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UNDERFRAME STRUCTURE FOR RAILWAY CARS

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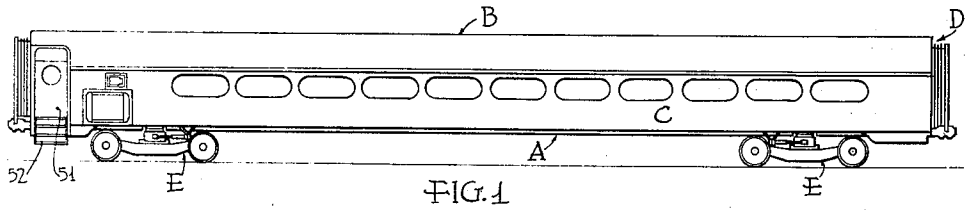

FIG. 1

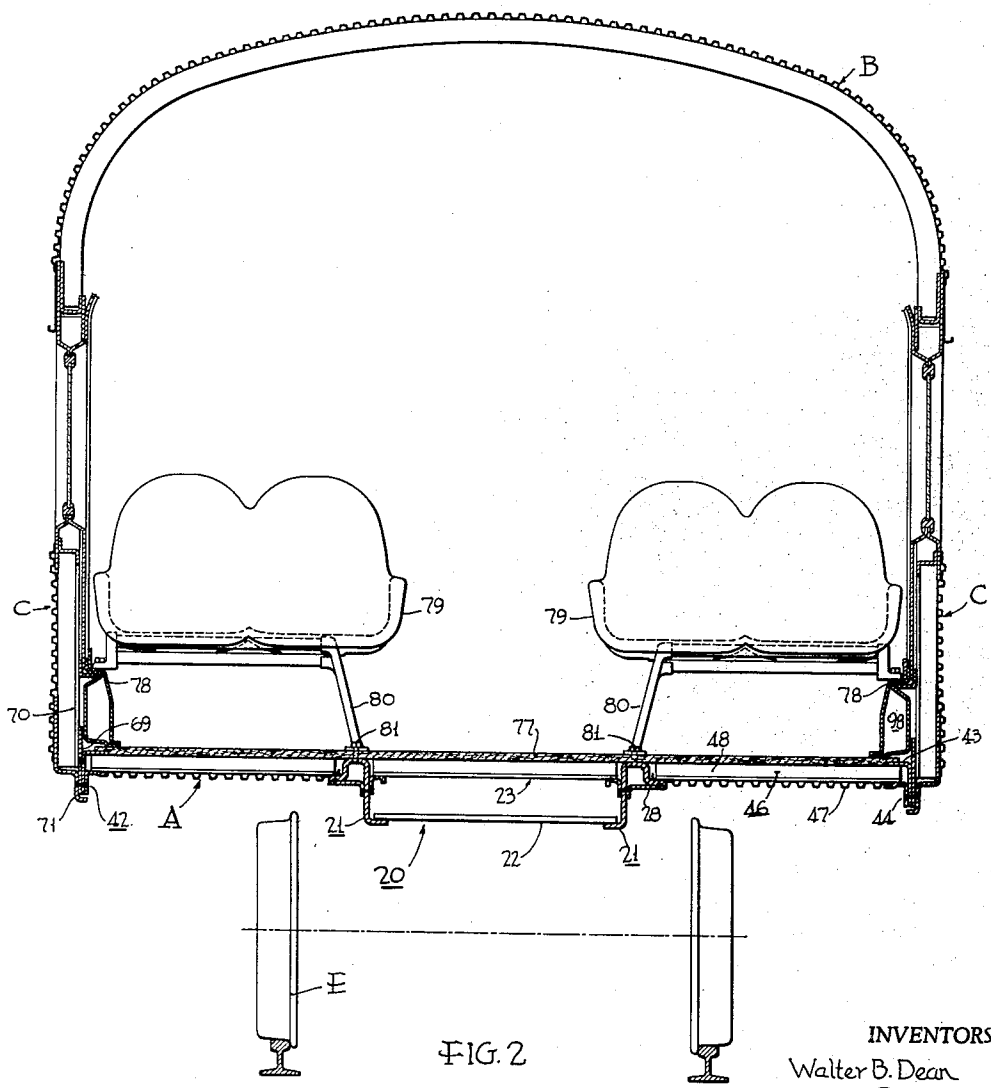

FIG. 2

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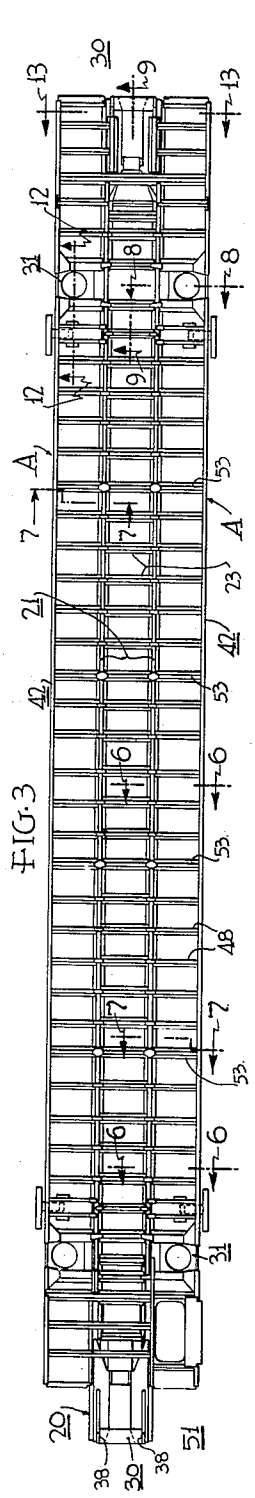

FIG. 3

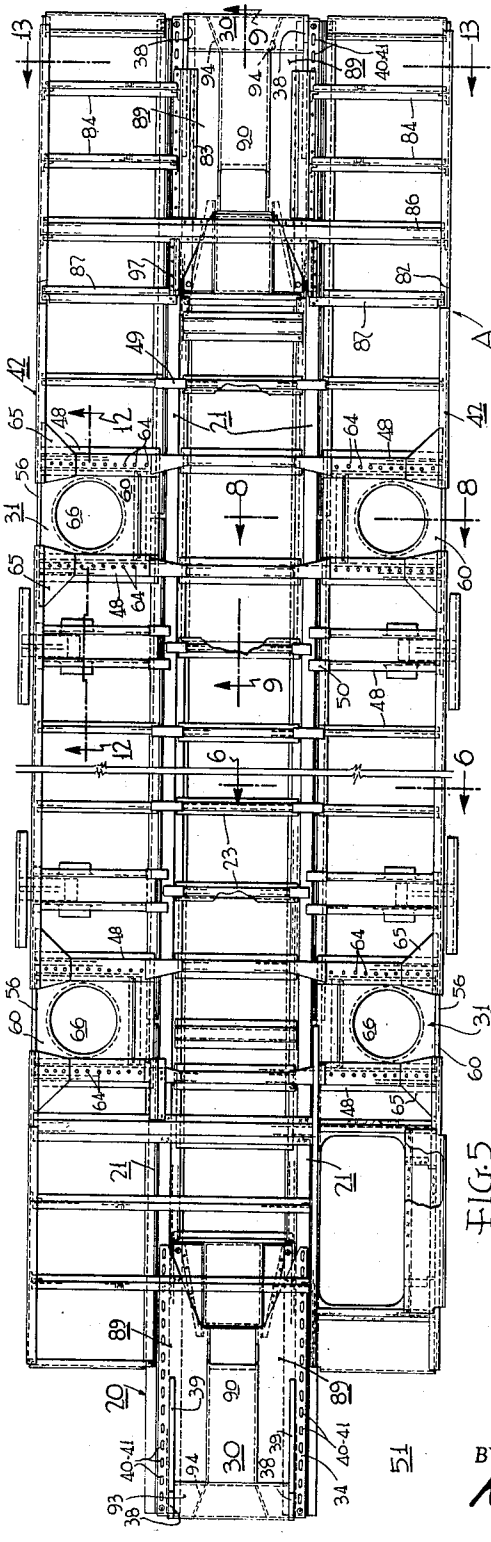

FIG. 5

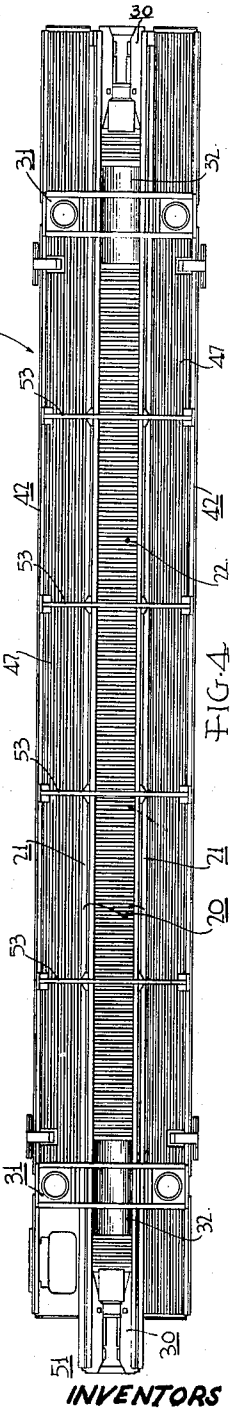

FIG. 4

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UNDERFRAME STRUCTURE FOR RAILWAY CARS

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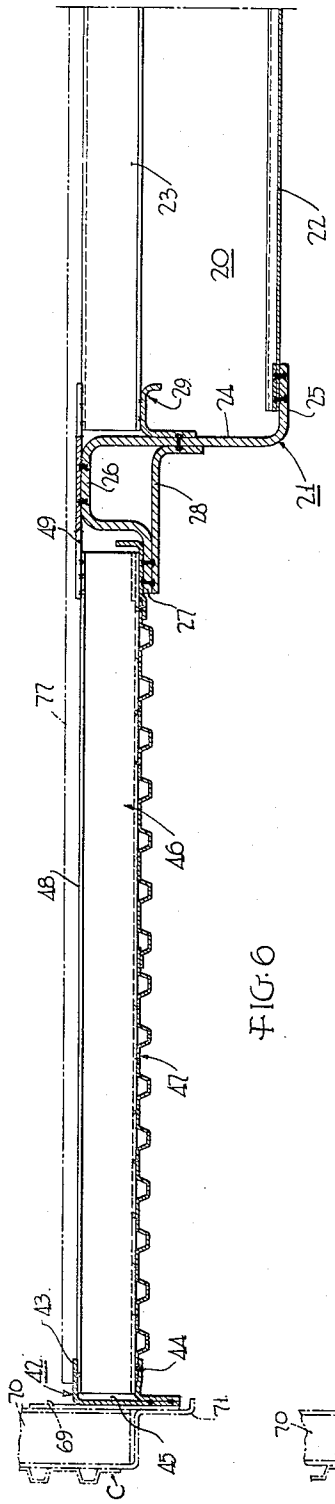

FIG. 6

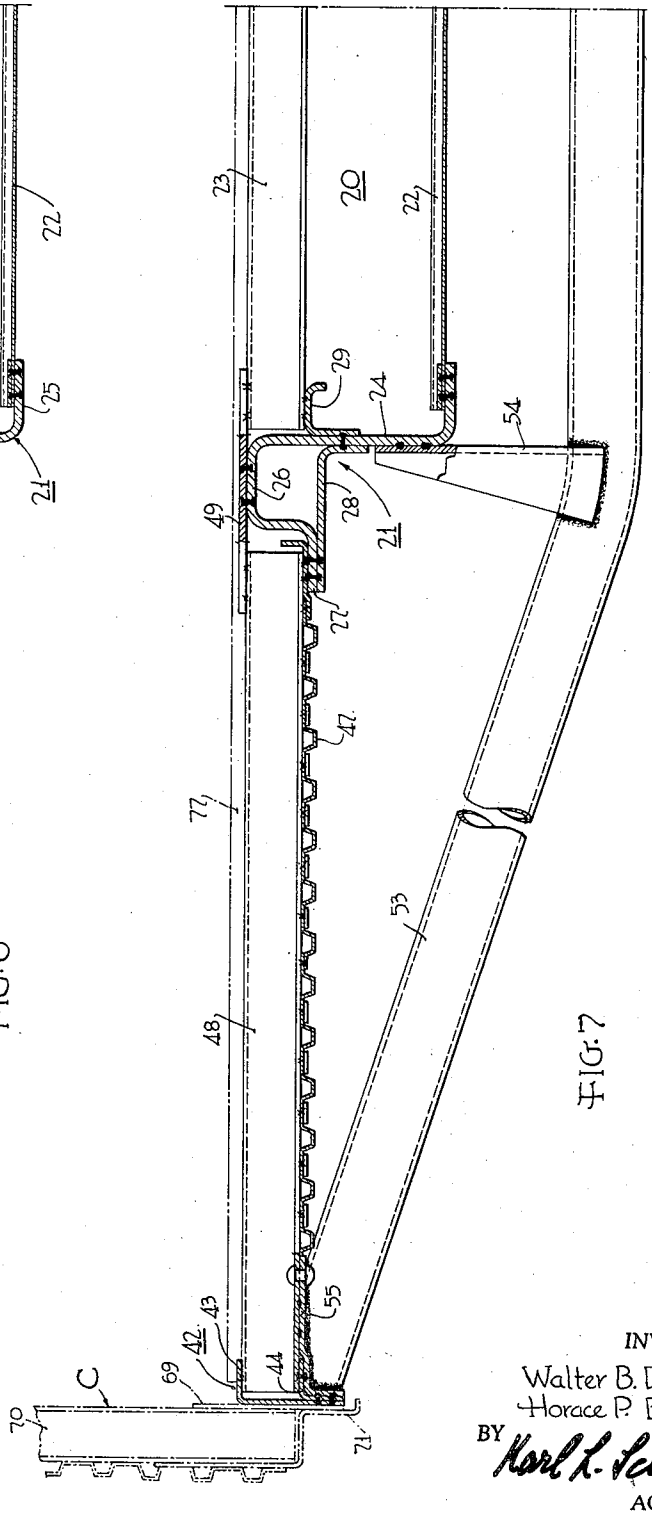

FIG. 7

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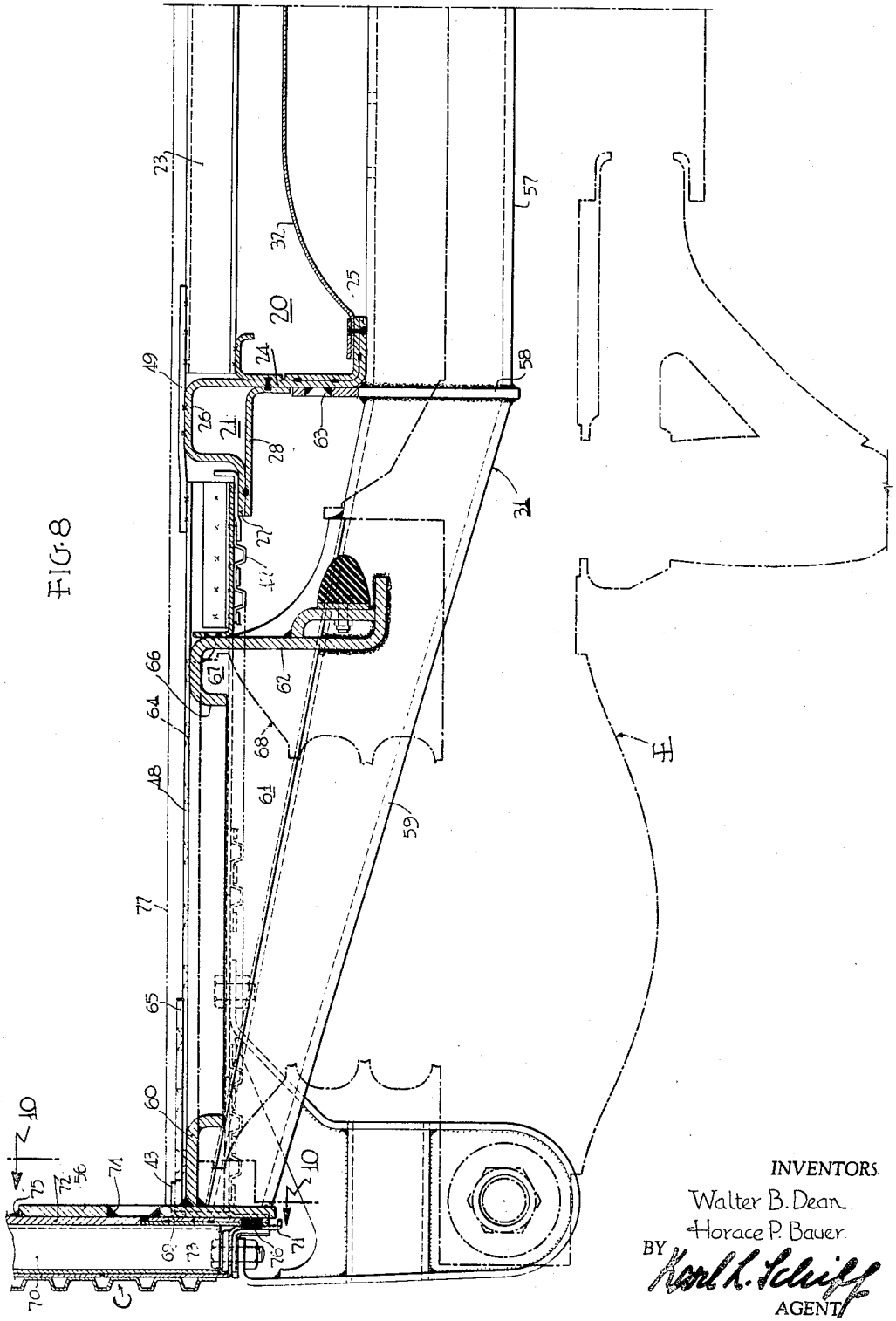
FIG. 8



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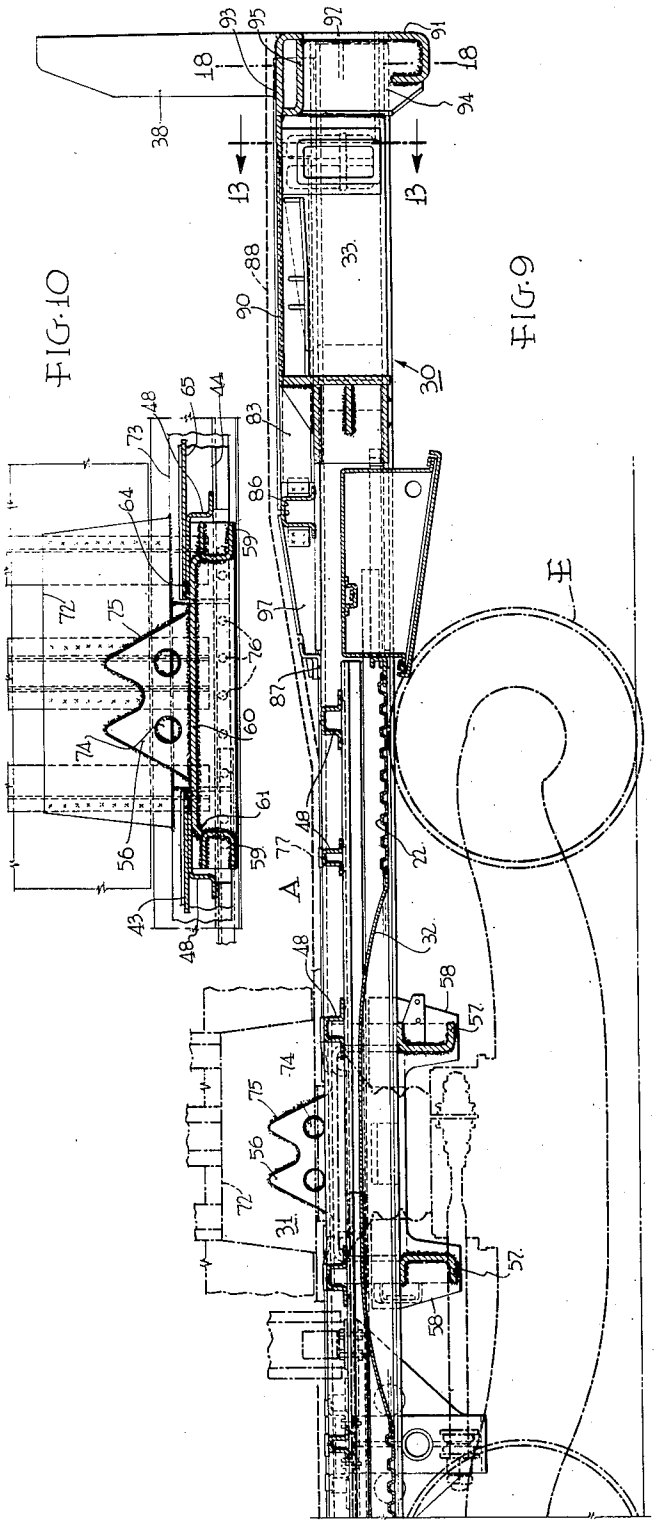

FIG. 10

FIG. 9

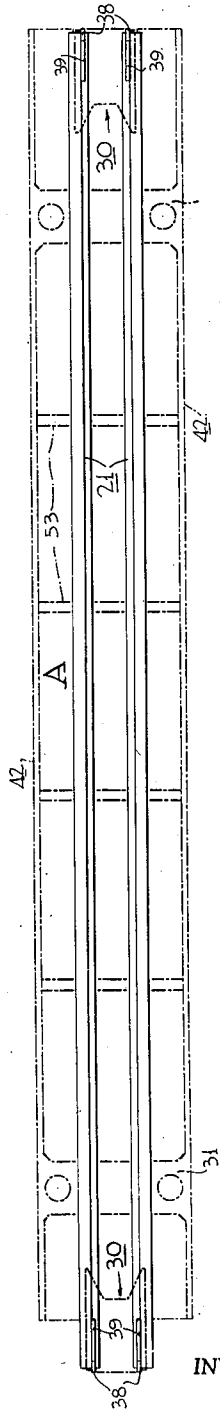

FIG. 11

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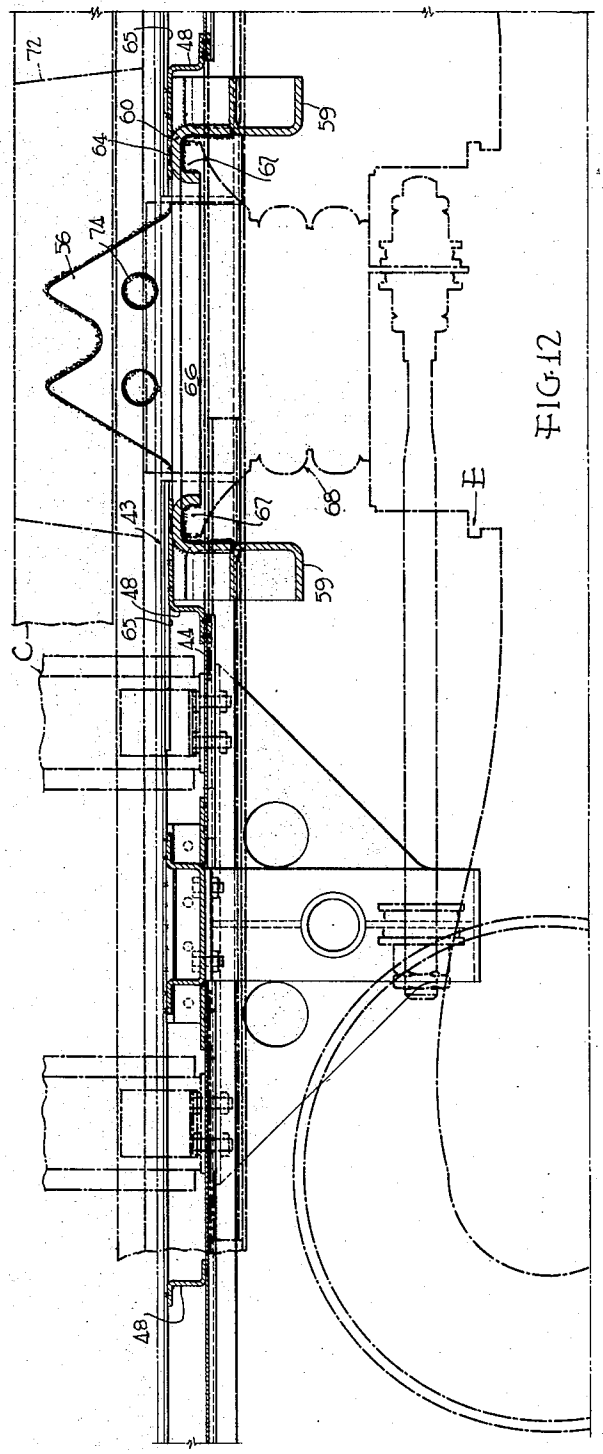

FIG. 12

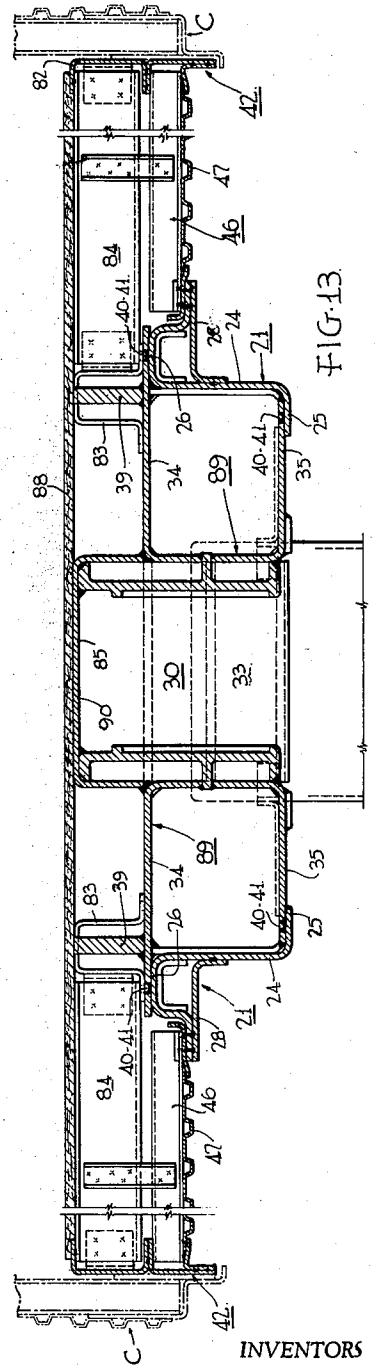

FIG. 13

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FIG. 14

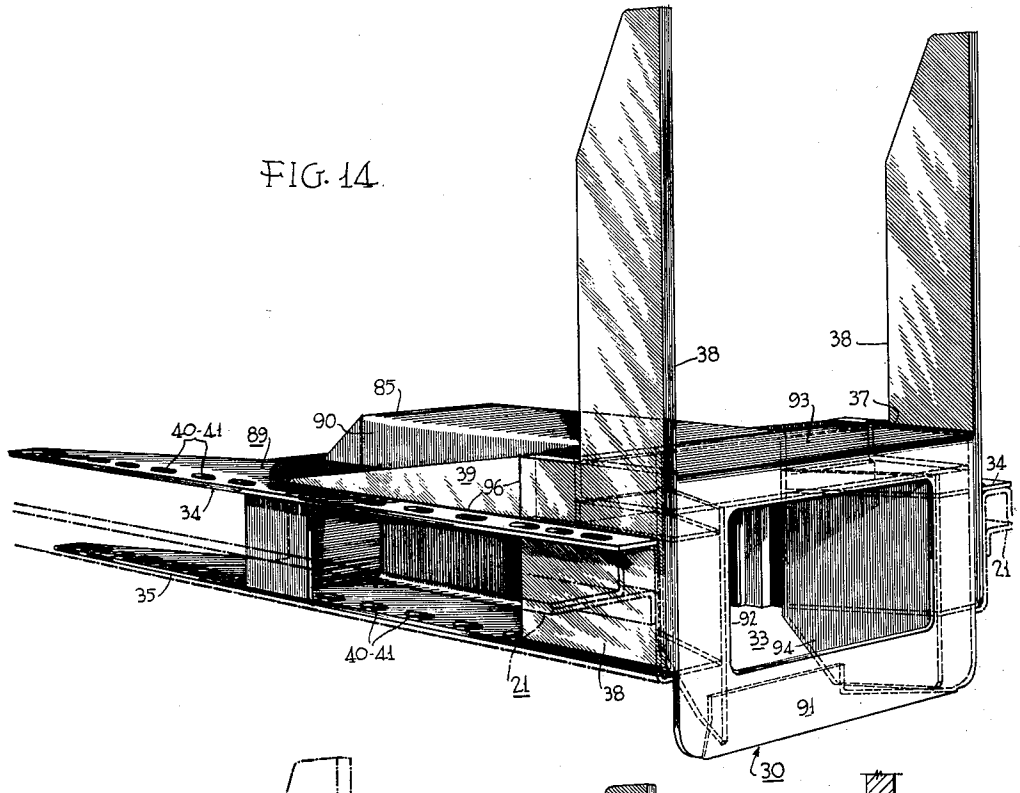
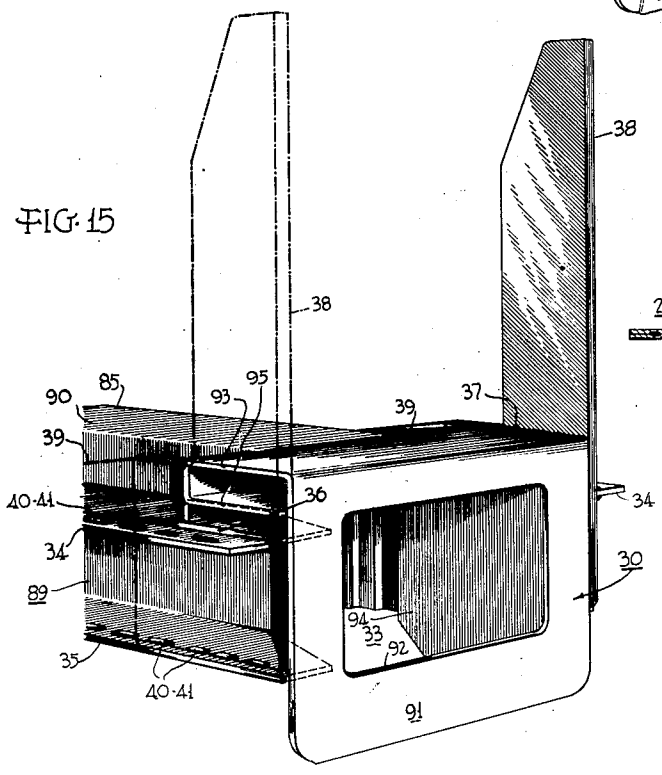


FIG. 15



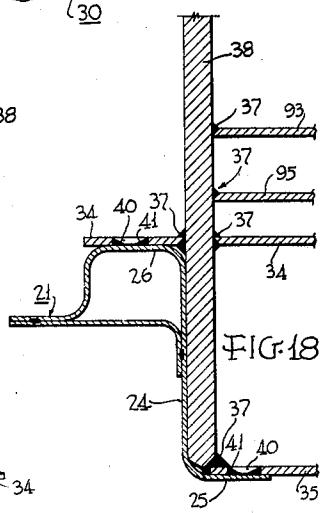


FIG. 18

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UNDERFRAME STRUCTURE FOR RAILWAY CARS

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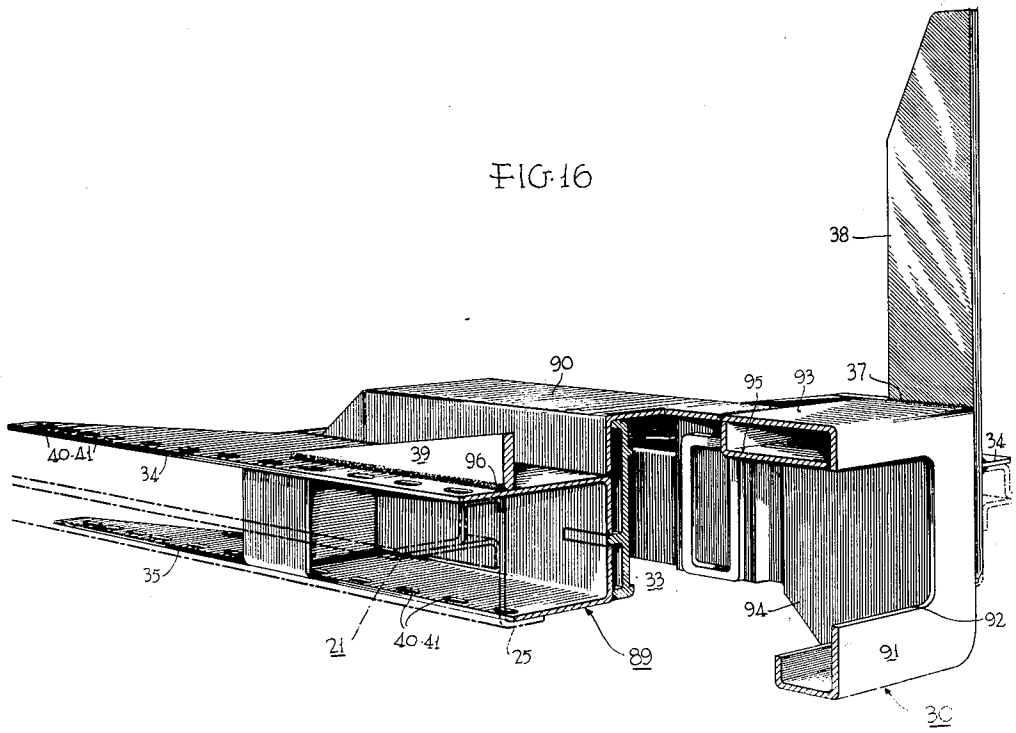
FIG. 16



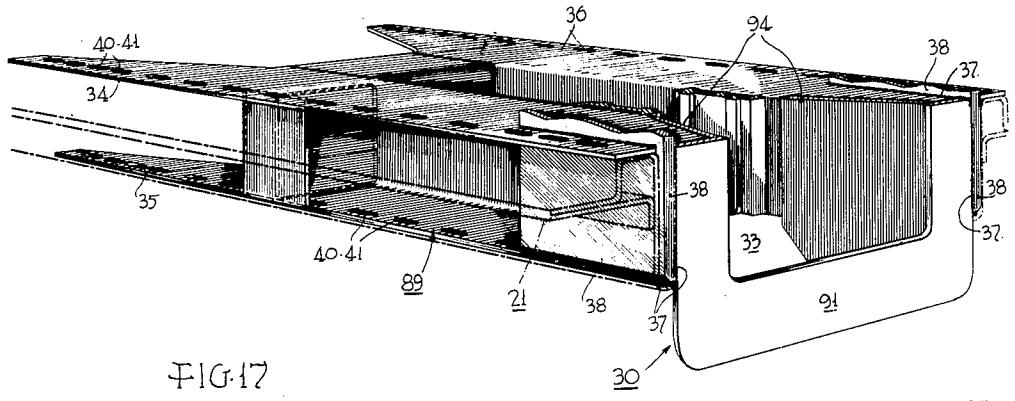


FIG. 17

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United States Patent Office 2,946,297 Patented July 26, 1960

2,946,297

UNDERFRAME STRUCTURE FOR RAILWAY CARS

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Filed June 18, 1956, Ser. No. 592,195

17 Claims. (Cl. 105—397)

This invention relates to an underframe structure for railway cars, particularly railway cars of light weight construction having a low center of gravity.

One of the objects of the present invention is to provide a railway car underframe construction which, while light in weight and economical and easy to manufacture, meets with the ICC and AAR requirements for buffing strength.

Another object of the invention is to provide a simplified underframe structure which is adapted for convenient connection to the railway car side and end walls to form together with the roof a closed box-sectional beam structure of great strength.

Another object of the invention is to provide a railway car underframe structure with a center sill of improved construction and great durability which is adapted to form a convenient and rigid mounting for the car seats and is adapted to form a housing for conduits and other accessories.

Another object of the invention is to provide a center sill which extends continuously from end to end of the railway car in such manner as to have a direct connection with the end collision posts, and which enables the use of a simplified end housing structure for the coupler and draft gear mechanism.

A further object is to provide a railway car underframe structure with an improved bolster unit of great strength and rigidity which is so arranged as to permit the transfer of car body loads to the car truck at regions between the center sill and the underframe side sills.

A still further object is to provide a railway car underframe structure with light weight, rigid cross bearer structures of great strength and torsional rigidity.

Other objects and advantages and the manner in which they are obtained will become evident from the following detailed description when read in connection with the drawings forming a part of this specification.

In the drawings:

Figure 1 is a side elevation of a railway car in which the underframe structure of the present invention is incorporated;

Figure 2 is a transverse section through the railway car of Figure 1, showing in particular the manner in which the seat supports adjacent the car aisle are secured to the longitudinal sill elements of the underframe center sill;

Figure 3 is a plan view of the upper side of the underframe structure;

Figure 4 is a plan view of the under side of the underframe structure;

Figure 5 is an enlarged fragmentary plan view of the upper side of the underframe structure showing portions of the same in greater detail;

Figure 6 is a transverse section taken approximately on lines 6—6 of Figures 3 and 5;

Figure 7 is an enlarged transverse section taken approximately on lines 7—7 of Figure 3 showing one of the cross-bearers;

Figure 8 is an enlarged transverse section taken approximately on lines 8—8 of Figures 3 and 5 showing one of the car bolsters;

Figure 9 is an enlarged longitudinal section taken on the lines 9—9 of Figures 3 and 5 to show the coupler and draft gear housing unit and bolster in greater detail;

Figure 10 is a section taken on line 10—10 of Figure 8 to show the bolster anchor;

Figure 11 is a phantom plan view to show how the center sill longitudinal elements extend continuously throughout the length of the car to the collision posts;

Figure 12 is an enlarged longitudinal section taken approximately on lines 12—12 of Figures 3 and 5 through the bolster;

Figure 13 is an enlarged section taken on the lines 13—13 of Figures 3 and 5 showing the coupler and draft gear housing unit in detail;

Figure 14 is a perspective view of the coupler and draft gear housing unit and collision post supports;

Figure 15 is a perspective view of a portion of the coupler and draft gear housing unit with one of the collision posts in dot and dash outline to show the recess which receives the collision post;

Figures 16 and 17 are perspective views, partially in section, of the coupler and draft gear housing unit showing the detailed construction of the same; and

Figure 18 is a fragmentary section taken on line 18—18 of Figure 9, showing the attachment of a collision post element to a longitudinal center sill element and the draft gear housing.

Referring to the accompanying drawings in which like numerals refer to like parts throughout the several views, the underframe structure A of the present invention, as shown in Figures 1 and 2 is embodied in a railway car of the coach type having a roof B, side and end wall structures C and D, respectively, connected with the underframe structure, as will be later described, and trucks E for supporting the car on the tracks over which it is to operate.

One of the features of the present invention is the center sill structure 20. It is comprised, as shown in Figures 2, 3, 4, 6 and 9, of a pair of transversely spaced, parallel sill elements 21 which extend continuously throughout the length of the car, transversely corrugated bottom plates 22 connecting the lower portions of the sill elements 21 and spaced, parallel aisle floor supporting beam elements 23 of hat-shaped cross-section interconnecting the upper portions of the sill elements 21.

Each of the sill elements 21 preferably is of one piece construction and comprises a vertical web 24, a lower inner horizontal flange 25 extending toward the corresponding flange of the other sill element 21, and an upper outwardly extending flange 26 which is downwardly bent to present a downwardly facing channel that terminates in an outwardly extending horizontal flange 27. Each sill element further embodies a throughrunning reinforcing outboard element 28 of L-shaped cross-section having one leg thereof secured at spaced intervals to the web 24 and its other leg secured at spaced intervals to the horizontal flange 27. Secured at spaced intervals to the inner face of the web 24 of each sill element 21 is a throughrunning angle member 29 to which the flanges of the hat-shaped elements 23 are secured. The angle members 29 are so located that the top faces of the elements 23 are level with the top faces of the sill element flanges 26.

As shown in various figures, the corrugated bottom plates 22 rest upon and are secured to the lower flanges 25 of the sill elements 21. The transverse members 22 and 23 hold the sill elements laterally and form a transverse box therewith to prevent all side turning tendency of the sill elements but do not intrinsically contribute to

any considerable degree to the longitudinal or bending strength of the beam elements.

Coupler and draft gear housing units **30**, to be later described, are secured to the end of the center sill **20** just described and the corrugated bottom plates **22** extend continuously throughout the length of the center sill between the end units **30** except in the regions of the car bolsters **31**. At each of these regions an arched plate **32** bridges the gap between longitudinally spaced bottom plates **22**.

The center sill **20** just described is thus of upwardly facing channel section, providing a throughrunning open space within which wiring and piping conduits, not shown, for the car may be disposed in concealed position. The longitudinally spaced beam members **23** allow access to this space before the floor is put down or when a portion of the floor is removed and the plates **22** provide a continuous bottom enclosure for such cables, wires or pipes as may be placed in the beam space.

Referring to Figures 9, 12 and 14 to 18, the coupler and draft gear housing units **30** each comprises a built-up welded structure that provides a housing **33** for the couplers and draft gear (not shown). This structure includes a pair of elongated, outwardly facing channel members **89** of substantial length, each having an upper flange **34** and a lower flange **35** of lesser length than the upper flange. The channel members **89** are bridged by an inverted channel member **90**, the downwardly extending sides of which are arc welded along their edges to the top side edges of channel members **89**. The flanges **34** and **35** of channel members **89** extend outboard longitudinally beyond the webs thereof and beyond the outer end of the inverted channel member **90**, and abut the inboard face of a transverse vertical end plate **91** where they are arc welded thereto, the end plate **91** being provided with a rectangular coupler opening **92**. The end plate **91** is provided with an inwardly extending top plate **93** and inwardly extending side plates **94** which flank and are arc welded to the channel members **89** and **90**, the side plates **94** extending between the outwardly extended flanges **34** and **35** of members **89**. The top plate **93** is reinforced by an angle member **95** welded thereto underneath to provide a box section.

The upper flanges **34**, as shown in Figure 15, are notched or recessed at **36**. Vertical, parallel plate elements **38**, which for the purposes of this specification are hereinafter called "collision post elements," constitute supports and connections for the end collision posts (not shown) of the end walls of the car. The collision post elements **38** are disposed within the recesses **36** and abut the ends of the end plate **91**, the top plate **93** and the reinforcement **95** for the top plate, the abutting surfaces being arc welded together as indicated by the numeral **37** in Figures 16 to 18, inclusive. Additional reinforcement for the structure is provided by tapering upright plates **39** which abut and extend inboard from the collision post elements **38** and are welded thereto and to the flanges **34**, as indicated by the numeral **96** in Figure 14.

The coupler and draft gear housing units **30** are nested within the ends of the center sill elements **21** with the upper and lower flanges **34** and **35** of the channel members **89** thereof seated upon the upper and lower sill element flanges **26** and **25**, respectively, and flanges **34** and **35** are each provided with a series of openings **40** whereby they are secured to flanges **26** and **25**, respectively, by plug welds **41** as shown in Figure 5 and 14 to 18, inclusive. In this assembled position the collision post elements **38** abut the webs **24** of the center sill elements **21** and extend downwardly to the lower flanges **25** where they are arc welded thereto, also indicated by numeral **37** in Figure 18.

As shown in the phantom view of Figure 11, there is thus provided a structure wherein the sill elements extend continuously throughout the length of the car and are connected directly to the collision post elements **38** through the medium of the adjacent upper and lower flanges **34** and **35** of the coupler and draft gear housing units **30**, whereby there will be a direct transfer of stresses from the collision post elements **38** to the sill elements **21** of the center sill **20**. Buffing loads likewise are transmitted directly between the sill elements **21** and the housing units **30**.

The underframe of the present invention includes, as shown in Figure 6, side sills **42**, each in the form of a pair of angle members **43** and **44** secured together at their vertical legs to present a channel **45**, the open side of which faces inwardly toward the center sill **20**. The angle members **43** are throughrunning except in the region of the bolster units to be presently described.

Disposed within the channel **45** of each side sill **42** and extending to the center sill element **21** is a rigid, sub-floor structure **46** which, although light in weight, is extremely rigid. The sub-floor structure at each side of the center sill **20** includes a corrugated floor panel or plate **47** extending continuously throughout the length of the car, except as hereinafter mentioned, and being secured at spaced intervals to the horizontal leg of the side sill angle member **44** and the flange **27** of center sill element **21**. Considerable strength is imparted to the panel **47** by its corrugations which extend longitudinally of the underframe. The sub-floor structure **46** at each side of the center sill **20** also includes a number of parallel, longitudinally spaced transverse elements **48**, some of which may be hat-shaped in cross-section whereas others may be of Z-shaped cross-section. These elements are secured to the panel **47**, to the horizontal leg of the side sill angle member **44**, to the flange **27** of center sill element **21** and to the leg of the side sill angle member **43**. At their inner ends the cross members or elements **48** are secured at their tops by attaching plates **49**, as shown in Figures 5 and 6, to the flanges **26** of the center sill elements **21**. Where the cross elements **48** are in line with the members **23** of the center sill **20**, the plates **49** extend beyond the sill elements **21** and are secured to the members **23**. At other locations where the members **23** are not in line with the cross elements **48**, plates **50** are secured to the flange **26** of a sill element **21** and to a cross member **23** or **48**, whichever may be present.

At the vestibule end **51** of the car, the sub-floor structure terminates short of the center sill **20**, as shown in Figure 5, whereby to receive the steps **52** (Figure 1).

The underframe structure intermediate the bolsters **31** is strengthened and rigidified at spaced points longitudinally by cross-bearers **53** of tubular cross-section, as shown in Figures 4 and 7. These cross-bearers extend between the side sills **42** below the center sill **20**. Flanged elements **54** welded to the cross-bearers **53** extend upwardly and are welded to the webs **24** of the web elements **21** of the center sill **20** to additionally rigidify the structure. The ends of the cross-bearers **53** are provided with angle members **55** welded thereto which in turn are secured to the side sills **42** and to the adjacent cross elements **48**.

The bolster unit **31**, as shown in Figures 5, 8, 9, 10 and 12, includes an elongated attaching plate **56** at each side of the underframe in the region of the side sills **42**. The plates **56** have connected to them a pair of cross members, spaced apart longitudinally of the underframe. Each cross member is comprised of a central channel member **57** welded at its ends to an attaching plate **58**, as indicated in Figure 8, and tapered channel members **59** which are welded to the plates **58** in line with the channel member **57** and extend outwardly and upwardly to the plates **56** where they are arc welded thereto.

Extending across the tapered channel members **59** at each side of the bolster unit **31** and arc welded thereto, as indicated in Figure 10, is a horizontal plate **60** having downwardly inwardly tapering flanges **61** arc welded to the channel members. These flanges are integral with a depending longitudinal inner end flange **62** which extends

between and is arc welded to the tapered channel members 59, as indicated in Figure 8. The plate 60 is also arc welded to the attaching plate 56. The plates 58 overlap and are secured to the vertical webs of the longitudinal center sill elements 21 by plug welds 63.

The underframe side sills 42 are interrupted (Figures 5 and 12) at the region of the horizontal plates 60. At each side of the underframe structure the bolster attaching plate 56 extends upwardly through the space between the ends of the intermediate side sill and between the side wall and the ends of the Z-shaped cross members 48. The upper legs of cross members 48 at the bolster region are of considerable width and overlap the plate member 60 and, as shown in Figure 12, are welded thereto by plug welds 64. Gusset plates 65 overlie these particular cross members 48 and underlie the ends of the upper legs 43 of the side sill 42 and are welded to the cross members 48 and side sill legs 43 to form a rigid connection therebetween. The plate members 60 are provided with openings 66 and each is flanged downwardly to form a downwardly facing circumferential channel 67. Each circumferential channel 67 receives the upper end of an air spring 68 which transmits the load to one end of the car truck E.

The bolster construction just described is of rigid construction and great strength and departs substantially from the conventional type of bolster which transmits the car load to the truck through a center plate disposed on the longitudinal axis of the car.

Referring to Figures 2, 6 and 8, each side wall structure C of the railway car is provided with a longitudinal side sill in the form of a flat longitudinal vertical plate 69 which extends downwardly below vertical posts 70 where it flanks and is secured to a longitudinal member 71. The longitudinal member 71 is outwardly offset to underlie the side structure posts and then extends upwardly in flanking relation with the outer faces of the posts 70.

In the assembled position of the underframe structure and sidewall structures, the flat plate 69 of the sidewall structure C flanks and is secured to the side sill member 42 of the underframe structure through the vertical legs or webs of side sill members 43 and 44, as indicated in Figure 2. At the region of each of the bolster units 31, a plate 72 is secured to the side wall structure above the plate 69 and in edge abutting relation therewith and with a splice plate 73 which is provided to compensate for the interruption of the side sill elements 43 and 44 at this location, the thickness of the two plates 69 and 73 together being equal to that of plate 72 and the plates 72 and 73 being secured to each other and to the edge of plate 69. Attaching plate 56 of the bolster unit is secured by large plug welds 74 to the plates 72 and 73 above the underframe structure and is also arc welded to the plate 72 as is indicated at 75 in Figures 8 and 12. Attaching plate 56 is also secured to the plates 69 and 73 and member 71 by plug welds 76.

The underframe and bolster units described enable the underframe to be disposed at a lower level than has been the usual practice whereby to lower the center of gravity of the car. In order to permit cars embodying an underframe structure of the present invention to be coupled to standard cars, the coupler and draft gear housing units are of the usual height, thus requiring the upper faces 85 of the housing unit channels 90 and top plates 93 of the end plates 91 to be at a higher level than the intermediate portion of the underframe structure. Hence, the floor is raised at the ends of the car to match the floor level of standard height cars.

At the non-vestibule end of the structure, that is, the end at the right as viewed in Figures 3, 5 and 9, the structure immediately in front of and at the sides of the inverted channel 90 is built upwardly through the use of channel members 82 superposed on and secured to the side sill units as seen in Figure 13. As seen in Figures 5, 9 and 13, a channel member 86 extends between the side sill units 42 in front of the inverted channel member 90 and secured to the upper flanges of the housing unit 30 are longitudinal channels 83 which extend to the cross member 86. Cross members 84 also extend between and are connected to the side sill units 42 and channel 83. The top faces of members 83, 84 and 86 just described are at the same level as the top face of inverted channel member 90. Forwardly of the cross member 86 the ends of the channel members 82 gradually decrease in height and secured to forward extensions of flanges 34 of the coupler housing unit 30 are longitudinal elements 97 which decrease in height the same as the ends of channel members 82. The forward ends of channel members 82 and elements 97 are interconnected by transverse elements 87, thus forming with the ends of members 82 and elements 97 a support for downwardly inclined portions of the floor 88 which merges into the main floor 77.

At the vestibule end the construction is the same as that described for the other end except that the side sills and related parts are cut away for the step wells, the remaining structure being altered appropriately in a manner which need not be detailed herein.

The sub-floor 46 and center sill 20 support the floor 77 of the car as shown in Figure 2.

Also, provided in the car adjacent the side wall structure C are side rails 78 above the heating ducts 98 which support the outer ends of the seats 79. The seats 79 are provided with inner end supports 80 adjacent the center aisle and these supports directly overlie the longitudinal center sill elements 21 and are secured thereto by bolts or cap screws 81. The center sill elements 21 thus provide rigid unyielding supports for the seats 79.

The center sill is so constructed and arranged as to permit easy assembly and convenient access for welding of the parts thereof. Through the use of the transversely corrugated member 22 and the upper cross members 23 substantially torsional rigidity is imparted to the center sill. Also, by running the center sill throughout the length of the underframe for direct connection with the collision post supports, the end underframe structure which forms a housing for the couplers and draft gear can be of much simpler construction and of considerably less weight than has been possible heretofore. The widely spaced longitudinal sill elements 21 provide rigid supports for the car seats and relieve the floor and underfloor structure of the usually attendant stresses.

The bolster units and their connection to the side sills, while of great simplicity and of great strength, are of such construction as to permit the transfer of the car load to the trucks intermediate the center sill and the side sills.

Furthermore, the longitudinally corrugated sub-flooring imparts rigidity to the underframe and effects a considerable saving in weight.

Being of tubular cross section, the cross bearer supports for the center sill present a simplified yet rigid construction.

While a preferred embodiment of the underframe structure of the present invention has been described herein, it will be understood that various changes and modifications may be made without departing from the spirit and substance of the invention as covered by the appended claims.

What is claimed is:

1. In a railway car structure, collision post elements spaced apart in pairs transversely of said structure for a distance sufficient for leaving a passage opening between them and located in longitudinally spaced pairs at the ends thereof, and an underframe center sill unit having a pair of transversely spaced sill elements extending continuously from end to end of said structure in transversely spaced apart relation and being interconnected with each other, the spacing between said sill elements equalling substantially the spacing of a pair of said collision post elements, each end of each sill element terminating adjacent one of said collision post elements, and

means rigidly securing each said sill end to the adjacent collision post element.

2. A structure according to claim 1 in which each end of each sill element terminates in overlapping flanking relation with the adjacent collision post element and is secured thereto through the sides.

3. A structure according to claim 1 in which said sill elements are parallel with each other throughout their length and each has a one piece web extending in a single vertical plane between the collision post elements at opposite car ends to which it is secured.

4. In a railway car underframe structure, a center sill unit extending longitudinally from end to end of the structure and having a pair of transversely spaced sill elements provided with continuously extending vertical webs, the spacing between said sill elements being approximately the width of the passenger aisle in the car, a coupler and draft gear housing unit of usual standard size at each end of said structure between said sill elements, the width of said housing being considerably less than the spacing between said center sill elements, said housing unit having a pair of vertically spaced longitudinally extending, outwardly directed, integral flanges at each side thereof, said flanges extending transversely to bridge the space between the draft gear housing and said center sill elements and into overlapping relation with said sill elements, and means securing said flanges to said sill elements.

5. A structure according to claim 4 in which each of the sill element webs is provided with integral upper and lower flanges which underlie in supporting relation the adjacent upper and lower flanges respectively of the housing unit.

6. A structure according to claim 4 in which each of the sill elements is provided with an upper, outwardly extending, horizontal flange and a lower, inwardly extending horizontal flange, said flanges overlapping and underlying the upper and lower flanges, respectively, of the housing unit in supporting relation.

7. In a railway car underframe structure, a center sill unit extending longitudinally from one end of the structure to the other and having a pair of transversely spaced sill elements, each sill element having a vertical web, a coupler and draft gear housing unit disposed at each end of said center sill between said webs in flanking relation, each housing unit having at each side a collision post element and an integral horizontal flange, said flanges at the outermost ends of said housing units being recessed adjacent said webs on each of said sill elements, a vertically arranged collision post element extending through one each of said recesses and engaging the side of the web of the adjacent sill element, means securing said collision post element to said housing unit flange and to said sill element and means securing said flange to the adjacent sill element.

8. In a railway car underframe structure, a center sill unit extending longitudinally from end to end thereof and having a pair of throughrunning, transversely spaced sill elements, each of said sill elements having a vertical web provided with an integral, horizontal, lower flange extending toward the other sill element and an integral, horizontal, upper flange extending away from the other sill element, said structure having at one end at least a pair of collision post elements, one post element of said pair being seated on the lower flange of and engaging the side of the web of one sill element and the other post element of said pair being seated on the lower flange of and engaging the side of the web of the other sill element, and means securing said collision post elements to said sill elements.

9. A structure according to claim 8, further comprising a coupler and draft gear housing unit disposed in the transverse space between said sill elements and between said collision post elements, and means securing said housing unit to said sill and collision post elements.

10. A structure according to claim 9 in which the coupler and draft gear housing unit is provided at each side with upper and lower flanges in overlapping, overlying relation with the upper and lower flanges respectively of said sill elements, and in which said upper flanges of said unit for a portion of their lengths embrace said collision post elements.

11. In a railway car underframe structure, a longitudinal center sill unit extending from end to end thereof comprising a pair of transversely spaced sill elements, the spacing between said sill elements being approximately the width of the passenger aisle in the car, longitudinally spaced cross elements interconnecting the upper portions of said sill elements throughout the length thereof and supporting the aisle floor, and a longitudinally continuous, lower member interconnecting the lower portions of said sill elements, and terminating short of the ends thereof, and a pair of spaced truck-mounted bolster units connected with said center sill, said lower member having transverse corrugations therein for its length between the regions of said bolster units.

12. A railway car center sill of approximately standard car aisle width comprising a pair of transversely spaced sill elements, each having a vertical web, a horizontal lower flange extending toward the other sill and an upper flange extending away from the other sill, a lower member in the form of a substantially continuous sheet of metal having transverse corrugations therein, means securing said lower member to the lower flange of each sill element, a longitudinally extending angle element secured to the inner face of the web of each sill element below the upper side thereof, and a plurality of load-supporting beam cross members seated upon and secured to said angle elements.

13. In a railway car underframe structure, the combination of a longitudinal center sill unit with longitudinal side sill units, and a sub-floor unit extending between said center sill unit and each side sill unit, each sub-floor unit comprising a sheet metal panel secured along one of its edges to said center sill unit and along the other one of its edges to a side sill unit, said panel having a plurality of corrugations extending in a direction parallel to said center and side sill units, and a plurality of cross members extending between said center and side sill units and secured to said center and side sill units and to said panel.

14. In a railway car underframe structure, a center sill unit having a longitudinal sill element provided with a longitudinally extending horizontal flange below the upper surface thereof, a side sill unit having a channel member extending longitudinally of the structure, the channel of said member facing toward said horizontal flange, a sub-floor unit comprising a sheet metal, longitudinally corrugated panel and a plurality of spaced cross members secured to the upper sides of said panel through the nodes of the corrugations thereof, said sub-floor unit at one side being disposed within said channel and secured to the walls thereof and at the other side being seated on and secured to said sill element flange, and plate-like members extending between the top sides of said sill element and cross members and being secured thereto.

15. In a railway car underframe structure, longitudinal side sill units, a longitudinal center sill unit intermediate and spaced from said side sill units, a truck-supported bolster comprising a pair of longitudinally spaced transverse members having central portions disposed below said center sill unit and end portions extending upwardly and outwardly to said side sill units, vertical plate members secured to the opposite ends of said transverse members, means securing said plate members to said side sill units, means securing said transverse members to opposite sides of said center sill unit, and means carried between said longitudinally spaced members and between the side sills and center sill for supporting the bolster and car body on a truck.

16. In a railway car underframe structure having longitudinal side sill units and a longitudinal center sill unit intermediate and spaced from said side sill units, the combination with a bolster comprised of a pair of longitudinally spaced transverse members, said members having a mid portion disposed below said center sill unit and outer portions extending outwardly and upwardly to said side sill units, means attaching the ends of said transverse members to said side sill units, means attaching the central portions of said transverse members to said center sill unit, and a load transmitting horizontal member arranged in the space between said center sill unit and each of said side sill units, said horizontal member bridging the space between said transverse members and being connected therewith.

17. In a railway car, an underframe structure, including a center sill provided with longitudinally extending, transversely-spaced sill elements extending longitudinally thereof, side wall units connected with said underframe structure and a floor covering said underframe structure, seats within and at the sides thereof, and having a longitudinal aisle therebetween, supports for said seats adjacent said aisle arranged vertically above said sill elements and vertical means securing said supports through said floor directly to said sill elements.

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