March 19, 1963 J. A. SZCZEPANIK 3,081,716

RAILWAY CAR

Filed June 9, 1959 2 Sheets-Sheet 1

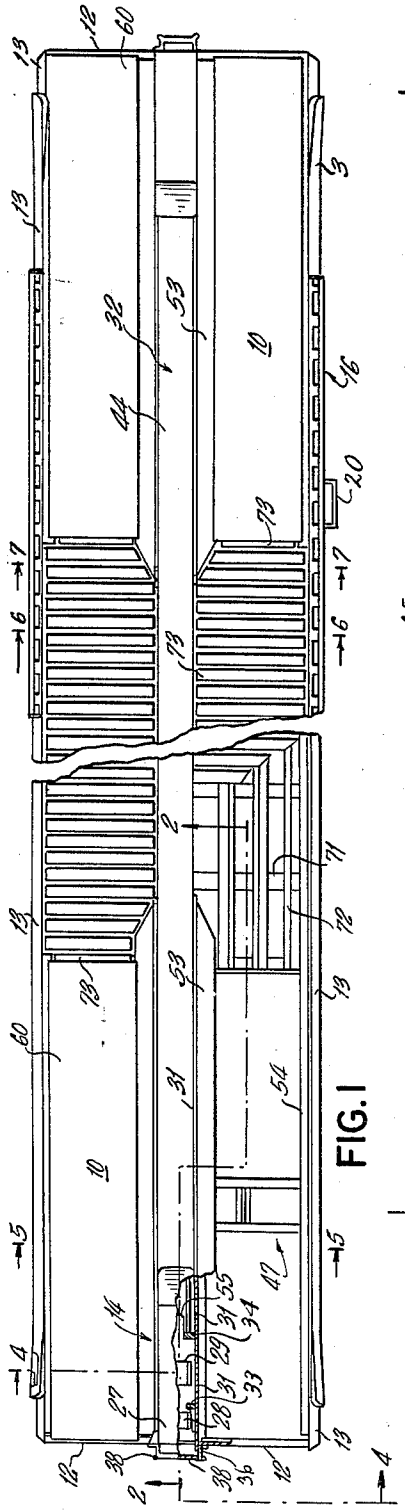


FIG. 1

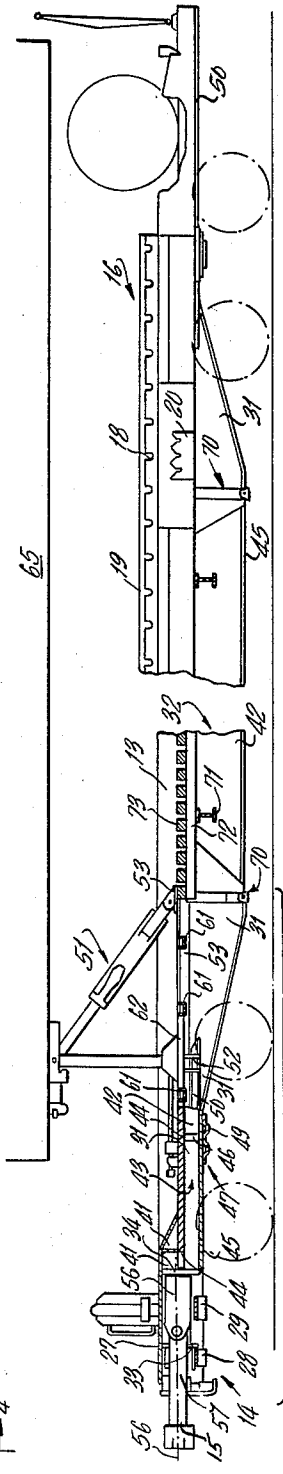


FIG. 2

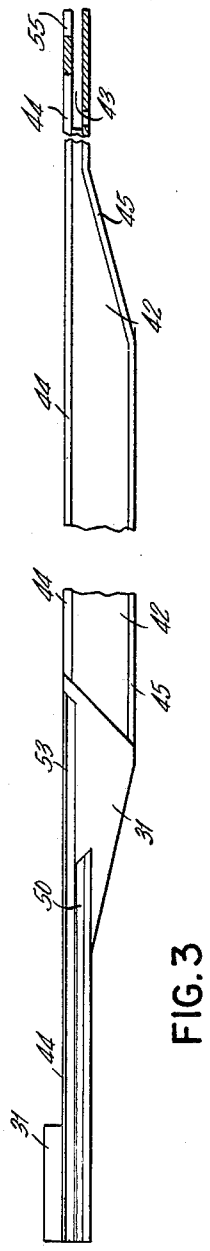


FIG. 3

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March 19, 1963 J. A. SZCZEPANIK 3,081,716

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Filed June 9, 1959 2 Sheets-Sheet 2

FIG.4

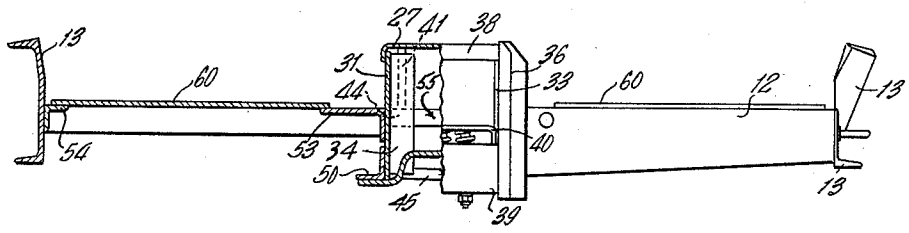


FIG.5

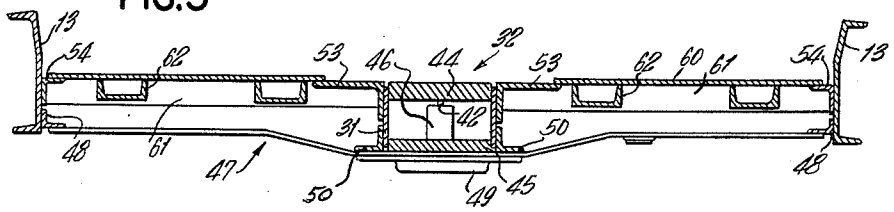


FIG.6

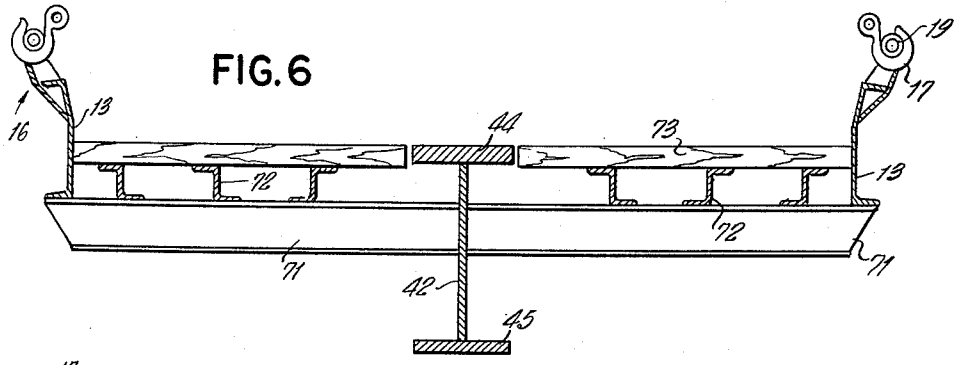
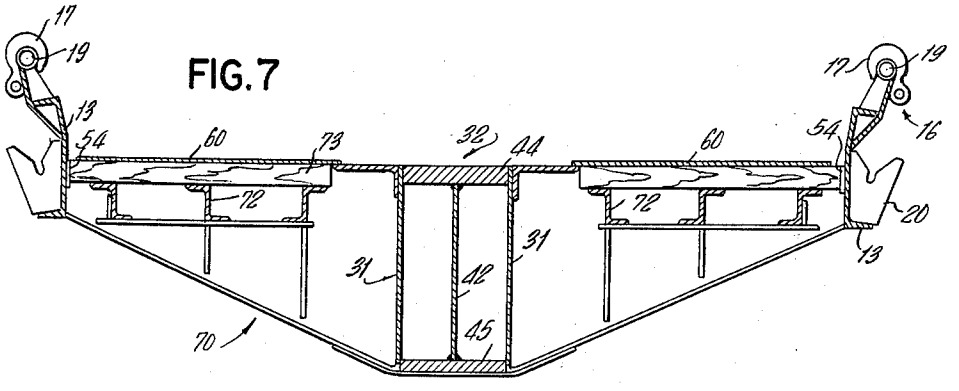


FIG.7



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3,081,716
Patented Mar. 19, 1963

3,081,716

RAILWAY CAR

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Filed June 9, 1959, Ser. No. 819,166
12 Claims. (Cl. 105—416)

The present invention relates to the provision of a low level deck in a railway car, particularly in a railway car for transporting road vehicles. More particularly, the invention relates to a novel center sill in a railway car positioned so that its entire upper surface is disposed in a plane at or below the center of buff force received at the ends of the car.

The height of a railway car coupler above the top of the rail is one of the invariable dimensions in all standard railroad equipment. The coupler must be mounted within a gear housing at the end of the railway car so that the longitudinal axis of the coupler shank is 34½ inches above the top level of the rails, or within very slight tolerances thereof. Normally, the center sill of a railway car is disposed to receive the impact of buff forces imparted to the gears associated with the couplers. In order to present great strength and ability to absorb these buff forces without bowing or buckling of the center sill, it has been necessary, in cars having center sills extending between and abutting the gear housings to directly receive buff forces, to have the neutral axis of the center sill lying in a plane slightly above or slightly below the center of buff force, that is, above or below the horizontal axes of the couplers.

Several problems result from this relationship between the placement of the center sill and its absorbing of buff forces. For instance, in the transportation of truck trailers, it has been necessary to drop the floor of a flat car on either side of the center sill to accommodate the height of various trailers through tunnels. The projection of the center sill above the lowered floor presents an obstruction for the utilization of various trailer front end securing devices or hitches which, even when in a retracted position, may add seven or eight inches of height above the center sill.

As there may not be more than eight inches of projection from the floor of a car over which trailers are to be driven, it is an object of this invention to present a flat deck for the trailer upon which trailer securing devices may be secured without offering any obstruction to a trailer or tractor under-carriage while the trailer is being driven over the car floor. Similarly, it is an object of this invention to pesent a lowered deck to enable the flat car and trailer to negotiate tunnels with low head clearances.

One of the problems involved in providing a low level deck for railway cars is that the center line of the draft and buff rigging will be substantially above the horizontal median line of the underframe structure. A a result, buff forces will tend to misshapen the structure at the end zones where the center sill and other reinforcing structure cannot be allowed a great deal of depth due to the support of the car upon the trucks. Furthermore, when trailers are transported on such cars, the shifting weight of the trailer will impart various forces of great magnitude upon the center of the end zone of the car where the trailer is secured to the floor. It is therefore a further object of this invention to impart great strength to the end zones of the car of the invention within the vertical limits between the truck and the floor of the car.

Other advantages will become obvious to those skilled in the art upon a reading of this specification with references to the drawings which form a part hereof.

In general, the objects of the invention are accomplished by providing a railway car underframe having a center sill which, because of its cross sectional dimensions, has its neutral axis close to its top surface. The top surface of the sill is made to lie in a plane at or below the center of buff forces received at the ends of the car. In this manner, a flat car for transporting trailers may be given a flat deck six or seven inches below the top of the gear housings, which is low enough for tunnel clearances and which permits the utilization of retractable trailer hitches which can be driven over readily without obstruction to the trailer or trailer tractor.

In the railway car of the present invention there is provided novel side plates or webs on either side of the center sill which extend past the ends of the center sill in the end zones of the car and form the sides of the gear housings which lie above the top surface of the center sill. The plates further provide anchorage or integral connections for underframe structure supporting means and for floor support means which are made to extend with the plates in the end zones of the car. For instance, floor supporting angle members having relatively wide horizontal flanges are made to run longitudinally of the car in the end zones substantially coextensive with the side plates. The integral interrelation of the side plates, the supporting means and the center sill having its neutral axis near its top, produces strong end zones, particularly for a car having its deck entirely below the center of buff forces.

Referring now to the drawings:

FIGURE 1 is a plan view, partly broken away and partly in section, of the top of a railway flat car embodying the invention;

FIGURE 2 is a side elevation, partly broken away and partly in section, of the railway car shown in FIGURE 1, the left side of which is taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a side elevation, partly broken away and partly in section, of the center sill used in the car of FIGURE 1;

FIGURE 4 shows a section taken along the line 4—4 of FIGURE 1;

FIGURE 5 shows a section taken along the line 5—5 of FIGURE 1;

FIGURE 6 shows a section taken along the line 6—6 of FIGURE 1; and

FIGURE 7 shows a section taken along the line 7—7 of FIGURE 1.

Indicated at **10** in FIGURE 1 is a railway flat car for transporting road vehicles having end sills **12** at each end of the car comprising two beams at each end in horizontal and transverse spaced relation. The end sills are connected at their outer ends by longitudinally disposed side sills **13**. Gear housings, indicated at **14**, are mounted centrally at each end sill and connect the inner ends of the end sill beams. Coupler members **15**, one of which is shown only in FIGURE 2, are mounted within the housings at standard height.

The side sills **13** are formed of outwardly opening C-beams. The upper part of the side sills are cut off at the ends where they join the end sills and present an L-shaped cross section as seen in FIGURES 1 and 4. The upper part of each C-beam side sill is used as a wheel guide for motor vehicles and in the car shown provides support for an anchor or keeper strip, indicated at **16**, for hooks **17**, shown in FIGURES 6 and 7, of cargo sway chains. The anchor strip is provided with openings, indicated at **18** in FIGURE 2, longitudinally spaced along the strip for the passage through of the hooks around the retainer bar portion **19** of the anchor strip. The car is also provided with sway chain pockets or retainers **20**, shown in FIG-

URES 2 and 7, for stowing the chains when not in use. FIGURES 6 and 7 show the hooks in operative and inoperative position respectively and the convenient placement of the chain retainers is shown in FIGURES 2 and 7.

Each gear housing is comprised of a top plates 27 having turned down sides, a pair of inverted U-sections 28 and 29 having flanged ends and forming front and rear bottom portions of the housings respectively and side plates 31 connecting the turned down sides of the top cover and the end flanges of the inverted U-sections. Longitudinally extending angle members 50 provide the connections between the side plates 31 and the bottom portions. These plates form continuous sides for the housing, extend from the front end of the housing inwardly of the car in vertical planes and are contoured at their inner extensions to form side walls or webs for the center sill, indicated at 32, as shown in FIGURES 2, 3, 4, 5 and 7. These plates extend from the outer ends of the housings throughout the end zones of the car. The end zones are defined as the portions of the car adjacent the trucks on either end of the car and are indicated in FIGURE 2 by the bracket E. A pair of elongated vertically oriented draft stops 33 are disposed in horizontal and transverse spaced relation adjacent the outer end of each of the housings and are secured to opposing inner surfaces of the plates 31 inside of the housing. A pair of elongated vertically oriented buff stops 34 are disposed in horizontal and transverse spaced relation adjacent the inner ends of each of the housings and are secured to opposing inner surfaces of the plates 31 inside of the housing. The front end of the housing provides the usual support members for the coupler, and the buff and draft gear is disposed between the stops. The front of the housing, FIGURE 4, is reinforced with side angles 36 which connect the side plates 31, the end sills and the top plate of the housing. Top and bottom front end pieces 38 and 39 are vertically spaced from one another for entry and retention of the coupler which is supported upon a resiliently mounted inverted U-member 40, as shown in FIGURE 4.

The center sill 32 comprises a vertically disposed I-beam extending longitudinally of the car between the housings. The ends of the center sill abut the rear surfaces of the buff stops. The vertical web 42 of the center sill has a cut-out section, indicated at 43 in FIGURES 2 and 3, at both ends of the center sill. The cut-out portion extends between the top and bottom flanges, 44 and 45 respectively, of the center sill and inwardly to a point approximately mediate the end zone. The web is discontinued at this point for placement of the king pin sleeve 46 in its vertical position between the two horizontal flanges. The car is supported on its trucks, not shown, at the ends of the car by transversely disposed bolsters, indicated at 47, each of which comprises two connected parallel beams supported at their ends by angle members 48 connected to the side sills. The bolster webs and top flanges are discontinued at the center to receive the center sill of the car and the truck bolster seat or bearing plate 49 interconnects the bolster beams and is disposed directly beneath the center sill in the path of the king pin sleeve 46 and the king pin aperture in the center sill. The bolster is connected to the side plates 31 on either side of the center sill by angle members 50. The angle members 50 extend from the ends of the car, past their bolster connection, to a position below the vertical leg of the trailer hitch 51, shown in FIGURE 2, where a pair of reinforcement plates 52 are vertically positioned on either side of the center sill between the horizontal legs of the angle member 50 and of the floor supporting angle member 53.

The top flange 44 of the center sill provides a cut-out portion, indicated at 55, at both ends of the center sill. The cut-out portion is U-shaped and permits the gear rigging room for inward movement under buff forces while at the same time the ends of the center sill adjacent the edges of the U-shaped cut-out provide abutment against the buff stops.

In the preferred embodiment of the invention, the top horizontal flange of the center sill abuts the buff stops substantially centrally thereof and in the railway car shown the upper surface of the top horizontal flange lies in a plane below the longitudinal axis, indicated at 56 in FIGURE 2, of the coupler shank 57 but in a plane common with the shank. Gussets 41 abut the rear surface of each buff stop and the upper surface of the top horizontal flange 44 of the center sill on either side of the U-shaped cut-out portion and provide reinforcement against inward movement of the upper part of the buff stops under buff force.

The center sill shown is constructed in the form of a "fish-belly" wherein the bottom horizontal flange 45 is dropped throughout the central zone of the car and tapers upwardly at both of its ends from the beginning of the end zones to a point adjacent the inner sides of the bolsters. It continues at either end in a horizontal plane to its point of abutment with the lower ends of the buff stops. The vertical web 42 of the center sill co-extends with the top and bottom flanges from bolster to bolster and interconnects the horizontal flanges centrally thereof.

At each end of the car, on either side of the center sill, floor supporting angle members 53 are welded or otherwise secured by their vertical segment to the outer surfaces of the side plates 31. They each have a comparatively wide horizontal segment lying substantially in the same plane as the upper surface of the top flange of the center sill. They extend longitudinally throughout the end zones. Also extending longitudinally in the end zones at each end of the car on either side of the center sill are floor supporting angle members 54 which are secured by the vertical segments to the side sills 13 on the inner surface thereof. Each of these members also has a horizontally disposed segment which lies in the same plane as the horizontal segments of the floor support members 53 attached to the side plates 31. End zone floor plates 60 are secured at their sides to, and are supported upon, these support members. The floor plates extend from the ends of the car, on either side of the center sill, throughout the end zones.

The floor plates are reinforced on their undersurface by transversely disposed and longitudinally spaced inverted U-beams 61. They extend on either side of the center sill and are connected at their ends to the floor support angles 53 and 54. The ends of their upturned legs abuttingly support the floor plate. Longitudinally disposed inverted U-members 62 interconnect some of the transverse inverted U-members and provide further abutting support of the floor with the upturned ends of their legs.

A pair of cross bearers, indicated at 70, are disposed transversely of the car on either side of the center sill at the approximate division line between the end zone and the central zone at each end of the car. They are secured to the side sills 13 at their outer ends and to the bottom of the center sill and to the side plates 31 at their inner ends. A plurality of transverse cross ties 71, on either side of the center sill, are connected at their outer ends to the botom of the side sills and at their inner ends to the central web 42 of the center sill. These cross ties are disposed in longitudinal spaced relation between the cross bearers. The cross bearers and the cross ties provide support for a plurality of longitudinally disposed stringers or angle members 72 which are in horizontal spaced relation and run the length of the central zone of the car on either side of the center sill. These stringers provide support for floor planks 73, the upper surfaces of which are disposed in the same horizontal plane as the upper surface of the top flange of the center sill. The floor planks, seen in FIGURES 1, 2, 6 and 7, are arranged

to lie transversely of the car on either side of the center sill and in horizontal spaced relation.

It will be seen in FIGURES 5, 6 and 7 that the cross sectional area of the top flange of the center sill is much greater than that of the bottom flange. The significance of the difference in mass between the flanges is that the neutral axis of the center sill is raised. This shifting of the neutral axis effects greater strength against buffing forces at the upper portion of the center sill where it is needed and allows the lowering of the center sill. To construct a center sill for use in forty to seventy ton low floor railway cars, it has been determined that the cross sectional area of the top flange should be between fifty percent and eighty-five percent greater than the cross sectional area of the bottom flange depending on the weight of the car. The greater the weight of the car, the lesser will be the difference in cross sectional area between the flanges because the flanges will be normally larger in heavier cars but only the same amount of added strength will be required to lower the center sill in each instance.

Utilizing the present invention and dropping the upper surface of the center sill below the center of buff force, as much as six or seven inches can be gained for the placement of collapsible trailer hitches in the longitudinal center line of the car. Furthermore a completely flat deck surface is achieved. This surface is substantially below the top of the gear housings and is close enough to the rails so that tunnels with low head clearances can be negotiated with large trailers being supported upon the lowered floor.

The positioning of the center sill entirely below the center of buff, achieved by the raising of the neutral axis of the center sill, is utilized in the invention to impart great strength to the end zones as well as to produce a low level floor for a railway car. The ends of the center sill **32** abut the buff stops of the gear housings which in turn lie in a higher plane than the "dropped" center sill. The comparatively large masses of the top and bottom flanges **44** and **45** of the center sill provide very great strength in the underframe of the car. As the center sills are tapered into the end zones to allow room for the trucks, added strength is supplied in the end zones by the side plates **31** which actually form integral side webs for the center sill throughout their tapered ends. These same plates extend past the ends of the center sill to form side walls for the gear housings and have the buff stops mounted directly on their inner walls within the housings. Buff forces received at the stops will be imparted directly to the center sill and to the integral plates. Further reinforcement of the end zones is supplied by the floor supporting angles **53** which are connected by welding or otherwise to the plates **31** and which also form integral parts of the center sill throughout the end zones of the car. The bolster supporting angles **50** are also integrally connected to the side plates, reinforce the bottom and side connections of the gear housing and extend longitudinally and inwardly through the better part of the end zones of the car. The relatively wide horizontal segments of the angles **53** add to their strength and consequently to the strength of the center sill and integral side plates. A trailer **65**, shown in FIGURE 2, produces shifting and twisting formes of very great magnitude through its hitch to the center sill. The floor supporting angles **53**, and angle members **50**, which support a part of the weight of the trailer, and the side plates add to the strength of the center sill to dissipate these forces as well as the buff forces. There is therefore presented by the longitudinal placement of and the integral interrelation between the center sill, the side plates, the floor supports and the bolster support angles, an extremely strong car structure, particularly for one having its entire floor lying in a plane below the center of buff forces received at the ends of the car.

Various changes in the details and construction of the railroad car of the invention may be made without departing from the spirit and scope of the invention. It is therefore intended to limit the scope of the invention only by the following claims.

What is claimed is:

1. A railway car adapted to run on rails and having draft gear housings positioned centrally at the ends of said car, coupler members mounted within said draft gear housings and including longitudinally disposed coupler shanks positioned at standard height above the rail, a center sill portion having ends abutting said draft gear housings, said center sill portion having a top surface lying in a plane common with said coupler shanks, and floor means extending from end to end of the car and having a top surface lying substantially in the same plane as said top surface of said center sill.

2. The railway car of claim 1 wherein sad center sill portion has side webs extending lengthwise of the car at either end thereof and above said floor to form sides for said draft gear housings.

3. The railway car of claim 2 wherein said floor means includes support means coextensive with said side webs and are integrally connected to said side webs.

4. The railway car of claim 3 wherein said support means has a horizontal floor supporting segment having a transverse width and vertical thickness greater than necessary to support said floor means whereby greater strength to resist buff forces is imparted to said center sill.

5. A railway car having draft gear housings disposed at standard height centrally at the ends of said car, said draft gear housings having elongated buff stops vertically oriented and positioned adjacent the inner ends of said draft gear housings, a center sill portion having ends abutting said buff stops, said center sill portion having a horizontally disposed top flange, said top flange abutting said buff stops at either end of said car substantially centrally of said buff stops, and floor means carried by said center sill portion and extending from end to end of said car and substantially in a plane common with said top flange of said center sill.

6. A truck mounted railway car comprising longitudinally disposed side sills connected at their ends by transversely extending end sills, a longitudinally disposed center sill, a plurality of transverse frame members connected at their outer ends to said side sills and at their inner ends to said center sill, draft gear housings mounted centrally at the end sills of said car, coupler members and associated draft gear rigging mounted within said housings at standard height, said coupler members having longitudinally disposed shanks, said draft gear housings including buff stop means adjacent the inner ends thereof, said center sill having ends abutting said buff stop means at each end of the car and comprising a vertically disposed I-beam portion having top and bottom flanges with the top surface of the top flange lying in a horizontal plane common with said coupler shanks, the ends of said I-beam portion having spaced apart vertically disposed side webs connecting the outer edges of said top and said bottom flanges, said side webs extending beyond the I-beam portion on either side of said sill to the ends of said car and forming sides for said draft gear housing, floor supporting means integrally connected to and substantially coextensive with said side webs and extending longitudinally of said car and having comparatively wide horizontal segments extending in the horizontal plane common with said top flange and coupler shanks, floor supporting means connected to said side sills, and floor means supported upon both said floor supporting means and said transverse frame members, said floor means lying substantially in the horizontal plane common with said top flange and coupler shanks.

7. The railway car of claim 6 wherein said top flange of the I-beam portion of said center sill is between fifty

percent and eighty-five percent greater in cross sectional area than said bottom flange.

8. The railway car of claim 7 wherein the I-beam portion of said center sill lies entirely below the longitudinal axes of said coupler shanks.

9. In a railway car adapted to run on rails and having end sills and center sills the combination of, a draft gear housing located centrally of each end sill, coupler members mounted within said draft gear housings, buff stop means secured within said draft gear housing adjacent their inner ends said coupler members having shanks with the longitudinal axes thereof disposed at standard height above the rails, a center sill portion extending between said buff stops and having its ends abutting the buff stop means of the draft gear housings, said center sill portion having a top flange extending the longitudinal length of said center sill portion and abutting said buff stop means substantially centrally thereof.

10. In a railway car described in claim 9 wherein said center sill portion has the top surface of the top flange lying in a plane common with the coupler shanks.

11. In a railway car adapted to run on rails and having end sills and a center sill, the combination of, draft gear housings centrally located on each end sill, coupler members mounted within said draft gear housings at either end of the car, buff stop means secured within each draft gear housing adjacent the inner ends thereof, said coupler members having shanks with the longitudinal axes of their shanks disposed at standard height above the rail, a center sill portion having its ends abutting said buff stop means of the draft gear housings said center sill portion comprising a vertically disposed I-beam having a top flange extending longitudinally of the car between the draft gear housings and secured to the buff stop means substantially centrally thereof.

12. In a railway car adapted to run on rails and having end sills and a center sill, the combination of, draft gear housing centrally located on each end sill, coupler members mounted within said draft gear housings at either end of the car, buff stop means secured within each draft gear housing adjacent the inner ends thereof, said couplers having shanks with the longitudinal axes of their shanks disposed at standard height above the rail, a center sill portion having its ends abutting and secured to the buff stop means of the draft gear housings and comprising a vertically disposed I-beam lying entirely below the axes of the coupler shanks, said I-beam having top and bottom flanges with the cross section of the top flange being substantially greater in area than the cross section of the bottom flange to thereby better withstand buff forces imposed on said coupler members.

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