United States Patent

Bateson et al.

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[54] CARGO HANDLING AND TRANSPORTATION SYSTEM

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[22] Filed: **Aug. 21, 1970**

[21] Appl. No.: **65,875**

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

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

[58] **Field of Search** ..... 105/366, 367, 368 R, 368; 214/38.8, 38 D, 152; 248/119; 280/179

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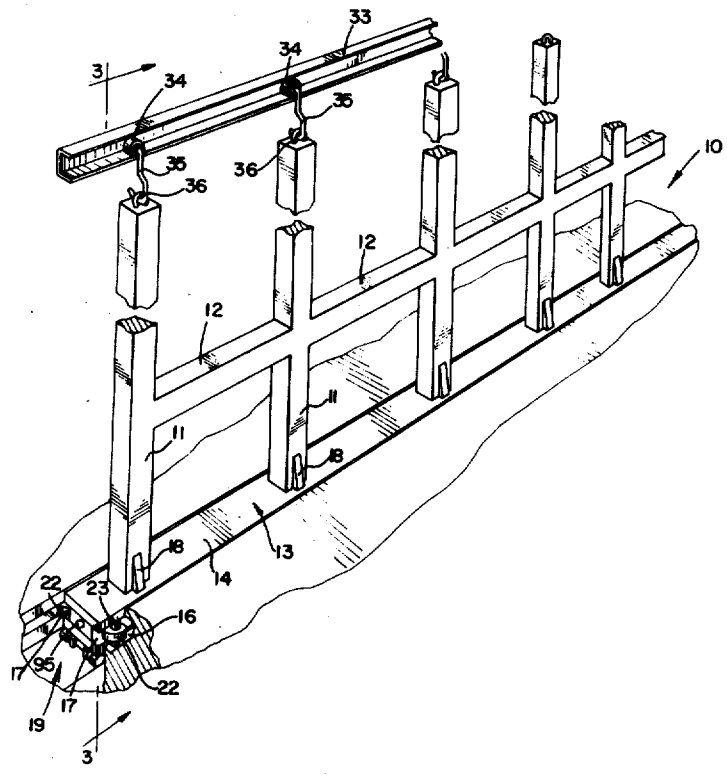
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[57] **ABSTRACT**

A cargo handling and transportation system includes a truss type of frame on which vehicles are suspended upon leaving the manufacturer's assembly line. The frame is connected to a longitudinal beam which moves in a track and transports the vehicles from the factory to a means of ground or highway transportation. In loading a railway car, the truss and vehicles thereon are removed from the longitudinal beam by a crane and are lowered through the open roof of the car into connecting relation with brackets disposed within the car so that the frame and cargo are ready for shipment. Similarly, the truss frames may be removed from the highway trailers or railway cars by lift mechanisms which shift the frames into aircraft or into holds of ships for further transportation. The longitudinal beams are movable in tracks below the ground, and may be removably connected to the lower ends of the truss to be transported therewith so that they may be guided in suitable track members in a ramp loading arrangement, such as may be desired for loading aircraft. The frames also may be stored within the hull of a ship or airplane fuselage in similar tracks which are engaged by the longitudinal beams removably connected to the lower ends of the truss frame.

3 Claims, 12 Drawing Figures



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5 Sheets-Sheet 1

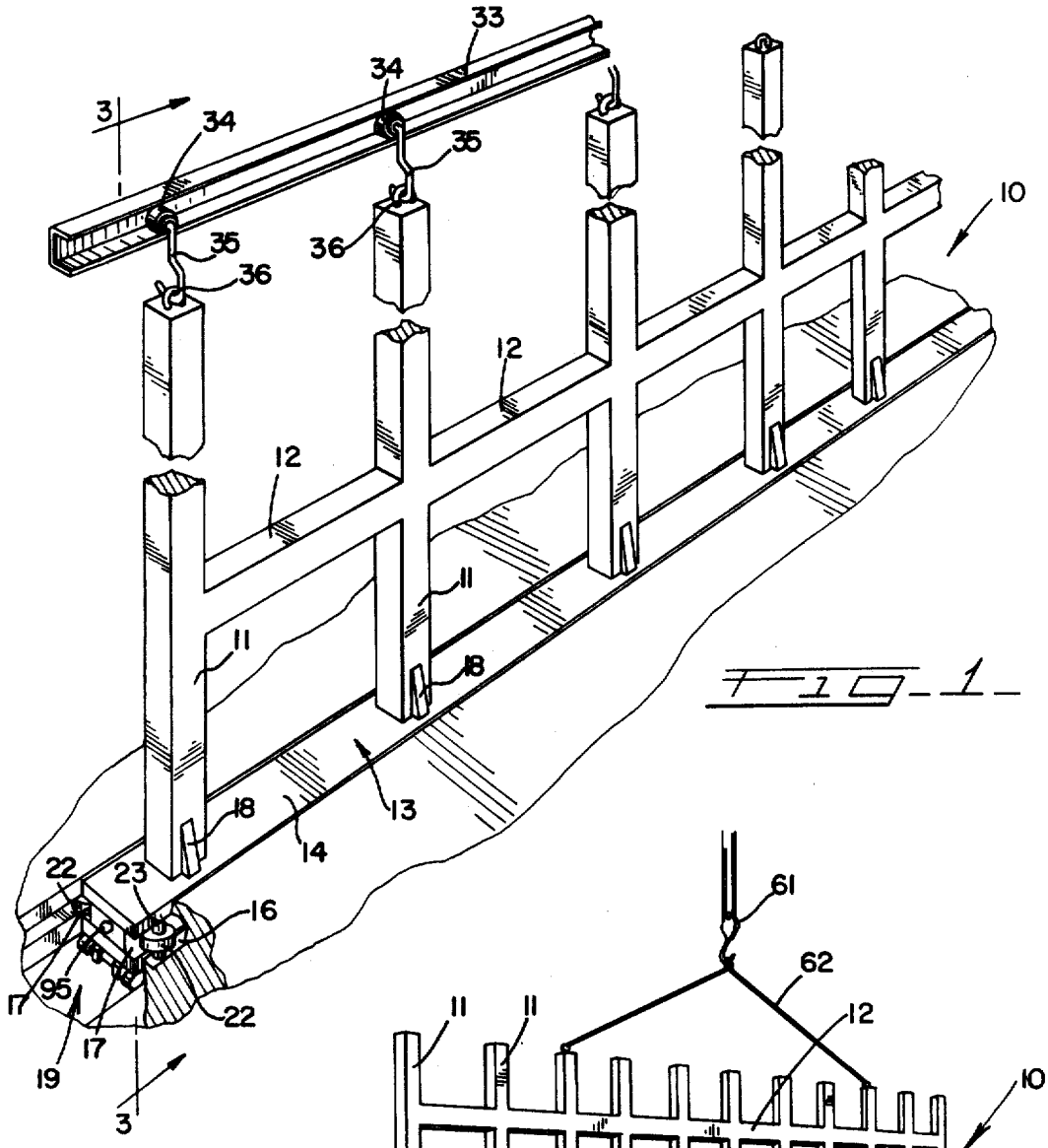


FIG. 1

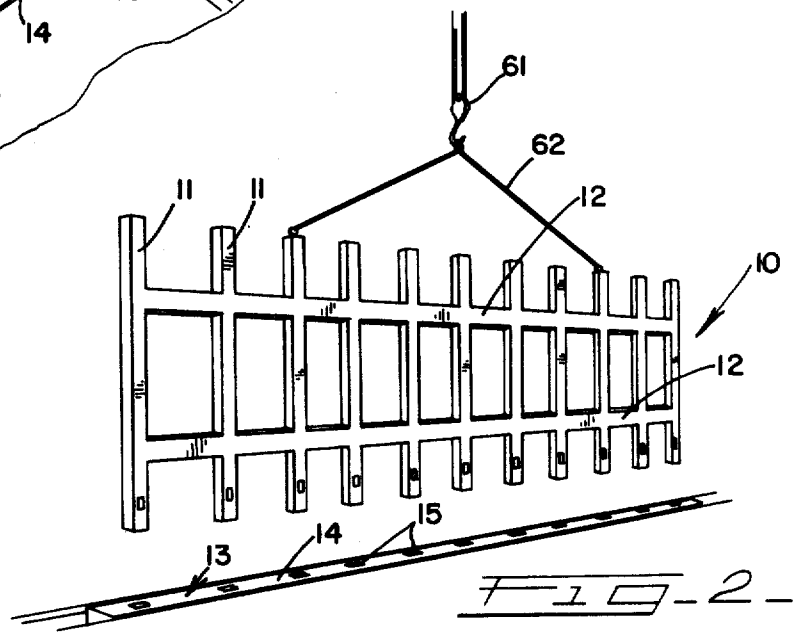


FIG. 2

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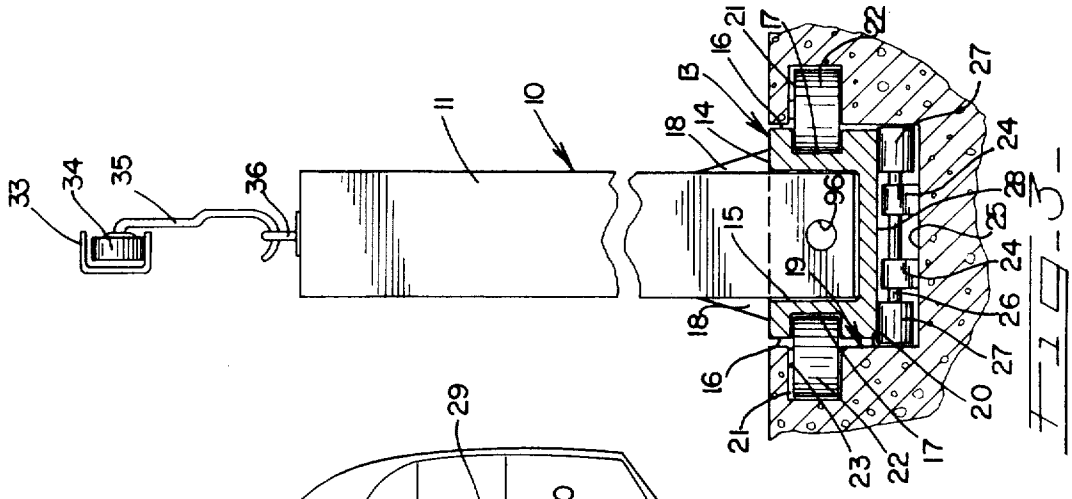


FIG-3-

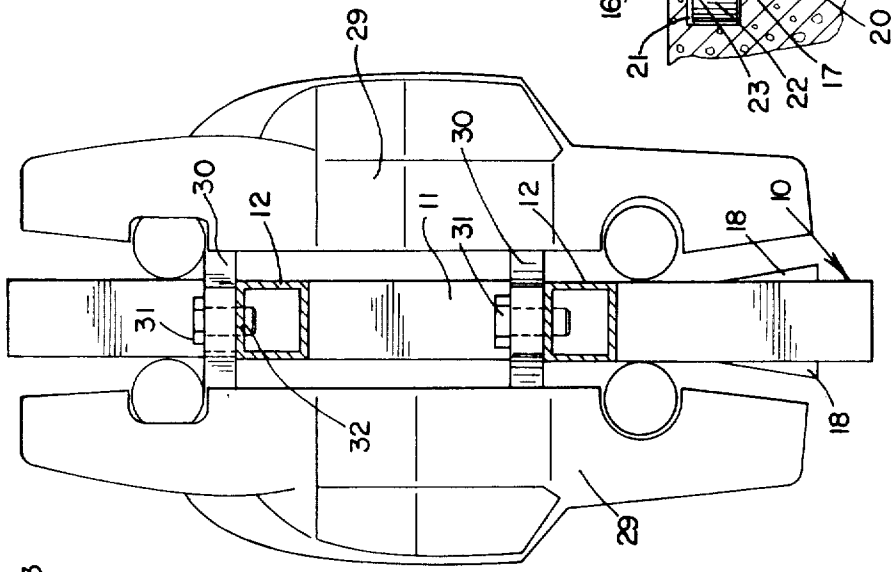


FIG-5-

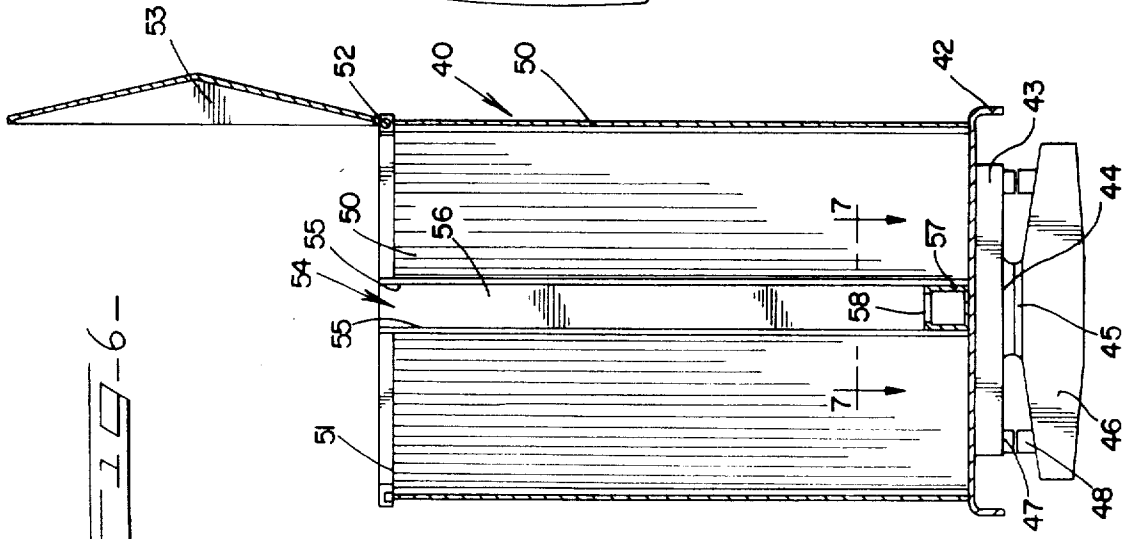


FIG-6-

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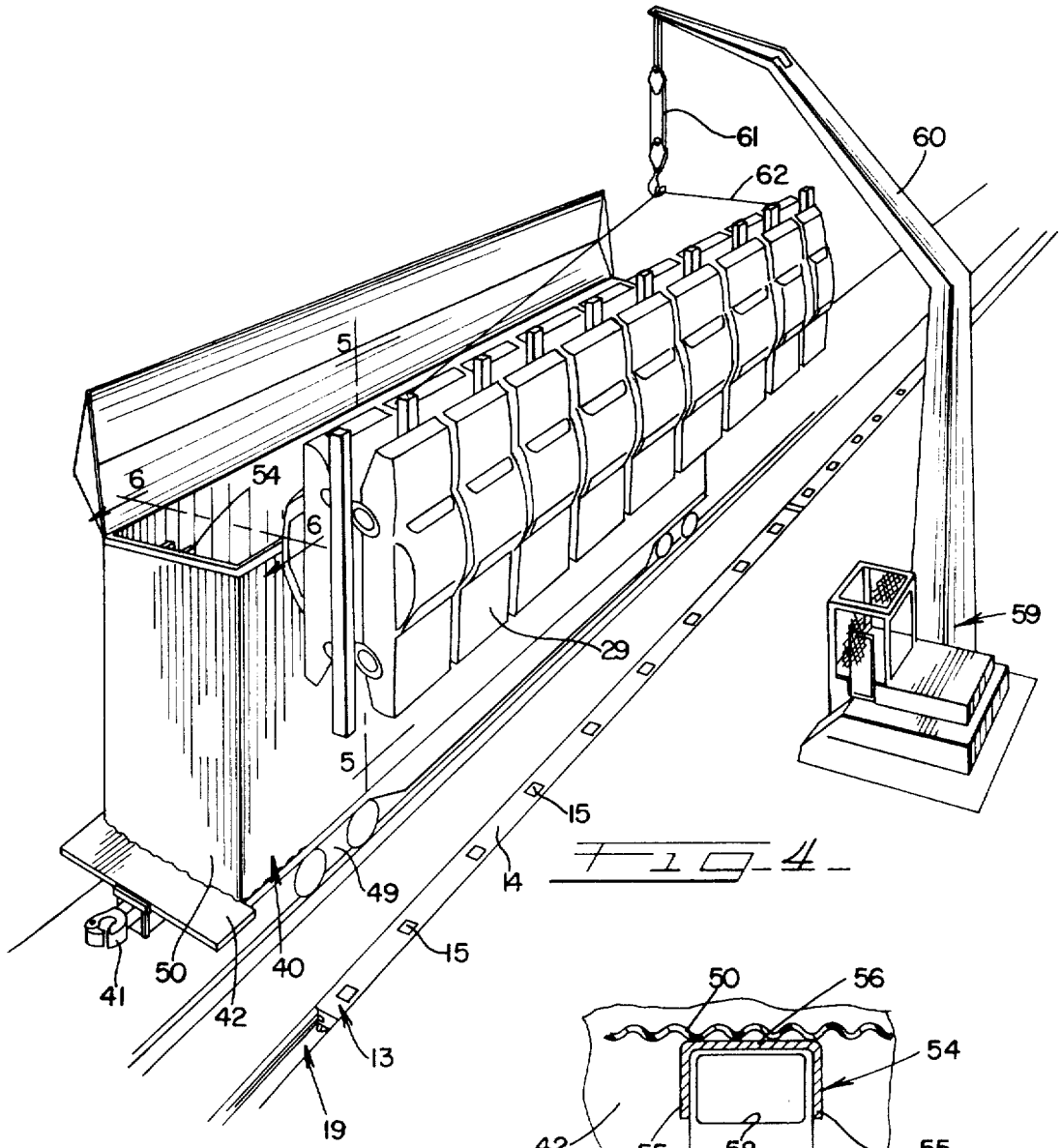


FIG. 4

FIG. 7

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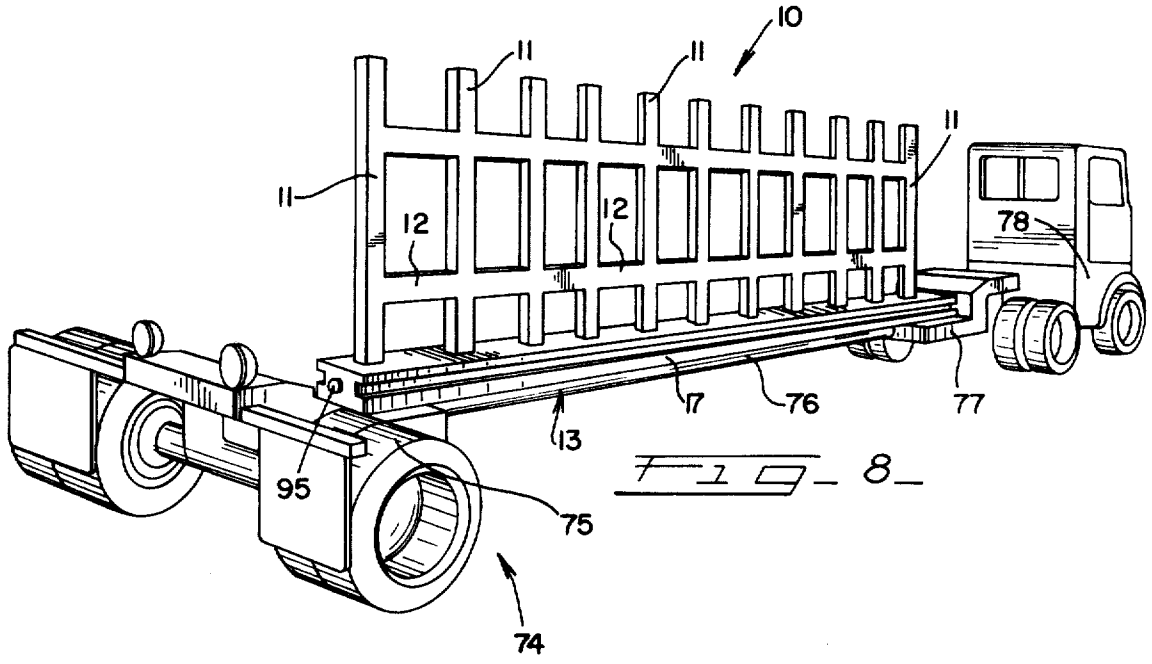


FIG. 8

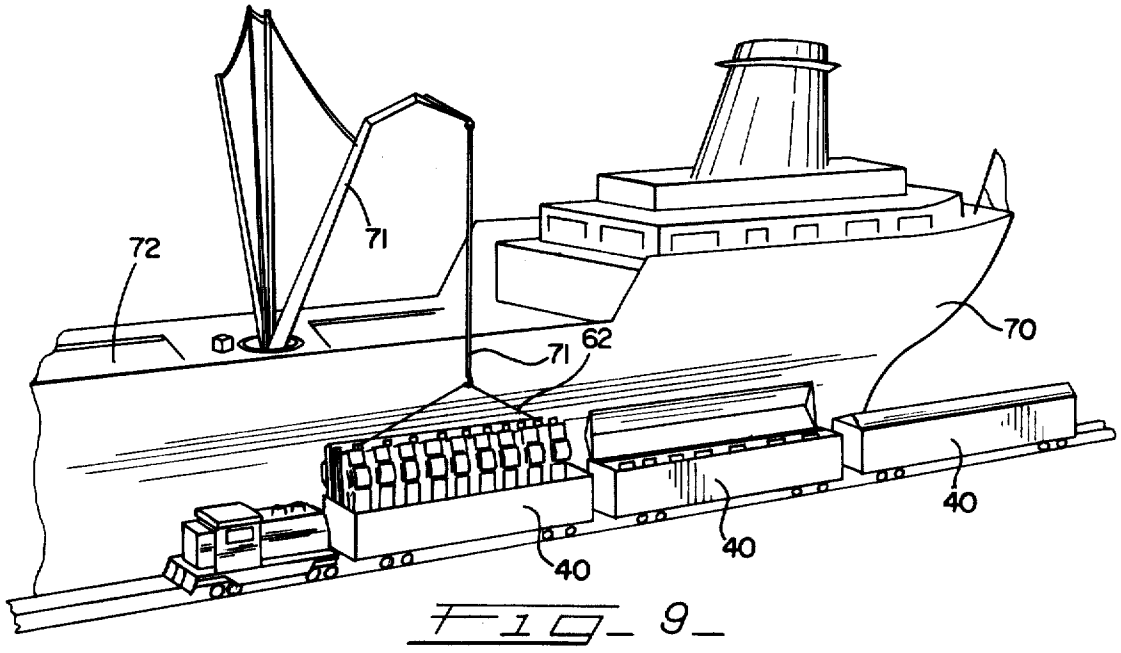


FIG. 9

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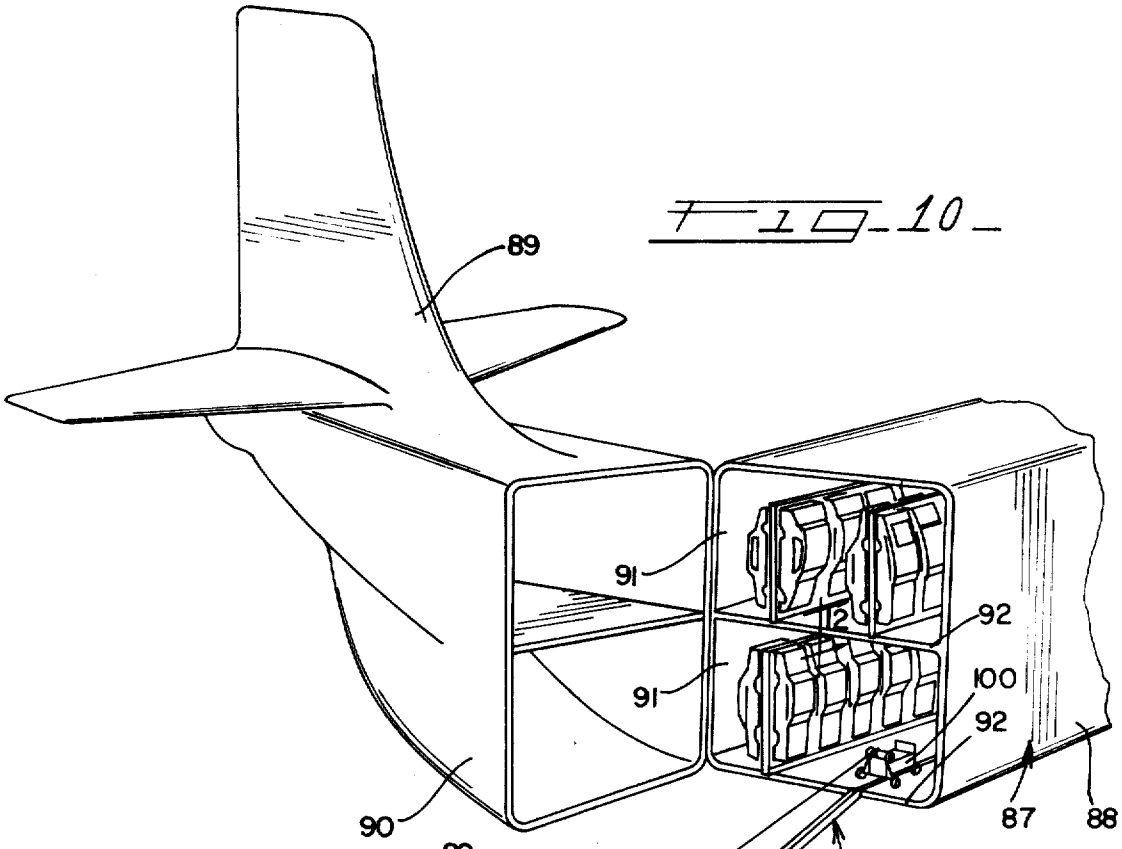


FIG. 10

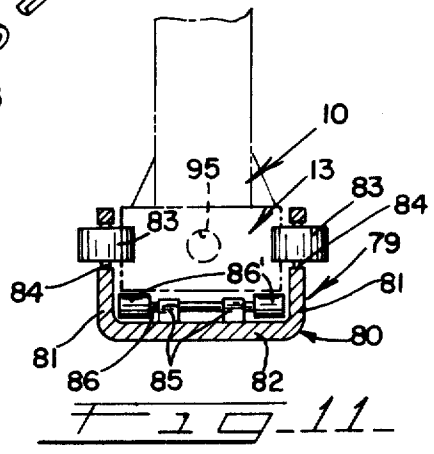


FIG. 11

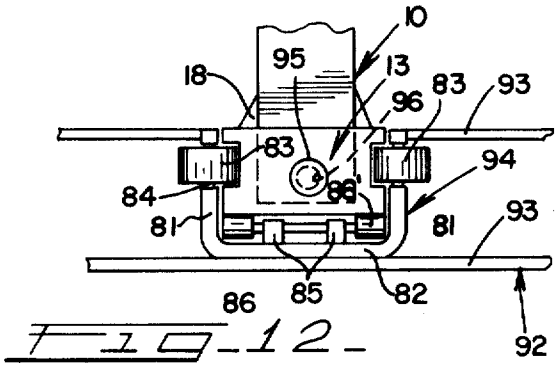


FIG. 12

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CARGO HANDLING AND TRANSPORTATION SYSTEM

The present invention is an improvement over applicants' copending patent application, Ser. No. 65,461 filed Aug. 20, 1970.

SUMMARY

The prime object of the present invention is to provide an improved cargo handling and transportation system particularly adaptable for automobiles and the like. The present method and system of handling automobiles from the place of manufacture to the dealer is well-known and consists primarily of the use of over-the-highway trailer and tractor combinations in which the automobile must be driven onto the trailer for shipment. Similarly, in rail car design, auto rack flat cars include upper and lower platform arrangements into which the automobiles are driven and then subsequently secured in place by suitable securing means. This type of handling is exceedingly expensive and also subject to many over-the-road hazards. Pilferage, vandalism, collisions resulting from driving the vehicles onto the racks, etc., are numerous. Further, generally after the cars are manufactured they are driven to parking areas adjacent the manufacturer's plant when they again must be driven onto the transportation vehicles. Thus large storage areas have to be provided and a great amount of costly handling is required.

The present system is primarily concerned with an improved system and method of handling automotive type vehicles which resolves many of the aforementioned problems. In the present system, as the cars are delivered from the assembly line they are immediately hoisted into position on a truss type of rack or frame arrangement and secured thereto by suitable brackets fastened to the rack and to the underframe of the automobile. The rack is removably positioned on a lower beam-type member which may be transported in concrete trackways directly to the means of transportation which is to be employed in delivery of the automobile. Thus the automobile need not be driven into parking areas and it is unnecessary to load the automobile with fuel which also is a hazardous and time consuming procedure. The racks are then raised from the lower longitudinal beam elements and are, by means of cranes or hoists, then lowered into the upper open end of a special type of railway car which by suitable bracket means receives the frame arrangement and firmly holds it in position, with the cars suspended on opposite sides thereon. In the event that the truss type frame, including the automobiles secured thereon, is to be shipped by highway transportation, the truss frame is secured to a trailer having a longitudinal beam which accommodates the truss frame or the truss frame as it is placed on the trailer includes the detachable beam which also has functioned to transport the frame and vehicle assembly from the manufacturing or assembly line. When the rail cars or trailers are shipped overseas, it is a simple matter to hoist the truss frames from the railway car into the hold of a ship which also includes bracketing means or suitable longitudinal beam members for receiving the truss frames and maintaining them in an upright position. Truss frames with their vehicles carried thereon, including the lower longitudinal beams, also may be quickly and easily loaded into the cargo container of an aircraft fuselage.

Essentially, therefore, the system includes a truss type frame including vertical and longitudinally interconnected members which will support on opposite sides thereon for transport, automobiles. The truss frame is removably connected to a longitudinally extending lower beam also movable in roller guides either within a concrete area or on the ground to transport the frame and vehicles to the next point of loading which may be either railroad car or other form of transportation. The truss structure with its removable lower longitudinal beam provides for various possibilities of loading and the lower beam may serve as a means for removably positioning the truss structures on other vehicles such as railway cars, trailer vehicles or ship and aircraft modes of transportation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a portion of a truss type frame structure for carrying automobiles;

FIG. 2 is a perspective view showing a truss structure being placed into connected position with a conveying beam;

FIG. 3 is a cross-sectional view taken substantially along the line 3—3 of FIG. 1;

FIG. 4 is a perspective view disclosing the loading of a plurality of automobiles carried on a truss structure into a railway car;

FIG. 5 is a cross-sectional view taken substantially along the line 5—5 of FIG. 4;

FIG. 6 is a cross-sectional view through a railway car taken substantially along the line 6—6 of FIG. 4;

FIG. 7 is a detail cross-sectional view taken along the line 7—7 of FIG. 6;

FIG. 8 is a perspective view showing a highway tractor and trailer arrangement and including an improved truss structure carried thereon;

FIG. 9 is a perspective view showing the loading of a truss structure, with attached automobiles, into the hold of a sea-going vessel after the truss structure is removed from a railway car;

FIG. 10 is a perspective view of a rear portion of a cargo airplane or fuselage showing a truss structure and means for loading the truss structure from a highway trailer into the fuselage;

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

FIG. 12 is a cross-sectional view taken substantially along the line 12—12 of FIG. 10.

DETAILED DESCRIPTION

Referring now particularly to FIGS. 1, 2, 3 and 5, truss type supporting frame 10 comprises a plurality of longitudinally spaced vertical members 11 connected intermediate their ends by means of longitudinally extending members 12 providing a truss structure of relatively strong and narrow construction. A lower transporting beam is designated at 13 which includes an upper surface 14 provided with a plurality of longitudinally disposed openings or apertures 15 which are complemental to the configuration of the vertical members 11 so that they may be received by said apertures 15 for securing the truss in an upright position. Each of the longitudinal transporting beams 13 also includes vertical sides 16 provided with U-shaped recesses or slots 17 extending substantially the length of the beam 13. As best shown in FIG. 1, each of the vertical members 11 also is provided near its lower end with stops 18 which, as shown in FIG. 3, serve to stabilize the vertical members 11 when they are positioned with the apertures 15. As best shown in FIGS. 1, 3 and 4, tracks 19 are provided for conveying the truss frames 10 mounted on the lower transporting beam 13. The tracks 19 may be incorporated beneath or on the ground in concrete, blacktop, or directly on the ground as desired, these tracks extending directly to the ends of the assembly line on which vehicles are assembled. Each track 19 is provided with vertical walls 20 having longitudinally extending slots or recesses 21 which are in registry with the slots 17 on opposite sides of the beam 13. Rollers 22 are mounted for rotation about vertical axes by means of vertical pivots 23 and are spaced along and within the track 19 for guiding the transporting beams 13. A lower horizontal wall 25 of each track 19 also is provided at horizontally spaced points with vertically extending brackets 24 which rotatively support shafts 26 to which rollers 27 are connected, the said rollers 27 supporting the underneath surface 28 of each beam 13.

As best shown in FIGS. 4 and 5, automobiles designated at 29 are carried on opposite sides of each truss frame 10 and are secured thereto by means of brackets 30 which are rigidly fastened to the underframes of the automobiles 29. The underframe of each vehicle 29 is connected to two of the

brackets 30 which are each removably secured, by means of removable pins 31, to the longitudinal members 12 through vertical openings 32. The connection of the brackets 30 to the underframe also may be such that the brackets 30 remain permanently on the truss structures 10 and the vehicle underframe is merely secured thereto, as may be desired.

As the automobiles leave the assembly line they are thus secured to the truss structures 10 which have been positioned in the transporting beams 13 slidingly positioned within the tracks 19. So as to stabilize the vertically positioned truss frames 10, upper guide tracks 33 are provided which include rollers 34 slidable therein, these in turn being connected to hanger members 35 extending through eyes 36 positioned on top surfaces of the vertical members 11. The truss frames 10 may then be moved with the beams 13 along the ground to the areas wherein further loading is to be done, as shown in FIG. 4. Such movement is obtained by tractors or other vehicles, or the tracks 19 may be automated in the sense that the rollers 34 may be power-driven to drive the vehicles 29 along in conventional conveyor-type fashion.

In FIG. 4, a railway car 40 is shown positioned on a track for receiving the truss structures 10 with vehicles 29 suspended thereon. The railway car 40 comprises conventional couplers 41 at opposite ends thereof and includes a platform 42 which extends substantially the length of the car but may be substantially non-structural, merely closing the lower end of the car. The car 40, as best shown in FIG. 6, and as disclosed in the aforementioned patent application, includes at opposite ends thereof, stabilizing members 43 each of which includes a center plate 44 cooperating with a center plate 45 provided on a conventional bolster 46. The stabilizing members 43 also include side bearings 47 which cooperate with side bearings 48 provided on the bolster 46. Conventional wheel trucks 49 are provided and carry the bolsters 46. The car 40 is enclosed by means of a flexible wall enclosure 50 which, similar to the platform 42, is merely for the purpose of enclosing the cargo rather than serving to strengthen the car. The flexible wall 50 is supported by an upper frame 51 which in turn has hingedly connected thereto, as indicated at 52, a hinged roof assembly 53. Thus the roof 53 may be hinged to the open position as shown in FIG. 4 so that the car may be loaded. The railway car 40 is also provided at opposite ends thereof with channel-shaped vertical bracket members 54 which face longitudinally toward one another, each including flange portions 55 connected to a vertical wall 56. The lower ends of the members 54 are suitably connected to the stabilizing members 43 to be rigidly supported thereon. Further, a lower longitudinal beam 57, as best shown in FIGS. 6 and 7, extends along the length of the railway car 40 and is rigidly secured to the stabilizing members 43 providing the primary structural underframe for the railway car. When the car is fully loaded and the truss frame 10 is in position, the truss frame itself further provides for strengthening of the car and with the beam 57 provides the primary support for the car and also the support for supporting the vehicles. The lower longitudinal beam 57 is also provided with a plurality of openings or apertures 58 longitudinally spaced to provide means for receiving the lower ends of the vertical members 11 of the truss frame 10. As best shown in FIG. 4, a crane or hoisting device is generally indicated at 59 and includes a boom 60 to which is connected a winching mechanism 61 connected to a cable sling 62 suitably connected to the truss frame 10 so that it may be hoisted into position in loading and unloading.

FIG. 9 discloses the railway cars 40 positioned adjacent a sea-going craft or cargo ship which is designated at 70. A hoisting cable 71 from a shipboard crane is connected to the cable sling 62 and raises the truss frame 10 and vehicles 29 carried thereon upwardly from the railway car 40 whereupon the load is then lowered into a hold 72 for further shipment. In the hold 72, while not specifically shown, there may be provided suitable members, similar to the beams 57, which may be secured within the hold 72 and which are provided at their ends with channel-shaped upright bracket members, such as 54, into which the truss frames 10 may be lowered and secured in the same manner as they are lowered and secured into the railway car disclosed, or the truss members may include at their lower ends the transporting beam 13 which may be removed from the trailer vehicles 74 of the type shown in FIG. 8 and the whole assembly may be lowered into the ship hold 72 with the beam 13 suitably secured to the floor of the hold to retain the truss frames 10 in the upright position.

Referring now to FIGS. 8 and 10, a highway vehicle 74 includes a rear wheel suspension 75 to which an elongated draft tube 76 is connected. The draft tube 76 is connected to a fifth wheel structure 77, in turn suitably connected to a highway tractor 78. In this type of transportation the truss structure 10 may be transported with its lower transporting beam 13 connected thereto as an integral part thereof. It is of course also realized that such a beam 13 may be permanently secured to the rear suspension 75 and fifth wheel structure 77 without the necessity of utilizing the draft tube 76. Thus the various adaptabilities of use of the transporting beam 13 is clear and such may be readily utilized. In FIG. 10, the highway tractor 78 is shown backed up to a ramp designated at 79. The ramp 79 more fully disclosed in FIG. 11, comprises a U-shaped beam or track memner 80 provided with vertical walls 81 and a horizontal base wall 82. Rollers 83 are pivotally secured by means of pivot shafts 84 on the walls 81 so that rollers 83 may rotate about vertical axes within and engage the recesses 17 of the transporting beam 13 as also shown in FIG. 3. The tracks 80 are essentially similar to the tracks 19 except in this case, the tracks 80 provide a ramp. The base wall 82 also supports upwardly extending brackets 85 on which a shaft 86 is rotatably positioned. Rollers 86' are connected to the shaft 86 for engaging the underneath side 28 of each of the beams 13. The ramp 79 is shown in position for loading into an aircraft 87 which comprises a cargo fuselage 88 having at its rearmost end an empennage 89 connected to a hinged rear fuselage portion 90 which may be opened and closed when access to the interior of the aircraft fuselage is necessary for loading and unloading. The fuselage portion 88 comprises upper and lower compartments 91 separated by a floor 92. As shown in FIG. 12, the floor 92 may consist of upper and lower floor panels 93 which are vertically spaced so that U-shaped tracks or beams 94 may be recessed therein. The U-shaped beams or tracks 94 are of the same construction as the ramp 79 and similar reference characters are applied. Essentially they both function in the same manner, in effect providing guides or tracks for transporting the truss frames 10 from a trailer into position within the cargo space of an aircraft. As indicated above, the truss frames 10 are removably connected to the beams 13 and this may be achieved by removable lock pins 95, shown in FIGS. 8 and 12, which extend through opposite ends of the beam 13 into openings or bores 96, provided in the end vertical members of each truss 10, the said bore 96 being disclosed in FIG. 3.

THE OPERATION

As shown in FIGS. 1 and 2, the truss frames 10 are positioned on the beam members 13 by inserting the lower ends of the vertical members 11 into the apertures 15 provided. They are then locked in position by inserting lock pins 95 and the truss structure is then rigidly secured for loading. The upper tracks 33 also cooperate with rollers 34 upon insertion of the hooks 35 through the eyes 36 which in turn are provided in the upper ends of the vertical members 11. Tracks 19 are provided at the ends of the assembly line, and automobiles as they leave the assembly line are loaded onto the truss members 10 by securing the automobiles by means of brackets 30 which are connected to the underframes of the automobiles. The truss frames 10 so loaded are now pulled by tractor or other means as previously mentioned to the location next to the railcar, shown in FIG. 4, wherein the crane lifts the automobiles from the transporting beams 13 and vertical members 11 at opposite ends of the truss frame 10 are inserted in the chan-

nel-shaped bracket members **54**, whereupon the vertical members **11** guide the truss downwardly into position with the lower ends of the vertical members **11** projecting into the apertures **58** provided in the lower longitudinal beam **57**. The truss frame is now firmly connected within the railway car and the truss frame with the associated cooperating parts of the car provide not only the cargo support but also serve to stabilize and provide the main structure for the railway car **40**. The railway cars are then made up into a train which may arrive adjacent an ocean-going vessel **70** wherein the truss frames **10** are again removed and are stored within the ship hold **72** as hereinabove described.

When it is desired to transport the truss frames by means of highway transport, the truss frame **10** and the transporting beam **13** may be disconnected from the tracks **19** and moved as a unitary structure to the trailer vehicle **74** disclosed in FIG. **8**. In this instance, the beam **13** may be suitably secured or fastened by conventional means to the trailer and the automobiles **29** are then ready for movement. If desired, the trailer **74** may include the beam **13** as a permanent part of the unit in which case the truss frames **10** would not include the lower beam **13**. However, in the unloading and loading of the airplane shown in FIG. **10**, the trailer has been directed to the airport with the beam **13** as an integral part of the truss frame **10**. In this case, the truss frame with the beam **13** may be removed by suitable crane or other handling mechanism and placed into position on the ramp structure designated at **79** whereupon it is then pulled by means of a winch mechanism **100** into the track member **80** whereupon it is guided into position and into the track **94** within the fuselage of the plane. In this connection, the transporting beam **13** also functions again in the tracks of the ramp **79** and in the permanent track **94** within the fuselage **88** to both provide for movement of the truss frame and at the same time to support it in an upright position for further transportation.

Thus it is believed that an improved and versatile system for transporting vehicles has been disclosed. It is contemplated that changes and variations may be made further which are within the scope of the present invention.

What is claimed is:

1. A cargo carrier for transporting cargo comprising:
a cargo carrier supported on wheel means,
said cargo carrier having longitudinally spaced vertical bracket members,
an upright frame of truss type construction including vertical and longitudinal interconnected relatively narrow members disposed between said bracket members,
said bracket members comprising vertically extending channel members having vertically extending openings facing one another and being open at their upright ends,
a longitudinally extending beam member carried between said channel members,
said beam including a plurality of spaced recesses detachably receiving the lower portions of said vertical members, and
means connected to said frame including vertical end members of the frame being inserted through said open ends of said channel members to slide said frame downwardly vertically to a position whereupon said frame is detachably retained on said channel members.

2. The invention according to claim 1, and
bracket means for suspending cargo on a side of said truss type frame,
said cargo including vehicles,
said frame being adapted to support and suspend said vehicles thereon by said bracket means.

3. A cargo carrier for transporting cargo comprising:
a cargo carrier supported on wheel means,
said cargo carrier having longitudinally spaced vertical bracket members,
an upright frame of truss type construction including generally vertical and longitudinal interconnected relatively narrow members to a narrow vertically elongated lattice beamwork disposed between said bracket members, said beamwork having finger like lower beam portions defined by extending the vertical members below the longitudinal members,
bracket means for suspending cargo on a side of said truss type frame,
a longitudinally extending beam member carried between said channel members,
said beam including a plurality of spaced recesses detachable receiving the lower portions of said vertical members, and
means provided on the body for fixedly attaching the longitudinal beam and the upright truss frame to the vehicle.

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