

April 27, 1965

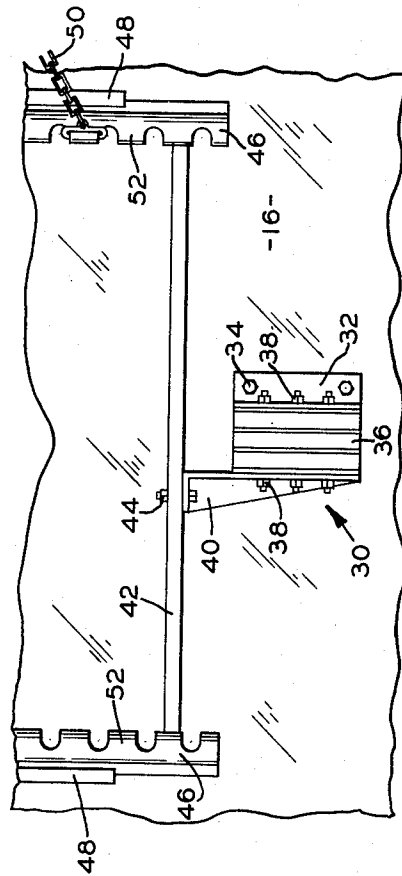
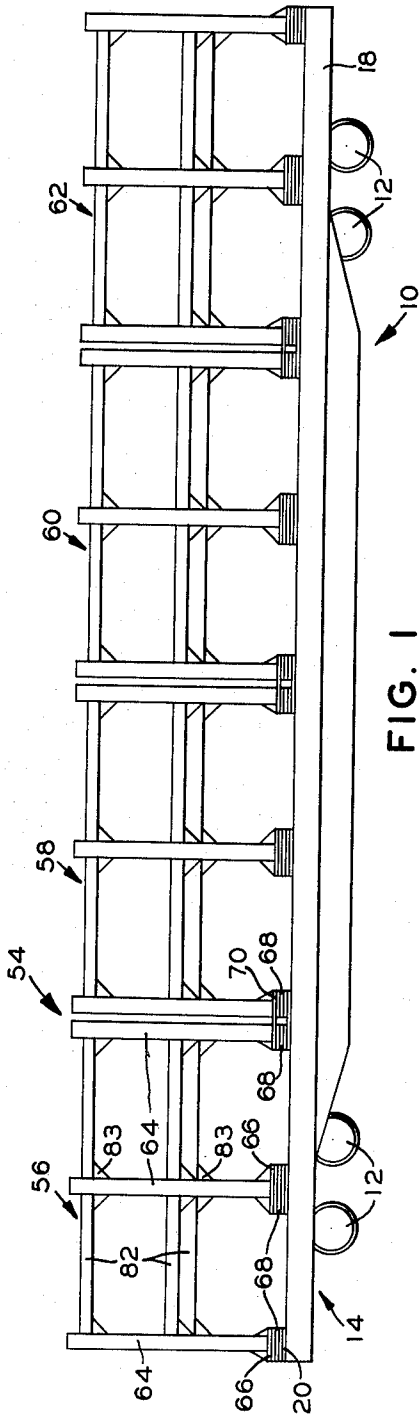
E. H. SHARP

3,180,283

MULTI-LEVEL TRANSPORT STRUCTURE

Filed Sept. 25, 1961

2 Sheets-Sheet 1



April 27, 1965

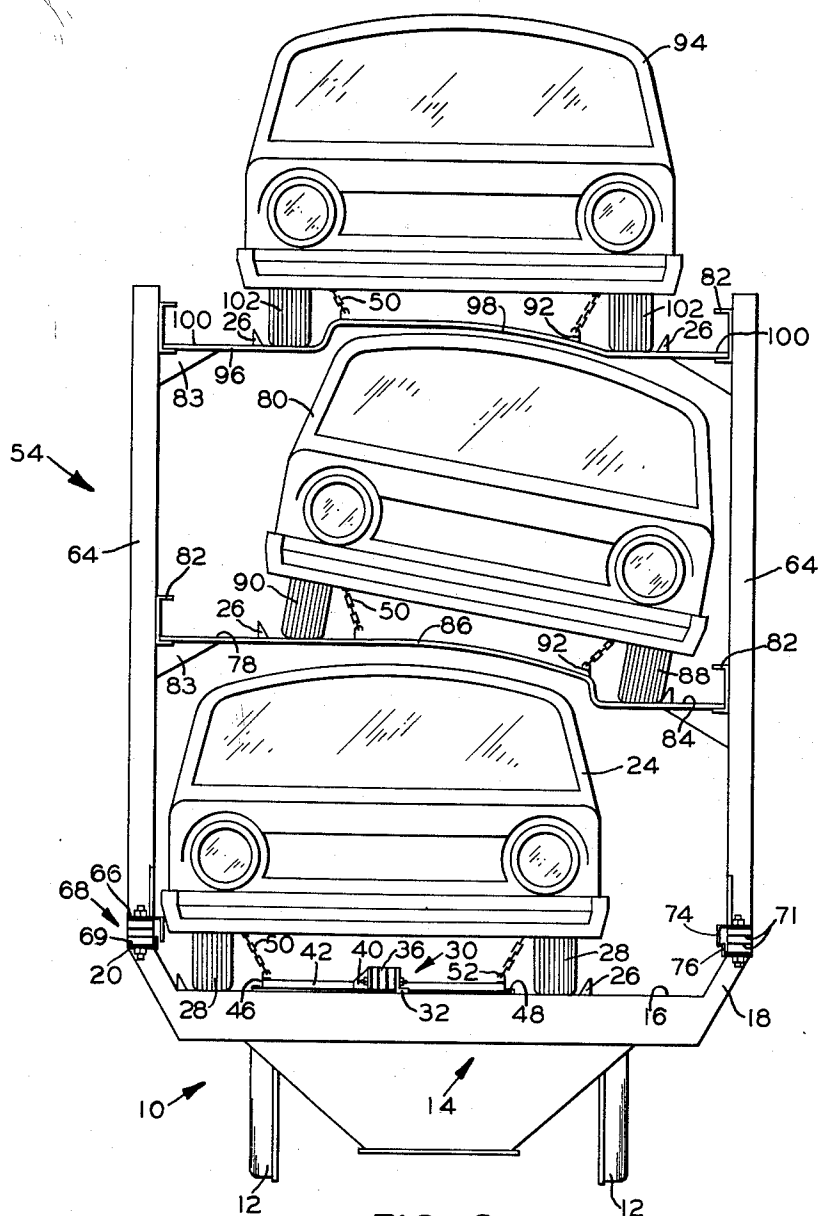
E. H. SHARP

3,180,283

MULTI-LEVEL TRANSPORT STRUCTURE

Filed Sept. 25, 1961

2 Sheets-Sheet 2



1

3,180,283

MULTI-LEVEL TRANSPORT STRUCTURE

Everett H. Sharp, Lambertville, Mich., assignor to Dana Corporation, Toledo, Ohio, a corporation of Virginia

Filed Sept. 25, 1961, Ser. No. 140,513

5 Claims. (Cl. 105-368)

This invention relates to transport structures in general, and is more specifically directed to a transport structure adapted to transport vehicles by railway cars.

Many prior art structures disclose devices for mounting a plurality of vehicles on a railway car for the convenient and safe transportation thereof. These devices have been limited in the means usable therein by reason of the railroad's limitation in the height and width requirements of the combination of the vehicle carrying superstructure and the railway car. However, to operate economically, the railway must position a large number of vehicles simultaneously on a railway car.

To this end numerous prior art devices have incorporated means for accommodating the plurality of vehicles. These prior art devices are highly complex and some of the various vehicle carrying decks of the superstructures incorporate means for longitudinally tilting the decks thereby longitudinally staggering the vehicles. These means are highly complicated, expensive, and tend to have a very limited operational life.

It is, therefore, an object of this invention to provide a vehicle carrying superstructure for a railway car which will accommodate a large number of vehicles.

It is another object of this invention to provide such a structure having a plurality of vertically spaced decks which need not be displaced subsequent to the loading of vehicles thereon while still carrying a plurality of vehicles in a staggered relationship.

It is yet another object of this invention to provide a vehicle carrying deck arrangement for a railway car whereby a minimum overall height will be provided without increasing the width of the railway car.

It is another object of this invention to provide a vehicle carrying superstructure having a plurality of vehicle carrying decks wherein the vehicles on the lower deck are maintained substantially horizontal and the vehicles in the second deck are canted or tilted laterally and straddle the upper portion of the vehicles in the lower deck thereby reducing the overall height requirements for said first and second decks.

It is yet a further object of this invention to provide a railway car superstructure adapted to carry vehicles which does not require adjustment of the decks subsequent to the vehicle being loaded thereon to displace the vehicles from a horizontal position.

It is a yet further object of this invention to provide such a structure which is simple and durable in construction and can be secured to a standard railway car with very little effort.

Other and further objects and advantages of this invention will become apparent upon reading the following detailed description when taken in conjunction with the accompanying drawings wherein:

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

FIG. 2 is an enlarged end elevational view of the railway car illustrated in FIG. 1 with vehicles shown disposed thereon.

FIG. 3 is an enlarged plan view of the tie down means used for the lower deck.

In the embodiment illustrated, a vehicle transporting device is provided consisting of a vehicle carrying superstructure suitably mounted on a railway car. The deck of the railway car is adapted to serve as the lower ve-

2

hicle carrying deck and support the first level of vehicles. A second deck is attached to the superstructure and disposed whereby the motor vehicles supported thereon are canted laterally and has means whereby the ground wheels of the second level of motor vehicles may straddle the uppermost portion of the first level of vehicles thereby reducing the overall height of the first and second levels. The third or top deck is adapted to carry the top level of motor vehicles in a substantially horizontal position and has means whereby the ground wheels of the top row of vehicles may straddle the uppermost portion of the canted vehicles in the second level. By laterally canting the second level of vehicles, and adapting the second and third decks whereby the vehicles contained thereon will straddle the uppermost portion of the vehicles in the next lower level, a great savings in vertical displacement of the superstructure and vehicles carried thereby is obtained without increasing the width requirements of the superstructure beyond the maximum allowable.

Referring now to the drawings and more particularly to FIGS. 1 and 2, a railway car shown generally at 10 is provided with the usual plurality of ground wheels 12 and a longitudinally extending main frame portion 14. The upper surface of the main frame 14 forms a horizontal lower deck 16, which extends longitudinally for substantially the whole length of the railway car 10. More particularly, the main frame 14 is provided with integral vertically inclined, longitudinally extending side members 18 terminated at their uppermost portion with attaching means in the form of a horizontal flange 20.

The lower deck 16 provides the means for supporting the first level of vehicles one of which is shown at 24, and has fixedly attached thereto a pair of laterally spaced longitudinally extending wheel abutment means 26 positioned to engage the outer lateral side of a plurality of ground wheels 28 of the vehicle 24 so that when the vehicle 24 is moved onto the deck 16 it is properly positioned. The lower level of vehicles 24 are disposed laterally toward one side of the deck 16.

To prevent impact loads from damaging the vehicles 24 loaded on the lower deck 16, the vehicles are resiliently attached to the deck. More specifically a resilient tie-down device shown generally at 30 in FIGS. 2 and 3, has a flange 32 fixedly attached to the lower deck 16 as by a plurality of bolts 34. A suitable resilient device 36, shown here as a resilient cushion having elastomeric elements disposed so as to act in shear in response to longitudinal shock loads, is fixedly attached as by bolts 38 to an upright portion of flange 32 and to an L-shaped mounting bracket 40. A laterally extending cross bar 42 is attached to the base of bracket 40 by a plurality of bolts, one of which is shown at 44, and has fixedly attached to the ends thereof longitudinally extending notched Z-shaped members 46. The members 46 are disposed in spaced parallel relationship and have a portion thereof slidably received in longitudinally extending inverted L-shaped members 48. The L-shaped members 48 are fixedly attached to the lower deck 16. It is readily apparent that the Z-shaped members 46 may slide longitudinally in the L-shaped members 48 and in so doing are resiliently connected to the deck 16 by means of the tie-down device 30.

A plurality of chains 50 are securely engaged at one end to a finger portion 52 formed by the spaced notches in member 46 and at the other end are secured to the vehicle 24 in a suitable manner. By means of the above described connection between the vehicles 24 and the lower deck 16, the vehicles 24 are supported in a resilient manner and protected against impact shock loads.

A vehicle carrying superstructure shown generally at 54 is preferably composed of a plurality of aligned, adjacent sections shown generally at 56, 58, 60 and 62,

which sections are resiliently attached to the main frame 14. Since the plurality of sections are substantially identical, only one section 56 will be hereinafter described. The section 56 consists of three pairs of longitudinally and laterally spaced channel shaped side posts 64 disposed in opposed relationship. The bottom portion of each side post 64 is fixedly attached to a substantially horizontal bracket member or attaching means 66. The bracket member is disposed in parallel relationship with the flange attaching means 20 on the main frame 14 and interconnected therewith by a suitable resilient means shown generally at 68. The juxtaposed side posts of adjacent sections preferably have a common bracket member 70 which bracket is supplied with a pair of resilient means 68; however, all of the side posts 64 may have individual brackets 66 and be individually attached to the frame 14.

The resilient means 68 preferably take the form of a resilient cushion which has a plurality of elastomeric elements 69 interconnected and faced by plates 71. The upper and lower portions of the resilient means 68 are suitably attached to the brackets 20 and 66 so as to be deformed in shear to dampen impact loads.

The attaching means 20 and 66 are further provided with means for limiting the lateral movement of the superstructure 54 relative to the main frame 14 so that the superstructure cannot move sufficiently laterally to engage the lower level of vehicle 24. More particularly the bracket 66 has a downwardly extending lip portion 74 and the flange 20 has an upwardly extending lip portion 76. The lip portions are arranged in cooperating relationship whereby they will engage each other after limited lateral movement between the superstructure 54 and the frame 14.

A second deck 78, which supports the second level of vehicles one of which is shown at 80, extends longitudinally for the length of each section of the superstructure 54. The second deck is fixedly attached at its lateral extremities to channel-shaped mounting brackets 82 which in turn are fixedly attached to the side posts 64. Triangular shaped brackets 83 securedly interconnect the brackets 82 and the posts 64 to provide additional support therebetween. As apparent in FIG. 2, the second deck 78 is provided with means whereby the vehicles 80 positioned thereon are canted from the horizontal position relative to the vehicles 24 supported by the lower deck 16. More particularly a lateral portion 84 of the deck 78 is deformed so that it extends below the remaining portion 86 and closer to the first deck 16. The remaining portions 86 is substantially horizontal and of sufficient width and height to accommodate the roof of the vehicle 24 positioned therebelow. With the second deck 78 disposed in this manner, the vehicle 80 supported thereon has the ground wheels 88 on the right side thereof supported by the portion 84 and disposed at a level below the roof of the vehicle 24, and the ground wheels 90 on the left side thereof supported by the remaining portion 86 so that the wheels 90 are above the roof of the vehicle 24, thus, the vehicles 80 are laterally canted and the ground wheels thereof straddle a portion of the roof of the vehicle 24. It is readily apparent that by so straddling the vehicle 24, the overall vertical displacement between the vehicles contained on the decks 78 and 16 is less than if the vehicles 80 in the second deck were in a substantially horizontal position with the ground wheels 88 on the same level as the ground wheels 90 and both the wheels 88 and 90 above the roof of the vehicle 24.

A pair of laterally spaced longitudinally extending wheel abutment means 26 are fixedly attached to the deck 78 and engage the outer lateral sides of the ground wheels 88 and 90 of the vehicle 80 to properly position the wheels when the vehicle is moved onto the deck 78 and to further prevent lateral displacement of the vehicle. A plurality of longitudinally and laterally spaced tie-down means 92 are carried by the deck 78 and selected ones have an end of one of the chains 50 securedly attached

thereto. The other ends of the chains 50 are securedly attached to the vehicle 80. Since the superstructure 54 is resiliently mounted on the railway car 10, the vehicles 80 are sufficiently protected from impact loads if they are merely securedly attached to the superstructure and move unitarily therewith. Therefore, neither the tie-down means 92 nor the chains 50 securing the vehicle 80 thereto need include load damping means.

If it is to desired, a third level of vehicles, one of which is shown at 94, may be positioned on the railway car 10. For this purpose a longitudinally extending third deck 96, having its lateral extremities disposed in a substantially horizontal plane, is secured at its lateral extremities to channel shaped mounting brackets 82. The brackets are in turn fixedly attached to the side posts 64. Triangular shaped brackets 83 securedly interconnect the brackets 82 and the posts 64 to provide additional support therebetween. As apparent in FIG. 2, an intermediate portion 98 of the deck 96 is displaced upwardly so that the upper portion of the lateral portions 100 of the deck 96 may be disposed below the roof of the vehicles 80 on the second level. In this manner the wheels 102 of the vehicles 94 may straddle a portion of the roof of the vehicle 80.

A pair of laterally spaced longitudinally extending wheel abutment means 26 are fixedly attached to the deck 96 and engage the outer lateral sides of ground wheels 102 of the vehicle 94 to properly laterally position the vehicles 94 when they are moved onto the deck 96. A plurality of longitudinally and laterally spaced tie-down means 92 are carried by the deck 96 and selected ones have an end of one of the chains 50 securedly attached thereto. The other ends of chains 50 are securedly attached to the vehicles 94. Therefore, the vehicles 94 are protected from impact loads in the same manner as previously described for the vehicles 80.

To load the transport structure, a loading means (not shown) having levels which are at the same vertical height as the decks 16, 78, and 96 is used. The vehicles are moved (as by driving) from the load means onto the decks and down the length of the superstructure 54. If necessary, suitable bridge means (not shown) may be positioned between the adjoining sections 56, 58, 60 and 62 of the superstructure 54 so that the vehicles may be driven the length thereof.

From the foregoing it is apparent that a vehicle carrying superstructure for a railway car has been described that will accommodate a large number of vehicles with minimum height and width requirements, that carries a plurality of vehicles in a staggered relationship yet need not have the decks thereof displaced subsequent to the loading of vehicles thereon, wherein the overall stacked height of the vehicles is at a minimum, wherein the reduced stacked height is accomplished by straddling the upper portion of the vehicles in each level with the wheels of the vehicles in the next above level, and wherein some of the levels of vehicles are canted laterally to reduce the stacked height.

The preferred embodiment of this invention has been shown and described, but changes and modifications can be made, and it is understood that this description is illustrative only and not for the purpose of rendering this invention limited to the details illustrated or described except insofar as they have been limited by the terms of the following claims.

What is claimed is:

1. A multi-level transport structure adapted to carry a plurality of vehicles thereon arranged in a first and a second level comprising in combination,

(a) a longitudinally elongated and laterally extending cargo carrier having a longitudinally extending central axis,

(b) a horizontally disposed lower support means carried by said carrier and including a pair of longitudinally extending and laterally spaced first vehicle wheel engaging track means,

5

6

- (1) said pair of track means being disposed on opposite sides of said central axis and having a longitudinally extending first track axis disposed laterally intermediate the same with said first track axis being displaced laterally to one side of the central axis of said carrier, 5
- (2) said first track means being adapted to have the wheels of the first level of vehicles disposed thereon and to support the first level of vehicles in a position which is displaced toward one side of said central axis, 10
- (c) a pair of laterally spaced and longitudinally elongated superstructure means with one being disposed on each lateral side of said carrier and supportingly carried thereby and extending vertically above said lower support means, 15
- (d) a second support means spaced vertically above said lower support means and including means securing the same to said superstructure means and a pair of longitudinally extending and laterally spaced second vehicle wheel engaging track means, 20
- (1) said pair of second track means having a longitudinally extending second track axis disposed laterally intermediate the same with said second track axis being displaced laterally to the other side of said central axis opposite to said one side thereof and with one of said second track means being disposed on said one side and the other of said second track means being disposed on said other side, 25
- (2) said pair of second track means being adapted to have the wheels of a second level of vehicles disposed thereon and to support the same in a position which is displaced toward said other side of said central axis, 30
- (e) said one of said second track means being positioned at a vertical level above said lower support means whereby the same is disposed at a level which will be above the top of the first level of vehicles disposed on said first support means, 40
- (f) said other of said second track means being positioned at a vertical level which is substantially below the vertical level of said one of said second track means and is laterally spaced therefrom sufficiently to said other side of said central axis so that it is disposed at a level and a lateral position whereby the same will be positioned vertically below the top of the first level of vehicles and laterally outside of the first level of vehicles, 45
- (g) whereby when a second level of vehicles is disposed on said second support means the vehicles will be displaced toward and canted laterally toward said other side of said central axis and the vehicle wheels on said one of said second track means will be disposed vertically above the first level of vehicles and the vehicle wheels on said other of said second track means will be displaced laterally to the other side of and vertically below the top of the vehicles of the first level of vehicles. 50
2. A transport structure as described in claim 1 wherein 60
- (a) said second support means is a second deck means which extends laterally between said pair of superstructure means and includes means securing the same to said superstructure means, 65
- (b) said pair of second track means are formed as laterally spaced portions of said second deck means, and
- (c) a portion of said second deck means intermediate said second track means is formed concavely with respect to said first support means and when the first level of vehicles is positioned on said first support means, said intermediate portion being adapted to be in closely fitted relationship with the top of the vehicles of the first level. 70

3. A transport structure as described in claim 1 wherein
- (a) said superstructure means extends vertically above said second support means,
- (b) a third support means is spaced vertically above said second support means and includes means securing the same to said superstructure means and a pair of longitudinally extending and laterally spaced third vehicle wheel engaging track means,
- (c) said third pair of track means having a longitudinally extending third track axis disposed laterally intermediate the same with said third track axis being substantially vertically aligned with said central axis and said third pair of tracks being disposed on opposite sides of said central axis,
- (d) said first support means is disposed in a substantially horizontal position,
- (e) said pair of third track means being disposed substantially horizontally and with each being at a substantially equal vertical distance from said first support means, which vertical distance is such that when the second level of vehicles is disposed on said second support means each of said third track means is disposed vertically below the upper portion of the vehicles of the second level, and the lateral spacing between said third track means being such that the same are disposed on opposite lateral sides of the top of the canted vehicles of the second level.
4. A transport structure as described in claim 3 wherein
- (a) said third support means is a third deck means which extends laterally between said pair of superstructure means and includes means securing the same to said superstructure means,
- (b) said pair of third track means are formed as laterally spaced portions of said third deck means, and
- (c) a portion of said third deck means intermediate said third track means is formed concavely with respect to said second track means and when the second level of vehicles is cantingly positioned on said second support means, said intermediate portion of said third deck means is adapted to be in closely fitting relationship with the upper portion of the canted vehicles of the second level.
5. A transport structure as described in claim 4 wherein
- (a) said second support means is a second deck means which extends laterally between said pair of superstructure means and includes means securing the same to said superstructure means,
- (b) said pair of second track means are formed as laterally spaced portions of said second deck means, and
- (c) a portion of said second deck means intermediate said second track means is formed concavely with respect to said first support means and when the first level of vehicles is positioned on said first support means, said intermediate portion of said second deck means is adapted to be in closely fitting relationship with the top of the vehicles of the first level.

References Cited by the Examiner

UNITED STATES PATENTS

1,276,556	8/18	Michod	105—368
1,894,534	1/33	Dolan	105—368
2,385,115	9/45	Stuart	105—368
2,636,772	4/53	Bridge	105—368
2,690,141	9/54	King	105—368
2,963,991	12/60	Schueder	105—368

OTHER REFERENCES

Article entitled "What's New in Rolling Stock," in Railway Age, February 15, 1960, page 23 relied upon.