United States Patent

Bateson et al.

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[54] TRUSS-TYPE CARGO CARRYING VEHICLE

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[52] **U.S. Cl.** ..... **105/368 R**, 105/4, 105/367, 105/414

[51] **Int. Cl.** **B60p 3/06**

[58] **Field of Search** ..... 105/366 R, 367, 368 R, 340, 105/392.5, 376, 377, 378, 4, 414; 213/75

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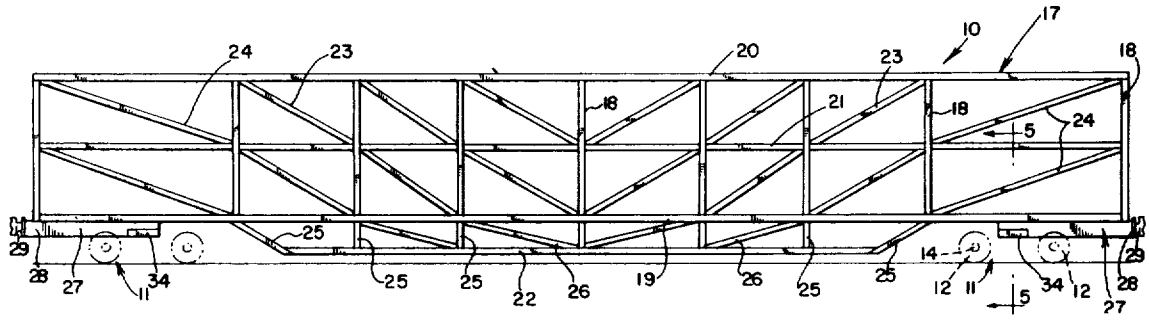
[57] **ABSTRACT**

A truss structure includes upper and lower beams with vertical interconnecting beams on which cargo of any type may be suspended. The truss structure is adapted to be supported on horizontally spaced wheel suspensions, such as is common in over-the-highway vehicles, or it may be disposed in and be connected to structural components in aircraft wherein the truss structure supports the cargo and provides a primary structural component of both modes of transportation.

In a railway car a relatively narrow upright truss structure is supported at its opposite ends on trucks. The truss structure is provided at opposite ends with short sill sections which contain coupler housings supporting conventional couplers. At opposite ends of the truss structure horizontal stabilizing members extend laterally outwardly of the truss structure and are adapted to be connected to conventional single or double axle trucks in conventional fashion. The narrow truss structure is the sole structural support of the car and provides on opposite sides thereof, between the trucks, a free and unencumbered space to which ready access may be had by suitable powered handling devices which may lift cargo into position to be connected and suspended on opposite sides from said truss structure.

A modified embodiment comprises a railway car which includes a pair of truss sections which have outer ends supported on single axle trucks, and adjacent inner ends supported on double axle trucks by means of an articulated connector assembly.

24 Claims, 14 Drawing Figures



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SHEET 1 OF 7

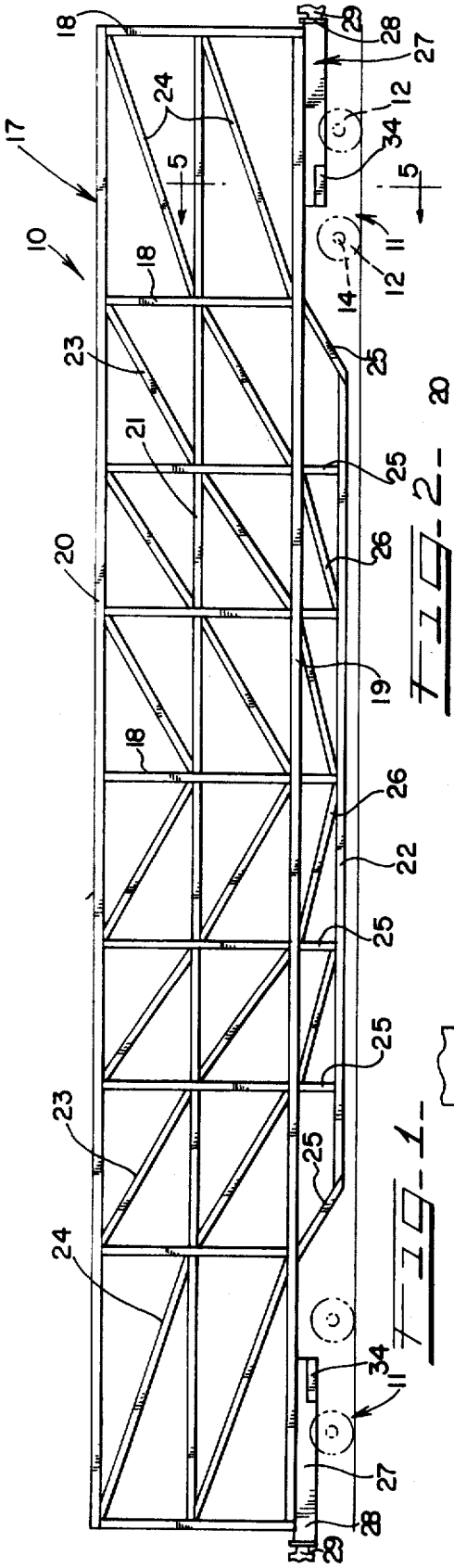


FIG-1

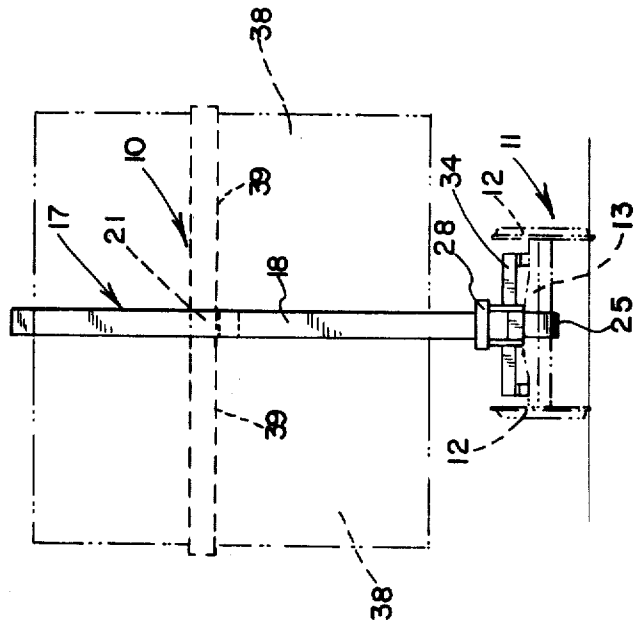


FIG-2

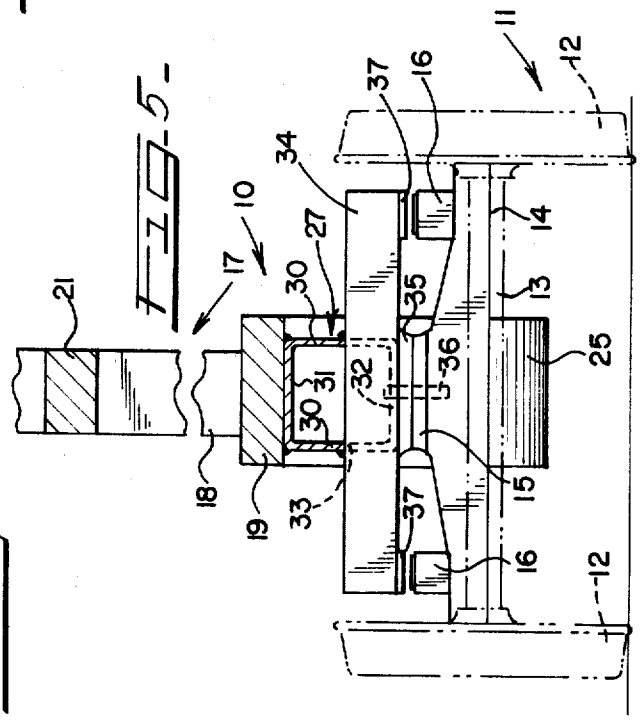


FIG-5

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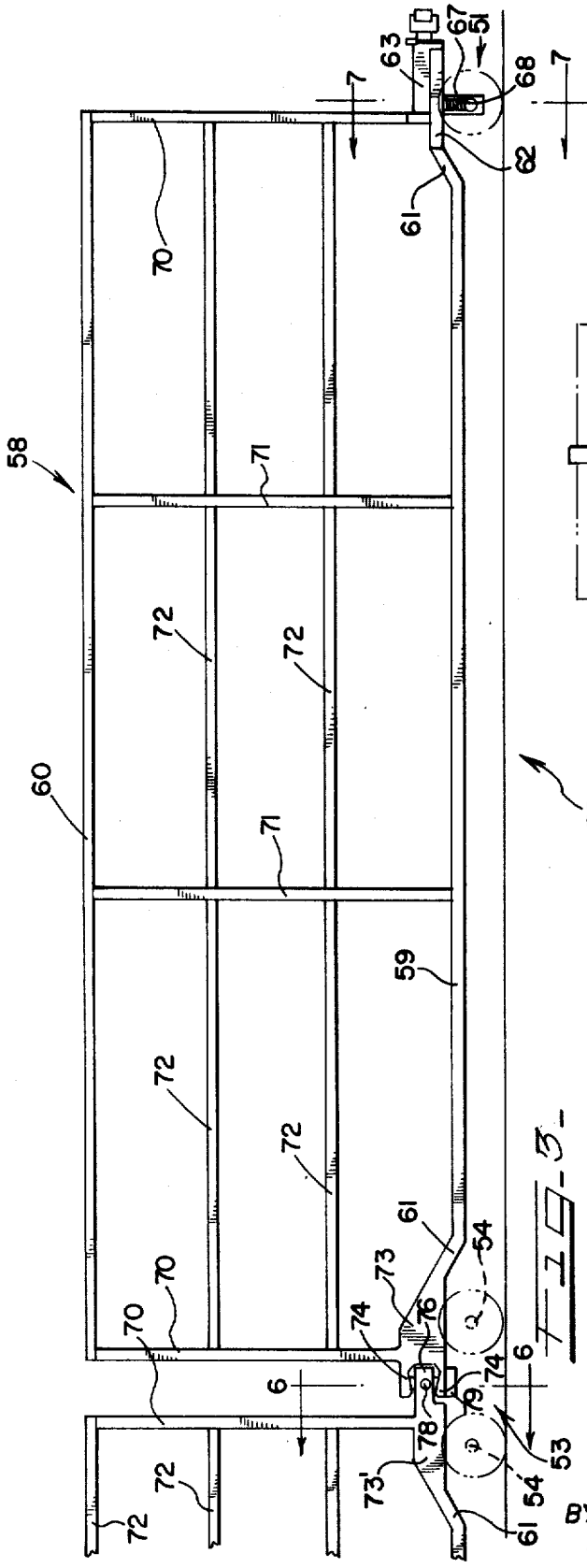


FIG-5

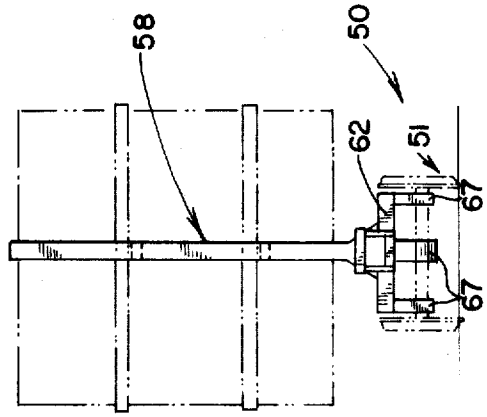


FIG-4

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Fig. 6.

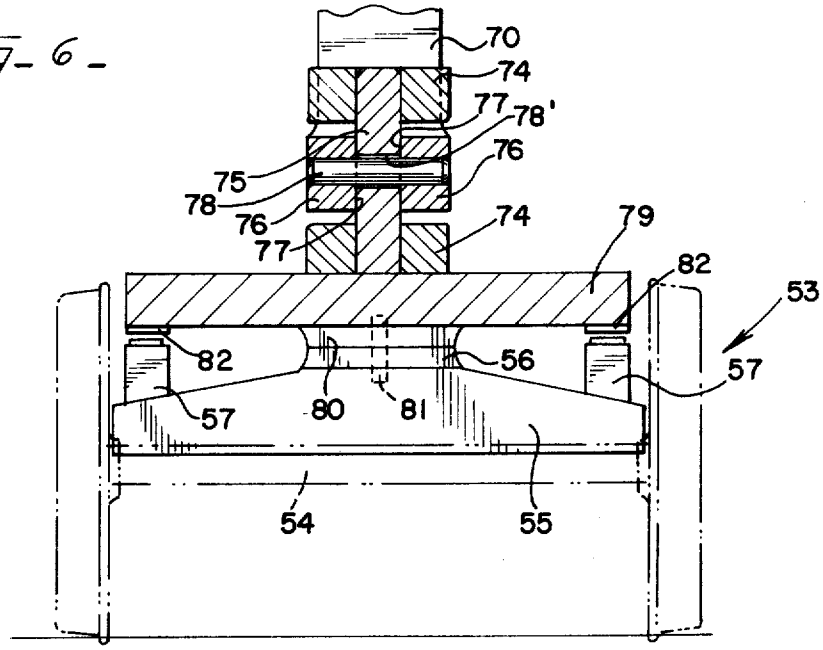
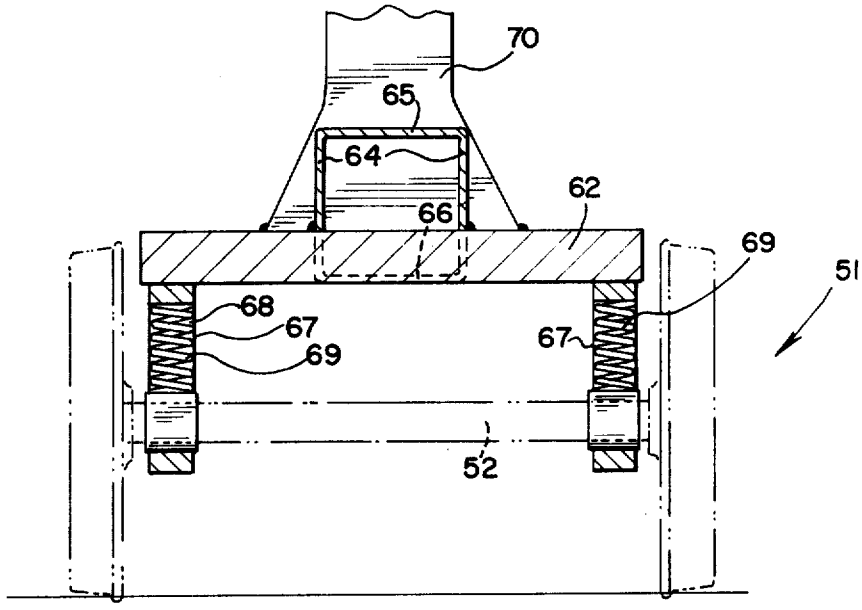


Fig. 7.



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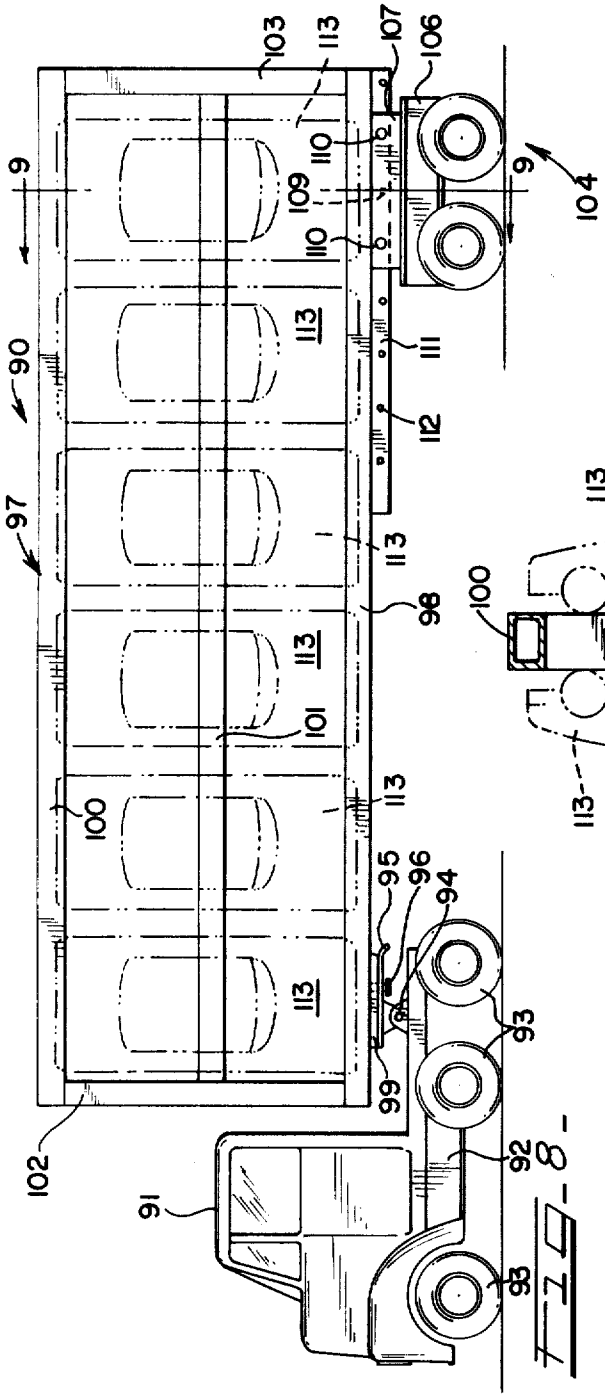


FIG. 8

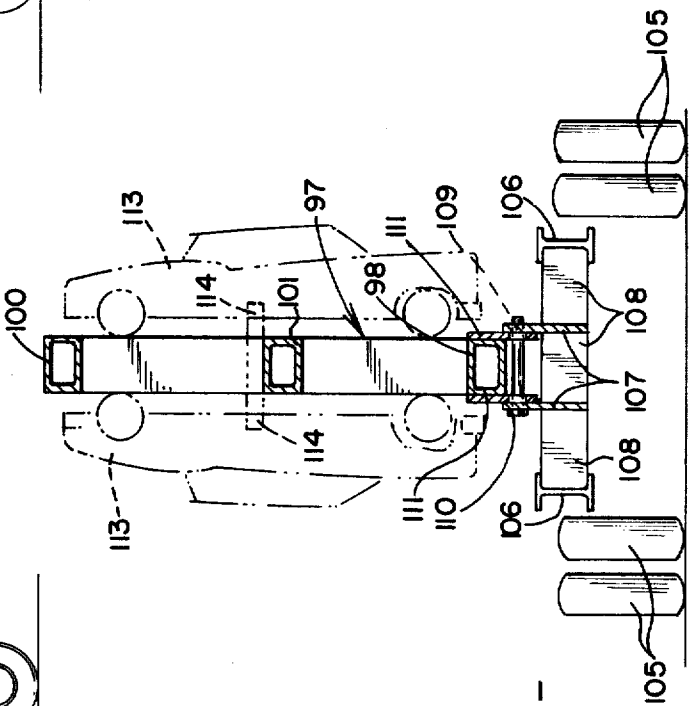


FIG. 9

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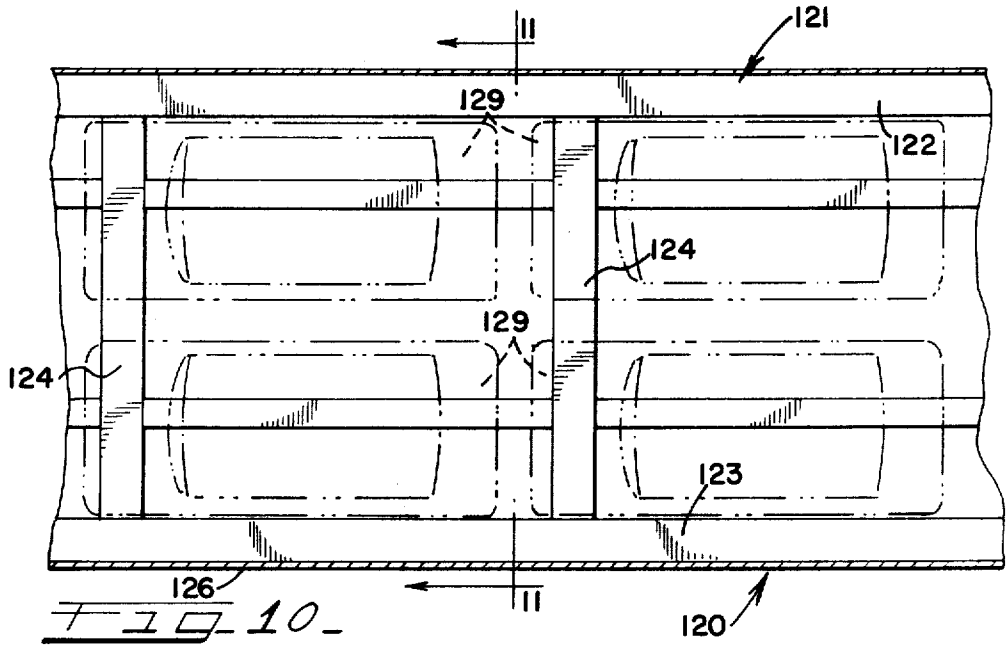


FIG. 10

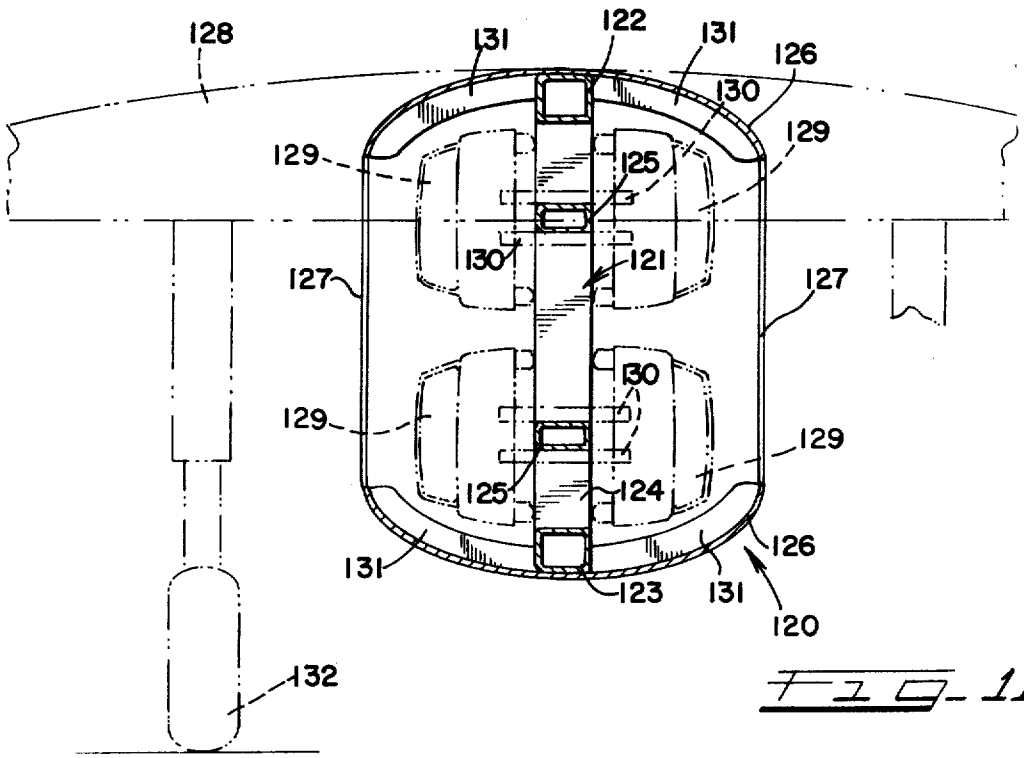


FIG. 11

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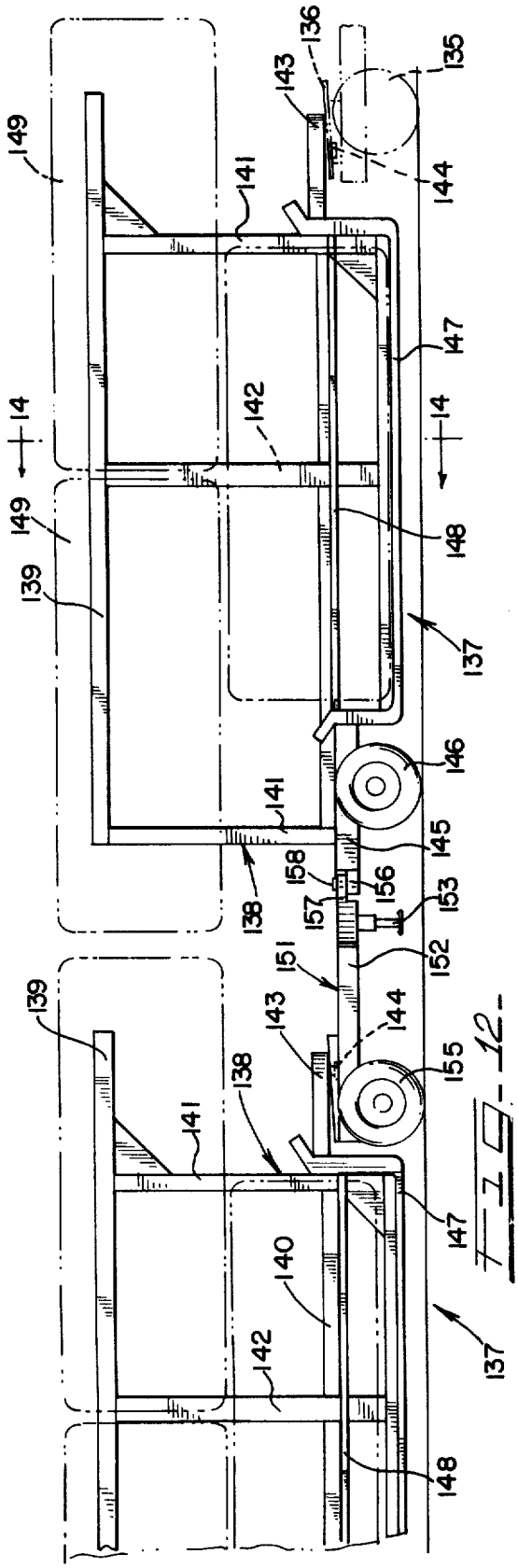


FIG. 12

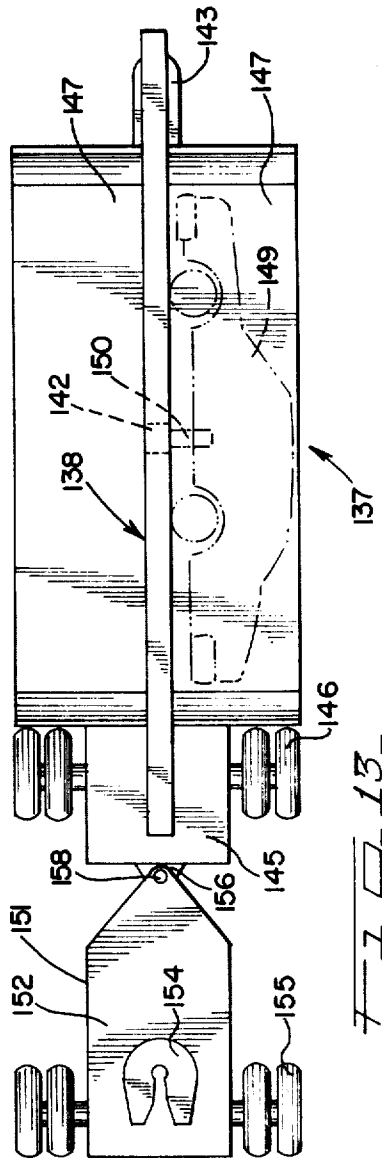


FIG. 13

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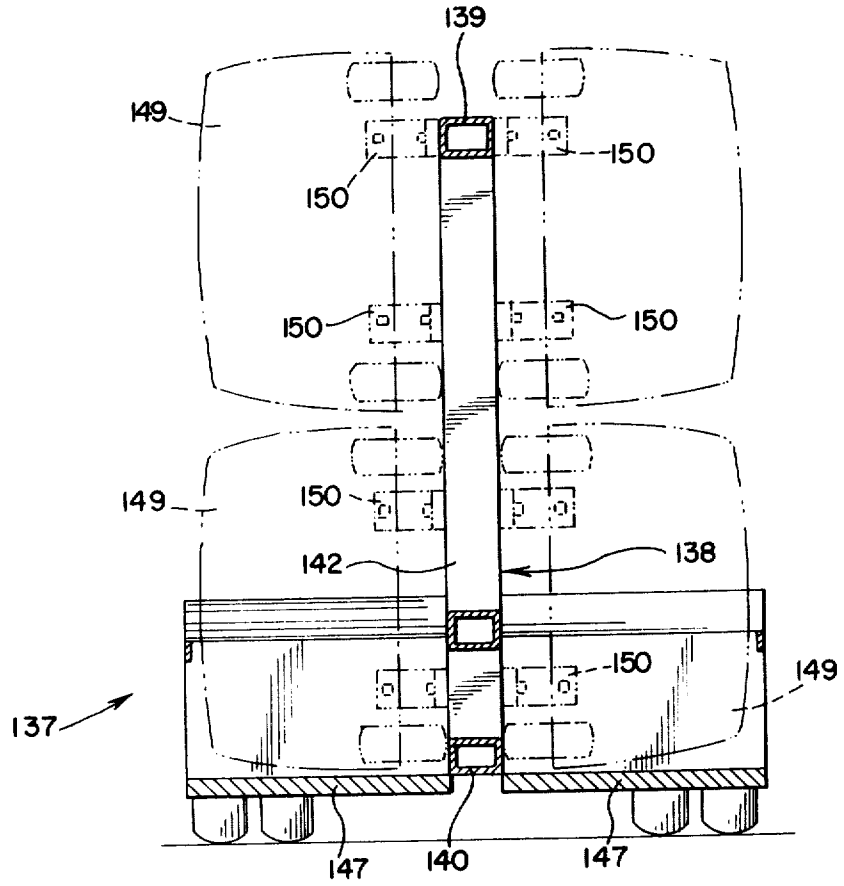


FIG. 14

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TRUSS-TYPE CARGO CARRYING VEHICLE

SUMMARY

The prime object of this invention is to provide an improved cargo carrier of simplified design wherein the primary structural member is an upstanding central longitudinal truss-type frame structure which is supported at its opposite ends on the wheels of a vehicle eliminating the usual and conventional deck or floor which also forms a structural part of the vehicle.

Another object of the invention is to provide a cargo carrier which includes a relatively narrow truss-like structure on which cargo is suspended, the said truss structure providing the primary structural support of a vehicle, such as a truck, trailer, or aircraft, and including a horizontal structural member projecting laterally outwardly of said truss structure to stabilize the same vertically.

The present invention, which includes the upstanding central frame structure, also includes at opposite ends thereof horizontally extending stabilizing members provided with center plate arrangements adapted to cooperate with car truck bolster center plates or vehicle suspensions in conventional fashion.

A central supporting framework comprises generally lower and upper longitudinally extending beams interconnected by suitable framing in the form of a truss or lattice-type structure. A railway car embodying this framework includes stub center sills supported on the horizontal stabilizing members which also include coupler housing adapted to contain conventional railway couplers.

The absence of any other laterally extending framework between the trucks of a railway car, or highway vehicle running gear, on the upstanding central frame structure provides for greater facility in loading and unloading and permits the cargo which may consist of containers or vehicles, etc., to be directly attached to, and suspended from, the truss structure of the frame. The invention may be utilized with the conventional two-axle trucks of a railroad car or may be combined with single-axle trucks disposed at opposite ends of the car, with the car comprising two individual articulated sections. Further, the truss structure may be placed on highway running gear and provide the primary structural component thereof or may provide the primary backbone or beam member of an aircraft fuselage or hull.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a railway car;

FIG. 2 is an end elevational view of the railway car shown in FIG. 1;

FIG. 3 is a side elevational view of a modified railway car;

FIG. 4 is an end elevational view of a railway car shown in FIG. 3;

FIG. 5 is a cross-sectional view taken along the line 5—5 of FIG. 1;

FIG. 6 is a cross-sectional view taken along the line 6—6 of FIG. 3;

FIG. 7 is a cross-sectional view taken along the line 7—7 of FIG. 3;

FIG. 8 is a side elevational view of a highway trailer embodying the truss structure of the present invention;

FIG. 9 is a cross-sectional view taken along the line 9—9 of FIG. 8;

FIG. 10 is a cross-sectional view through an airplane fuselage;

FIG. 11 is a cross-sectional view taken along the line 11—11 of FIG. 10;

FIG. 12 is a side elevational view of another modified articulated trailer construction embodying the truss structure of the present invention;

FIG. 13 is a plan view of a portion of the trailer construction disclosed in FIG. 12; and

FIG. 14 is a cross-sectional view taken along the line 14—14 of FIG. 13.

DETAILED DESCRIPTION

Referring now particularly to FIGS. 1, 2, and 5, an improved railway car is generally designated by the reference character 10 which includes at opposite ends thereof conventional trucks 11. Trucks 11 are of the two-axle type with wheels designated at 12 on axles 14. Each truck 11 also includes a truck bolster 13 on which is carried a conventional center plate 15. As shown in FIG. 5, side or outer bearings or supports 16 are suitably provided on the bolster 13.

The railway car 10 comprises primarily an upstanding central longitudinally extending truss or framing structure designated at 17 which includes a plurality of vertically extending horizontally spaced frame members 18. The frame members 18 are suitably connected to a lower relatively narrow longitudinally extending beam 19 and the upper ends of the frame members 18 are suitably connected to a similar upper beam 20. An intermediate horizontal beam 21 is suitably connected to the frame members 18 and the structure is rigidified by means of diagonal truss members 23 and 24. The framing structure 17 also includes a depending structure comprising a longitudinal beam 22 disposed below the upper edges of the railway wheels 12 and is supported by means of depending frame members 25 suitably braced by diagonal truss members 26. As best shown in FIG. 2, the framing structure 17 being of a truss type is of relatively narrow configuration with no parts thereof extending laterally outwardly on opposite sides thereof. Thus a rigid central upstanding structure of great strength is provided which does not require any laterally extending members such as cross-bearers, platform or deck, required in the conventional railroad car.

The longitudinal lower beam 19 of the truss structure 17 is connected at opposite ends thereof to short or stub length center sills 27 which are provided at their outer ends with open end coupler housing 28 adapted to contain conventional railroad couplers 29. As best shown in FIG. 5, each stub center sill 27 is provided with vertical side plates 30 connected to a top plate 31 and a bottom plate 32. As best shown in FIGS. 1 and 5, the rear end of each sill 27 is suitably recessed as indicated at 33 and has rigidly secured thereto a transverse stabilizing member 34 which may comprise one or more structural plates or elements and which includes a suitable center plate 35 adapted to cooperate with a center plate 15 on the bolster 13 in conventional fashion. A conventional pin 36 projects from the stabilizing member 34 in conventional fashion through the center plates 15 and 35. Each of the stabilizing members 34 also includes horizontally spaced bearing elements 37 adapted to cooperate with the side bearing 16 in conventional fashion.

The truss or framing structure 17 provides the sole support for cargo to be supported and suspended on the railway car 10. As schematically shown in FIG. 2, such cargo may consist of containers 38 carried on opposite sides of the truss structure 17 by suitable connecting bands or elements 39 which secure the containers directly to the framing members of the truss structure 17. It is contemplated of course that the cargo can be of any type and the structure 17 is particularly adaptable for supporting vehicles which would merely be suspended from the sides of the framing structure by well-known tie-down or securing means. Any cargo which can readily be suspended may be carried by the railway car described.

Thus it can be seen that a greatly simplified truss structure forms the sole structural beam for carrying cargo which may be suspended on the said structure. Additional strength is obtained by the utilization of the depending longitudinal beam 22 and its associate framing truss members. The relatively narrow design permits a maximum width dimension of cargo to be suspended thereon which still is within the lateral limits specified by the A.A.R. Further, a deck structure having the usual structural capabilities is unnecessary and undesirable. With the present type of narrow frame structure, loading is greatly facilitated since loading devices may be moved substantially right up against the truss structure without interference. Crane loading is particularly facilitated. Further, the

structural transverse stabilizing members **34** are of sufficient magnitude and strength to provide for the vertical stability required.

DETAILED DESCRIPTION OF A MODIFIED EMBODIMENT

Referring now to FIGS. **3**, **4**, **6** and **7**, a modified embodiment of an improved railway car **50** is disclosed. The railway car **50** comprises at opposite ends thereof single axle trucks **51**, only one of which is shown since the car is identical at opposite ends thereof. Each truck **51** comprises a single axle **52** being supported on conventional wheels. The car **50** also is of articulated design and is provided centrally with a double axle truck **53** including axles **54** which support, as best shown in FIG. **6**, a truck bolster **55** having a conventional center plate **56** supported thereon. The truck **53** also includes outer or side bearings **57** of conventional design which are carried by the bolster **55**. The articulated car **50** comprises two sections of truss or framing structures **58** each of which includes a lower longitudinal beam **59** and an upper beam **60**. Each lower beam **59** is provided at its longitudinally outermost ends with a diagonal beam portion **61**. The diagonal beam portions **61** provided at the outermost opposite ends of the sections **58** are connected to horizontally extending stabilizing members **62** which have supported thereon stub center sills **63**. As best shown in FIG. **7**, the stub center sills **63** include side plates **64** connected to a top plate **65** and a bottom plate **66**. The stabilizing members **62** are of heavy structural fabrication and are provided with conventional depending pedestals **67** suitably provided with slots **68** within which springs **69** are suitably secured. The axles **52**, including conventional bearing portions, are vertically movable in the slots **68** and are cushioned therein by means of the springs **69** in a manner which is well known in the art.

Each of the truss or framing structure sections **58** includes vertical end frame members **70** which are suitably secured to the lower beam **59** and are suitably connected to the upper beam **60**. Intermediate vertical frame members **71** are also similarly connected and are further connected to horizontally extending frame members **72** thus providing a suitable rigid type truss structure. The vertical frame members **70** also are connected at their lower ends, at the center portion of the car **50**, to vertical webs **73** and **73'** as shown in FIG. **3**. The web **73** is provided with vertically spaced horizontally extending yoke members **74** which support a vertical pivot pin **75**, as best shown in FIG. **6**. The vertical web **73'** of the adjacent sections **58** is provided with horizontally spaced vertically extending yoke elements **76** which are provided with aligned bores **77** through which the pin **75** extends. A horizontal pivot pin **78** is supported on the yoke element **76** and extends through a bore **78'** provided in the pivot pin **75**.

As best shown in FIG. **6**, the relationship of the yokes **74** and **76** and their associated pivot pins is such that full articulation of the sections **58** is provided. Such articulation is conventional in the art and further need not be detailed for the present invention.

The web **73** also has connected thereto in the area of the lower yoke element **74**, a transverse stabilizing member **79** as best shown in FIG. **6**. The stabilizing member **79** includes a suitable downwardly extending center plate **80** adapted to conventionally cooperate with the center plate **56** supported on the bolster **55** and for this purpose a suitable pivot pin **81** is provided. The stabilizing member **79** also is provided at its lower surface with bearing pads **82** adapted to cooperate with the outer bearings **57**. The features of the modification are the same as those enumerated with respect to the first embodiment disclosed hereinabove. In both cars the structure of the upstanding longitudinally extending truss performs the same function and has the advantages which are indicated. The invention thus can be utilized in a single-section railway car as indicated in FIG. **1** or two or more articulations may be provided, a two-section car being disclosed in FIGS. **3**, **4**, **6** and **7**.

DETAILED DESCRIPTION OF ANOTHER MODIFIED EMBODIMENT

In FIG. **8**, another modified application of the truss structure invention is provided. In this case a highway trailer is generally designated by the reference character **90** which is pulled by a conventional tractor **91** including a body **92** supported on ground wheels **93**. The tractor **91** has supported on the said body **92** a conventional fifth wheel **94** having connected thereto a fifth wheel plate **95**. The kingpin **96** of conventional construction is secured on the plate **95** and is rigidly connected to a truss-type frame **97** of similar construction as that shown in the aforementioned embodiments. The truss type of frame **97** includes a lower beam **98** which has connected thereto a spacer plate **99** to which the kingpin **96** is also connected. The frame **97** also includes an upper beam **100** and an intermediate beam **101**, the said upper and lower beams **98** and **100** being respectively connected by vertical end beams **102** and **103**. The trailer **90** is supported on a conventional type of wheel suspension generally designated at **104** and includes suitable wheels **105** connected to the wheel suspension **104** by conventional spring devices. The wheel suspension **104** also includes a pair of horizontally extending frame members **106** which are connected to two vertically extending plates **107** by means of transverse beam members **108** connected to the frame members **106** at longitudinally spaced locations to provide a rigid construction. As best shown in FIG. **9**, the vertical plates **107** are provided with openings **109** within which pins **110** are secured which suitably support a pair of track members **111** provided with a plurality of longitudinally spaced transversely aligned holes **112**. The track members **111** are connected to the lower beam **98** and serve to secure the truss structure **97** on the wheel suspension **104**. The wheel suspension **104** may be adjusted longitudinally on the track members **111** in conventional fashion by the removal and reinsertion of the pins **110**. The longitudinal adjustment of the suspension is provided by means of the holes **112** which are placed in alignment with the holes **109** so that the pins **110** may be connected therethrough.

DETAILED DESCRIPTION OF ANOTHER MODIFICATION

Referring now particularly to FIGS. **10** and **11**, a cross-section through a portion of an airplane fuselage or hull, which is designated at **120**, is disclosed. The fusilage or hull **120** has provided therein a truss structure **121** of similar construction as previously described. The truss structure **121** comprises an upper beam **122** and a lower beam **123** suitably interconnected by vertical beams **124**. The truss structure **121** is also provided with a plurality of horizontal intermediate beams **125** in turn suitably connected to the vertical beams **124**. The truss structure **121** provides the main support for the fuselage **120** and a skin or envelope **126** is supported on the truss structure **121** by suitable stringers or transversely extending brackets or gussets **131** suitably connected to the beams **122** and **123**. The skin or envelope **126** may also be provided with suitable openings **127** which may be closed by means of doors (not shown). A suitable wing structure **128** is shown schematically and same is rigidly attached to the truss structure **121** in a manner which may be well-known to anyone skilled in the art. Further, a suitable empennage or tail assembly is connected to the truss structure **121**.

The truss structure **121** provides the primary structural support for the airplane fuselage **120**, and vehicles **129**, such automobiles, are connected directly thereto and suspended therefrom by means of brackets generally indicated at **130**. A conventional retractable landing gear structure **132** is suitably connected to the wing structure **128** as indicated in FIG. **11**.

Referring now to FIGS. **12**, **13** and **14**, another modified trailer arrangement is disclosed which embodies the truss structure concept of the present invention. A conventional tractor **135** is schematically disclosed and includes a fifth wheel plate **136**. A pair of trailers are disclosed and are designated at **137**, each including a truss structure generally

designated at 138. The truss structures 138 of each trailer 137 include an upper longitudinal beam 139 and a lower longitudinal beam 140 connected at opposite ends by vertical end beam members 141. A central vertical beam 142 also connects the beams 140 and 141. A stabilizing member or tongue 143 is provided at the front of each trailer and includes a kingpin 144 which in the case of the lead trailer is connected to the fifth wheel plate 136 in conventional fashion. The truss structure 138, and particularly the lower longitudinal beam 140, are connected to a rear stabilizing member 145 supported on a suitable wheel and axle suspension 146. A U-shaped guard 147 is positioned on opposite sides of the truss structure 138 to protect the cargo carried thereon. Side rails 148 connected to the U-shaped guards 147 are also provided for this purpose. The trailers 137 are shown carrying vehicles 149 which are suitably connected by means of brackets 150, in the case of the lowermost vehicles 149, to the central beam 142. In the case of the upper vehicles 149, the brackets 150, as shown in FIG. 14, connect the vehicles to the upper beam 139. Similarly, brackets may connect the upper vehicles 149 to the vertical end beams 141. The brackets may be conventional securing brackets which removably secure the underframe of a conventional automobile to the truss structure.

FIGS. 12 and 13 also show a dolly construction having a body 152 provided with a conventional landing gear 153. The body 152 also supports a conventional fifth wheel plate 154 and said body is supported by a suitable axle and wheel suspension 155. The stabilizing member 145 includes a pivot bracket 156, in turn connected to a pivot bracket 157 by means of a removable pivot pin 158. As shown in FIG. 12, the rearmost trailer 137 may have its kingpin 144 in engagement in conventional fashion with the fifth wheel plate 154 so as to provide for a train of two or more trailers. In the present modification, the truss structures again are the primary structural components of the trailer and also provide the primary means of suspension of the cargo.

In the various embodiments shown, the truss structures provide the primary or basic structural member of the vehicle and is also the primary member providing support for the cargo which is to be carried thereon. In the railway adaptation the truss structure is provided at its lower ends with the horizontal members which in turn are carried by the trucks of the railway car and provide vertical stability. In the highway trailer modification shown in FIG. 8, the truss structure is supported at its front by means of the fifth wheel plate 95 which thus provides the horizontal or transverse stabilizing means for the truss structure 97. Likewise, the rear of the truss structure 97 is provided with transverse stabilizing means in the form of the vertical plates 107 which are adjustably and releasably connected to the lower beams 98.

In the aircraft construction shown in FIG. 11, the truss structure supports the skin or fuselage and also, the wings and empennage which are connected to the truss structure provide the vertical stability for the aircraft. Thus the truss structure in each instance is provided to act as a main structural member and also to carry the cargo directly suspended thereon.

In the embodiment shown in FIG. 8, the truss structure is disclosed as being removable relative to the fifth wheel plate 94 and the suspension 104 so that the truss including the cargo can be removed from the vehicles and therefore the vehicles can be attached to the truss structure either within or outside the factory in which the vehicles are manufactured wherein the truss structure can then be suitably handled and releasably attached to the wheel structure disclosed.

In the railway adaptation the truss structures also can easily be removed from the wheel trucks by merely raising the truss structures from the trucks. In conventional railway car manufacture, the cars are lowered onto the bolsters of the trucks and may be likewise removed by merely lifting the cars from the said bolster structures of the trucks. Thus, in each of the instances disclosed in FIGS. 1 through 8, the truss structures are removable. Similarly, in the aircraft structure FIG. 11, the truss structure can be made removable relative to the aircraft wing and tail or empennage assembly but when attached thereto, provides the main structural support.

What is claimed is:

1. A railroad car comprising:
a vertically extending truss structure of relatively narrow width and constituting the primary structural unit having means thereon adapted to have cargo suspendingly connected to the vertical side thereof,
said truss structure having substantially upper and lower vertically spaced longitudinally and horizontally extending beams and fore and aft longitudinally spaced vertically extending beams including end beams interconnecting with the longitudinal beams,
an end of car construction mounted at the lower end of said truss structure adjacent said lower beam and an end beam and including a center sill means and an elongated laterally extending narrow height stabilizing member on the underside of said center sill means and supporting said center sill means, said truss structure being in vertical alignment with said center sill means,
a coupling housing at the outer end of said center sill means and receiving a coupler, and
wheeled truck means supporting said stabilizing member and coupling means on the underside of said stabilizing member and atop of said truck means coupling the stabilizing member to said truck means.

2. The invention according to claim 1, and
said center sill means being mounted underneath said lower beam and having a recess in its underside receiving said stabilizing member.

3. The invention according to claim 1, and
said stabilizing member being connected to said end beam and to said lower beam and said center sill means being mounted on said stabilizing member and extending outwardly of said end beam.

4. The invention according to claim 1, and
a reinforcing structure depending from said lower beam and including a third horizontal beam depending below said lower beam and a plurality of vertical lower end portions extending down from said vertical beams and said lower beam and connecting with said third beam.

5. The invention according to claim 4, and
said reinforcing structure including an end diagonal beam portion connecting said lower beam with said third beam.

6. The invention according to claim 1, and
said truss structure including diagonal truss members extending between said vertical and horizontal beams.

7. The invention according to claim 1, and
a reinforcing structure depending from said lower beam between and in horizontal alignment with the truck means at each end of the car.

8. The invention according to claim 1, and
said lower beam extending for most of its length being below the stabilizing member and having a diagonal portion connecting with the stabilizing member.

9. The invention according to claim 1, and
a reinforcing structure depending from said lower beam between and in horizontal alignment with the truck means at each end of the car, and
said center sill means being mounted on the underneath side of the lower beam and said stabilizing member being attached to the underside of said center sill means.

10. The invention according to claim 1, and
said center sill means being mounted on the underneath side of the lower beam and said stabilizing member being attached to the underside of said center sill means.

11. The invention according to claim 1, and
said center sill means being a stub center sill.

12. The invention according to claim 1, and
a second truss structure for carrying cargo,
a second transverse stabilizing member,
articulated connecting means connecting one truss structure with the other and including yoke means for each

truss structure pivotally interconnecting same, said yoke means including a truss structure connecting pin mounted on said second stabilizing member extending under said yoke means, and

further truck means being underneath and carrying said second stabilizing member.

13. The invention according to claim 1, and

a second truss structure for carrying cargo,

a second transversely and horizontally extending stabilizing member,

articulated connecting means connecting one truss structure with the other and including a yoke for each truss structure pivotally interconnected with the other, said second stabilizing member supporting said yokes and truck means supporting said second stabilizing member.

14. The invention according to claim 1, and

first bearing means on the lateral ends of the stabilizing member and second bearing means on the lateral ends of the truck means for engagement with the first bearing means.

15. The invention according to claim 1, and

said coupling means including a first center plate on the underside of the stabilizing member and a second center plate on the truck means supportingly engaging the first center plate.

16. The invention according to claim 1, and

said coupling means including pedestal means depending from each lateral end of the stabilizing member and connecting with the truck means,

spring means for each pedestal means between the stabilizing member and truck means for resilient support of the truss structure.

17. The invention according to claim 1, and

said coupling means having means for releasably connecting said stabilizing member with said truck means.

18. The invention according to claim 1, and

said truss structure having a second end construction including a second stabilizing member and second truck means supporting said second end construction, further coupling means on the underside of said second stabilizing member and atop said truck means, said first mentioned coupling means and said further coupling means releasably supporting said truss structure on said first and second truck means.

19. The invention according to claim 1, and

a second truss structure having first and second end construction,

said first mentioned truss structure having another end of car construction,

said truss structures having articulated means intercoupling said another end of car construction and said first end construction, and

second truck means supporting said articulated means and third truck means supporting said second end construction.

20. The invention according to claim 1, and

a second end of car construction mounted at the other lower end of said truss structure adjacent said lower beam and the other end beam and including a second elongated laterally extending narrow stabilizing member on the underside of said center sill means and supporting said center sill means and a second coupling housing at the other outer end of the center sill means and receiving a coupler, and

wheeled truck means supporting said second stabilizing member and coupling means on the underside of said second stabilizing member and atop said second truck means coupling the second stabilizing member to said second truck means.

21. The invention according to claim 20, and

said center sill means including a pair of stub center sills, one for each stabilizing member, each stabilizing member being attached to the underside of a respective center sill which is attached to a respective underside end of the lower beam, each stabilizing member being under the inward end portion of its respective stub center sill.

22. The invention according to claim 1, and

said stabilizing member connecting with said end beam and said lower beam and said center sill means being mounted on said stabilizing member, and

a second truss structure having first and second end constructions,

said first mentioned truss structure having another end of car construction,

said truss structures having articulated means intercoupling said another end of car construction and said first end construction,

second truck means supporting said articulated means and third truck means supporting said second end construction.

23. The invention according to claim 22, and

said lower beam extending for most of its length below the stabilizing member and having a diagonal portion connecting with the stabilizing member.

24. The invention according to claim 1, and

said primary structural unit having means thereon adapted to have cargo suspendingly connected to the vertical opposite sides of said unit and said truss structure in transverse section being of generally inverted T-shaped construction.

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