconnecting the respective ends of said lower beam members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower beam members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, and a pair of rockably mounted floor sections for each of said pairs of hopper openings disposed in one position so as to close said hopper openings from above and being positioned between the respective upper edge portions of said cross beam members to provide thereby a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections.

4. In a convertible car of the character described, a center sill, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extending underneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, additional cross beam members dividing said two pairs of hopper openings into eight openings and extending between the car sides and said center sill and secured to opposite sides of the latter, the upper edges of said cross beam members being substantially coplanar with the upper surfaces of said floor sections, side stakes secured to said side walls at the ends of said cross beam members, lower beam members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, plate means interconnecting the respective ends of said lower beam members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower beam members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, plate means individual to each of said eight hopper openings defining a chute leading to said V-arranged inner and outer doors therebelow and having flat floor sections along said hopper opening defining edges of said end floor sections, and a pair of floor sections for each of said pairs of hopper openings rockably mounted on said flat floor sections in one position so as to close said hopper openings from above and provide a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections.

5. In a convertible car of the character described, a center sill, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extending undereneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, additional cross beam members dividing said two pairs of hopper openings into eight openings and extending between the car sides and said center sill and secured to opposite sides of the latter, the upper edges of said cross beam members being substantially coplanar with the upper surfaces of said floor sections, side stakes secured to said side walls at the ends of said cross beam members, lower channel members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, L-shaped plates interconnecting the respective ends of said lower channel members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower channel members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, plate means individual to each of said eight hopper openings defining a chute leading to said V-arranged inner and outer doors therebelow and having flat floor sections along said hopper opening defining edges of said end floor sections, and a pair of floor sections for each of said pairs of hopper openings rockably mounted on said flat floor sections in one position so as to close said hopper openings from above and provide a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections.

6. In a convertible car of the character described, a center sill, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extending underneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, additional cross beam members dividing said two pairs of hopper openings into eight openings and extending between the car sides and said center sill and secured to opposite sides of the latter, the upper edges of said cross beam members being substantially coplanar with the upper sur-

faces of said floor sections, side stakes secured to said side walls at the ends of said cross beam members, lower channel members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, L-shaped plates interconnecting the respective ends of said lower channel members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower channel members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, plate means individual to each of said eight hopper openings defining a chute leading to said V-arranged inner and outer doors therebelow and having flat floor sections along said hopper opening defining edges of said end floor sections, a pair of floor sections for each of said pairs of hopper openings rockably mounted on said flat floor sections in one position so as to close said hopper openings from above and provide a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections, trunnions projecting laterally from said floor sections along their respective pivot axes, and stop means cooperating with said trunnions to limit sliding movement of said floor sections when they are swung to provide said inclined hopper walls.

7. In a convertible car of the character described, a center sill of inverted U-shape, side walls spaced from said center sill, body bolsters near the ends of said center sill and side walls to support the same, a flat floor section at each end of the car, an intervening flat floor section above said center sill and between said side walls, said intervening flat floor section being spaced from said end floor sections to provide with said center sill two pairs of hopper openings, cross beam members extending underneath said floor sections along the ends of said hopper openings between the car sides and said center sill and secured to opposite sides of the latter, additional cross beam members dividing said two pairs of hopper openings into eight openings and extending between the car sides and said center sill and secured to opposite sides of the latter, the upper edges of said cross beam members being substantially coplanar with the upper surfaces of said floor sections, spacer means extending between and secured to the branches of said U-shaped center sill and constituting continuations of said

cross beam members, side stakes secured to said side walls at the ends of said cross beam members, lower beam members underneath and secured to said center sill and extending along the hopper opening defining edges of said end floor sections, L-shaped plates interconnecting the respective ends of said lower beam members and said cross beam members with the lower ends of said side stakes, pairs of V-arranged inner and outer doors pivoted on and between said lower beam members for closing said hopper openings from the underside thereof, operating means for opening and closing said doors, plate means individual to each of said eight hopper openings defining a chute leading to said V-arranged inner and outer doors therebelow and having flat floor sections along said hopper opening defining edges of said end floor sections, a pair of floor sections for each of said pairs of hopper openings rockably mounted on said flat floor sections in one position so as to close said hopper openings from above and provide a flat bottomed car and in another position to provide inclined hopper end walls with the adjacent floor sections forming a transverse ridge overlying said intervening flat floor section and the remaining floor sections overlying the respective end portions of said end floor sections, trunnions projecting laterally from said floor sections along their respective pivot axes, stop means cooperating with said trunnions to limit sliding movement of said floor sections when they are swung to provide said inclined hopper walls, and shelf means carried by said side walls for engaging said floor sections to hold the same in said inclined positions.

GEORGE B. DOREY.

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