United States Patent [19]

Thornton et al.

[11] **3,875,871**

[45] **Apr. 8, 1975**

[54] **MULTI-LEVEL TRANSPORTATION VEHICLE**

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[73] Assignee: **ACF Industries, Incorporated**, New York, N.Y.

[22] Filed: **Mar. 29, 1973**

[21] Appl. No.: **346,061**

[52] **U.S. Cl.**....., **105/375**; 105/367 R; 105/422

[51] **Int. Cl.**..... **B61d 3/04**

[58] **Field of Search**..... 105/375, 367 R, 422; 114/72; 52/126

[56] **References Cited**

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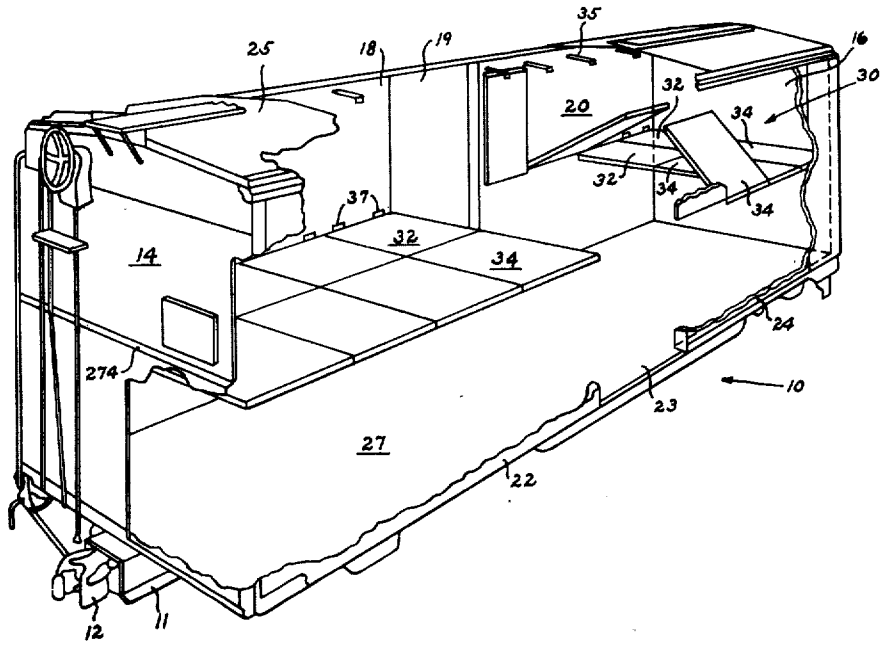
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Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Richard A. Bertsch
Attorney, Agent, or Firm—Henry W. Cummings

[57] **ABSTRACT**

A freight carrier such as a railroad car is provided having sections which fold either upwardly or downwardly and inwardly from a stored position to an operational position which provides a supplementary level. Means are provided on the sections for supporting a subsequent section to be installed to aid a single operator in installing the supplementary floor. In the installed position, the sections have joining means which self-support the load and transmit lading shearing and bending moments between the sections so that additional supports from the floor are not required. In one embodiment the lowering into position of one section acts to disengage a subsequent section from a stored position so that it is ready for movement into the installed position. Several embodiments are disclosed directed to safety means to avoid the sections or platens releasing and harming the operator or others in the car.

50 Claims, 43 Drawing Figures



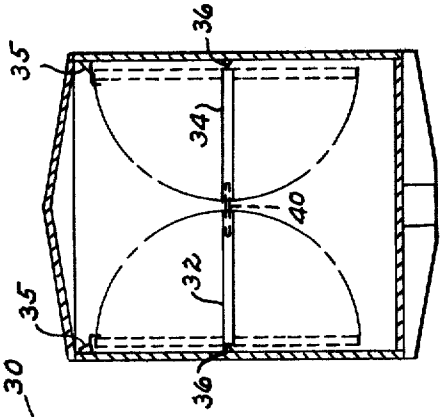


FIG. 2.

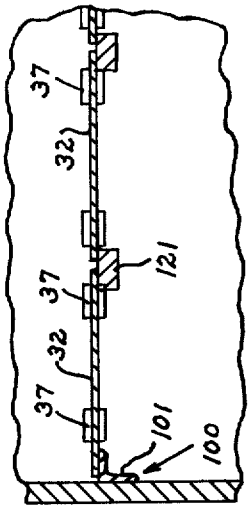


FIG. 10.

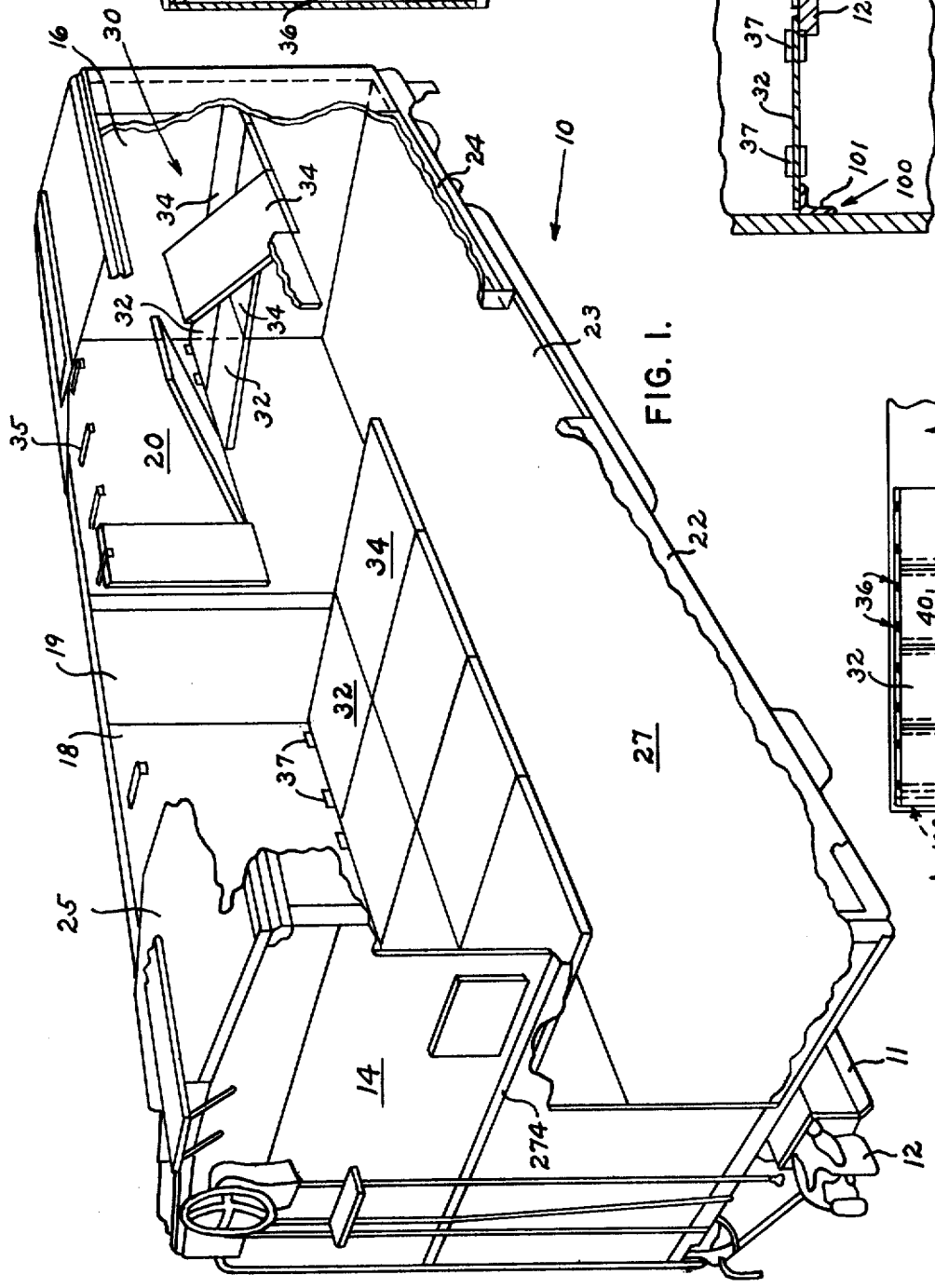


FIG. 1.

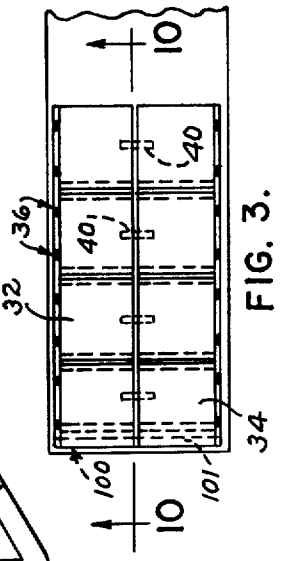
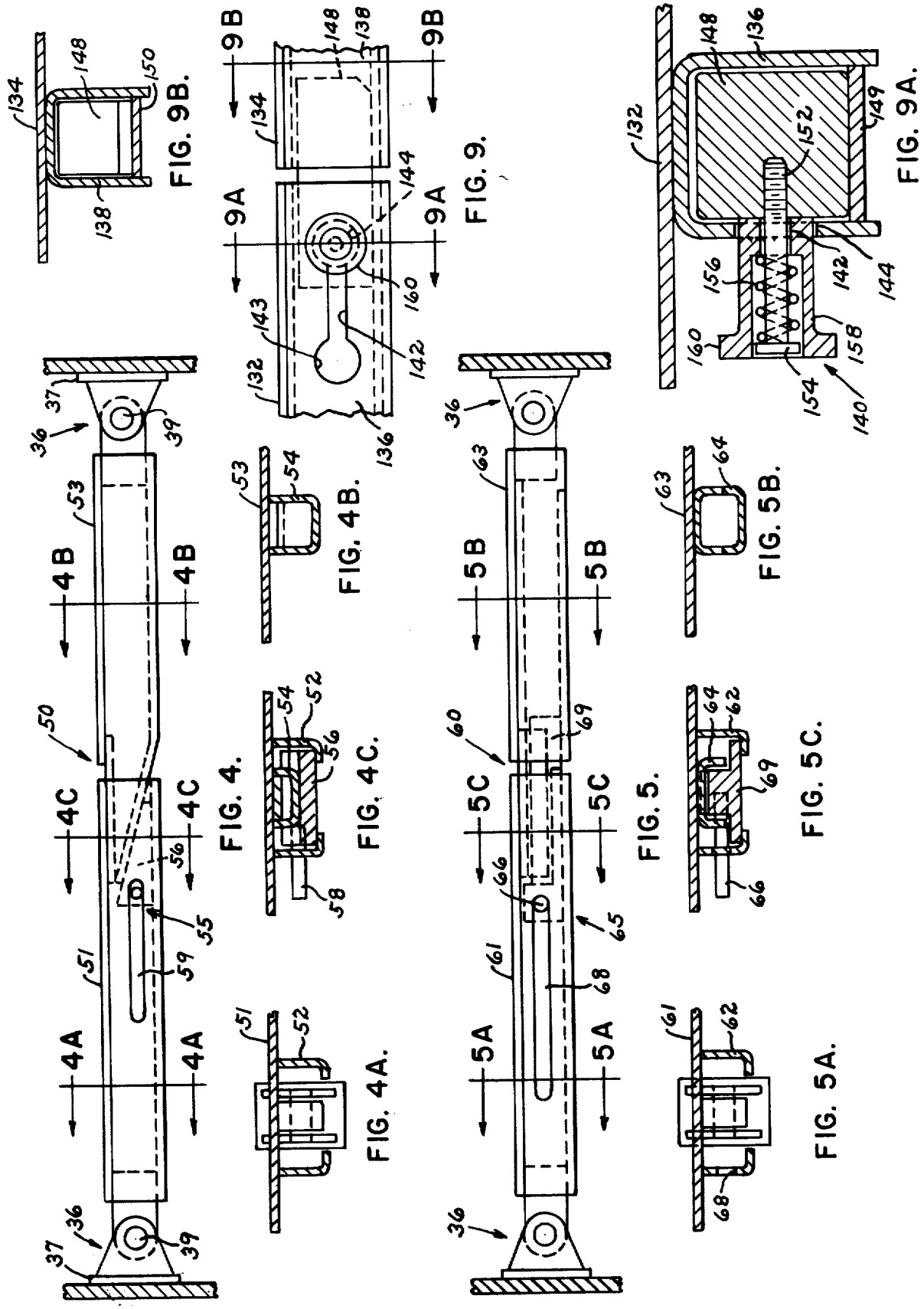


FIG. 3.


FIG. 9B.
FIG. 9.
FIG. 9A.
FIG. 4.
FIG. 4B.
FIG. 4C.
FIG. 4A.
FIG. 5.
FIG. 5B.
FIG. 5C.
FIG. 5A.

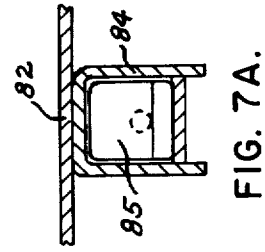


FIG. 7A.

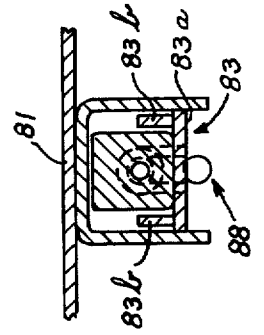


FIG. 7B.

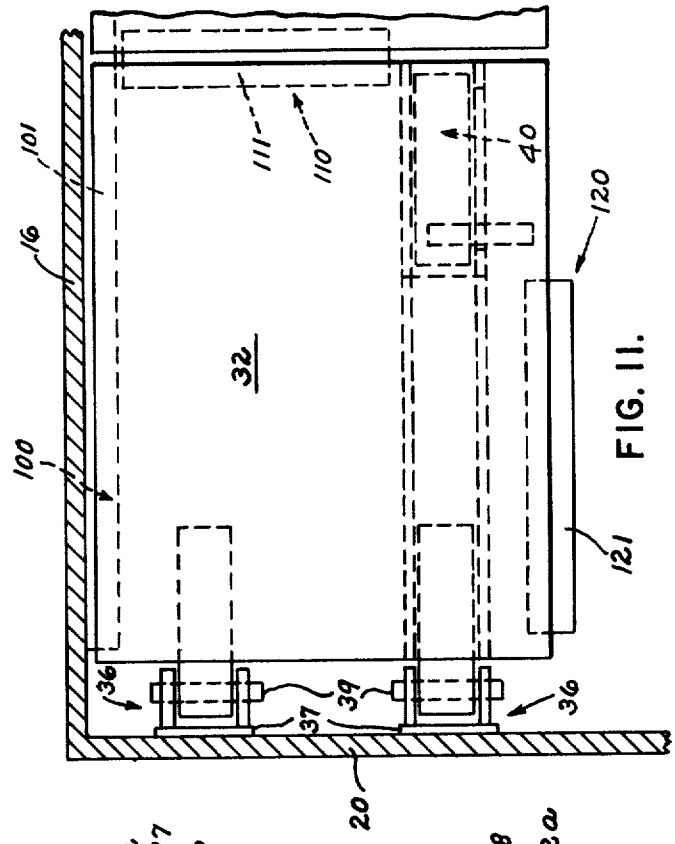


FIG. 11.

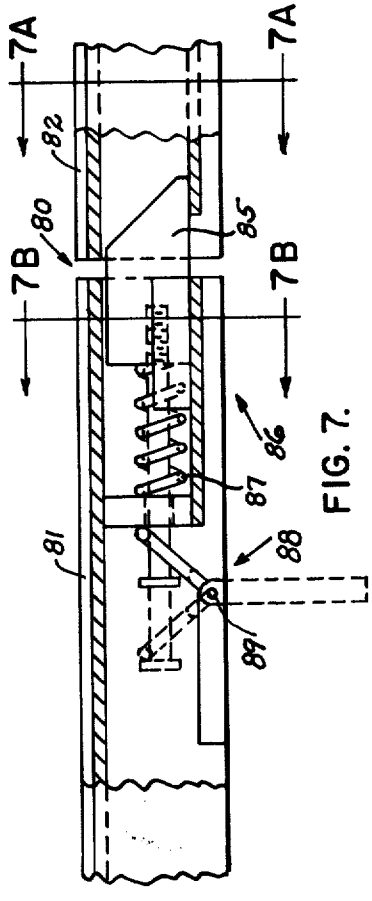


FIG. 7.

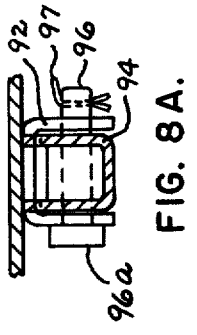


FIG. 8A.

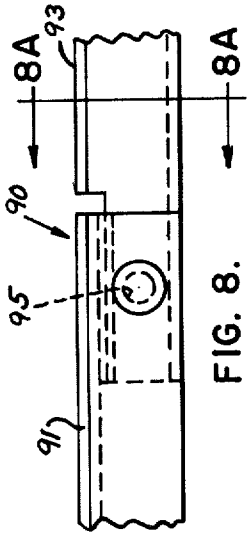


FIG. 8.

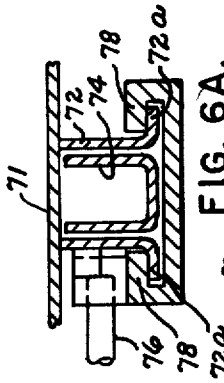


FIG. 6A.

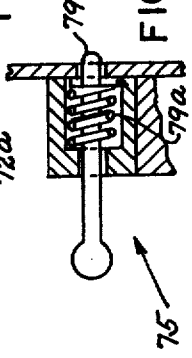


FIG. 6B.

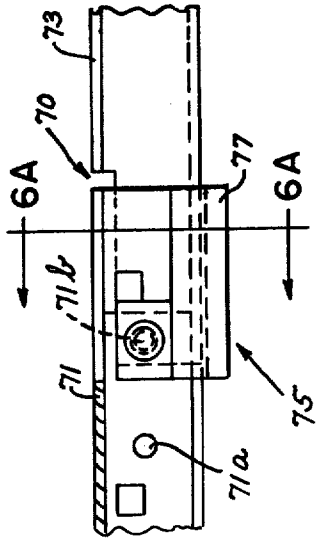


FIG. 6.

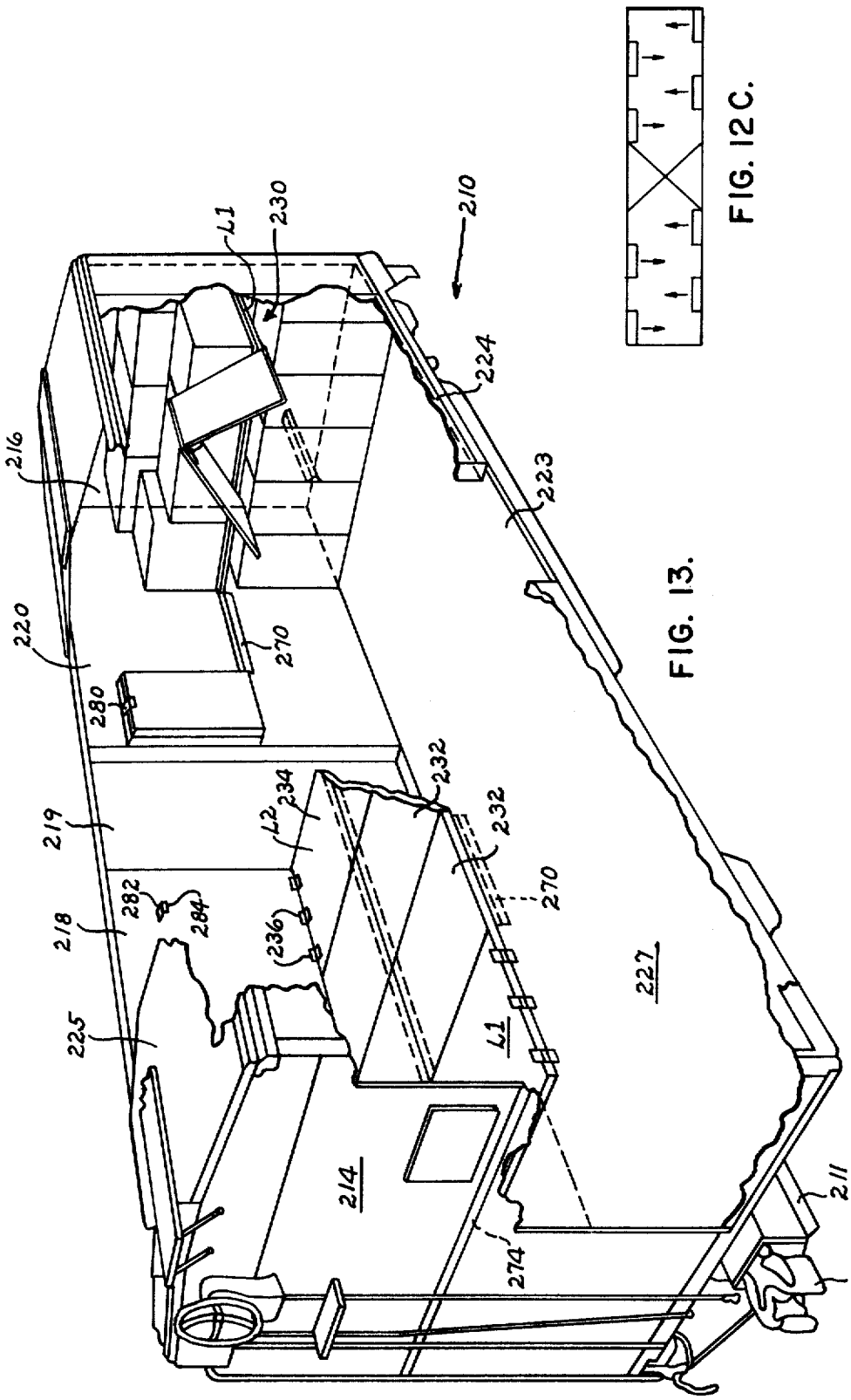


FIG. 13.

FIG. 12C.

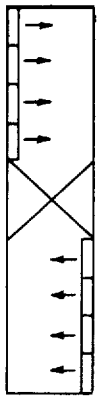


FIG. 12B.

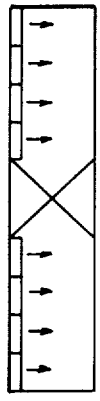


FIG. 12A.

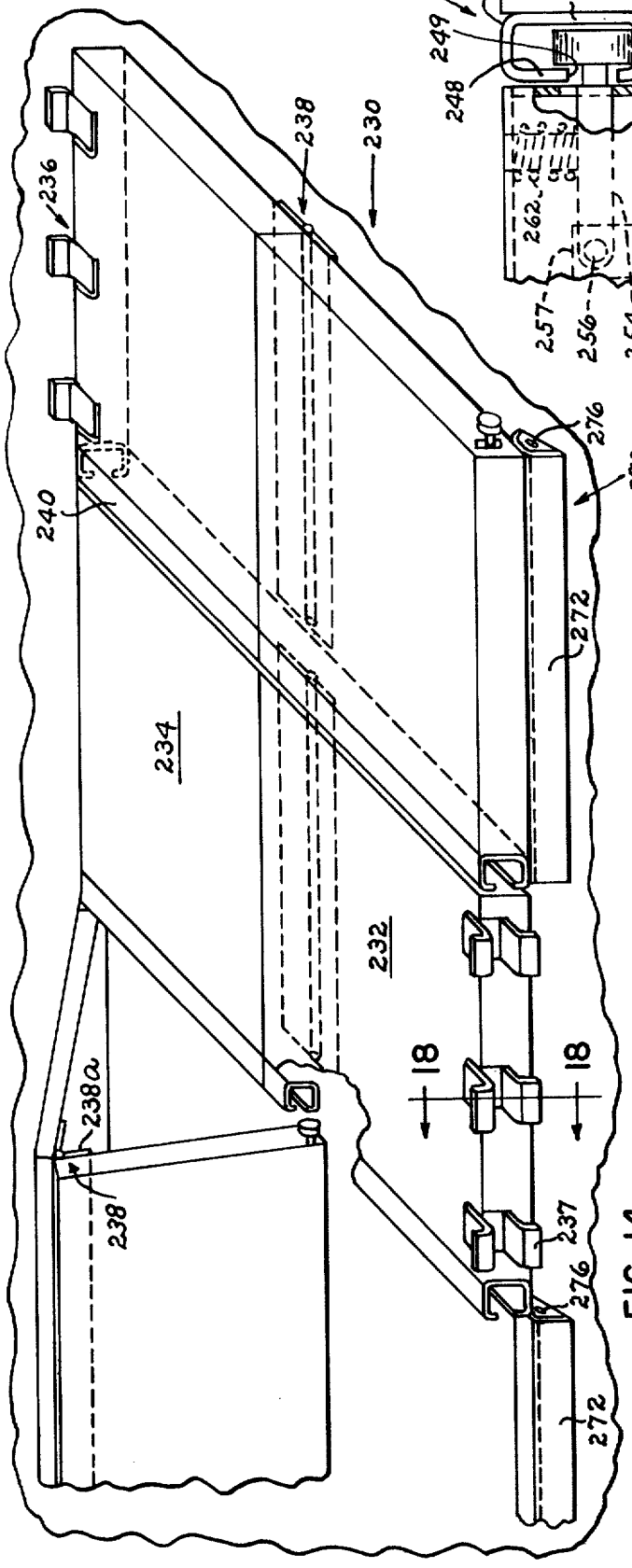


FIG. 14.

FIG. 16.

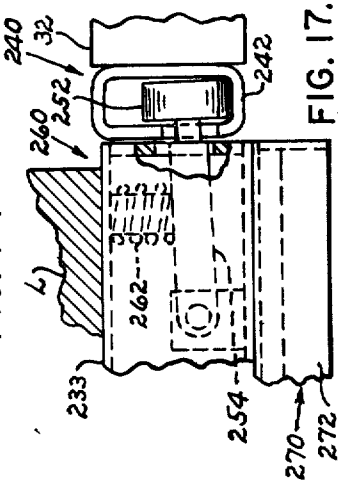


FIG. 17.

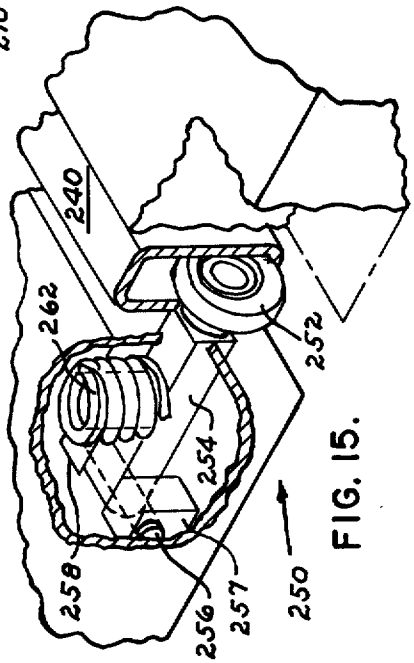


FIG. 15.

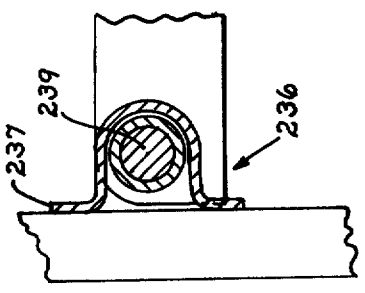


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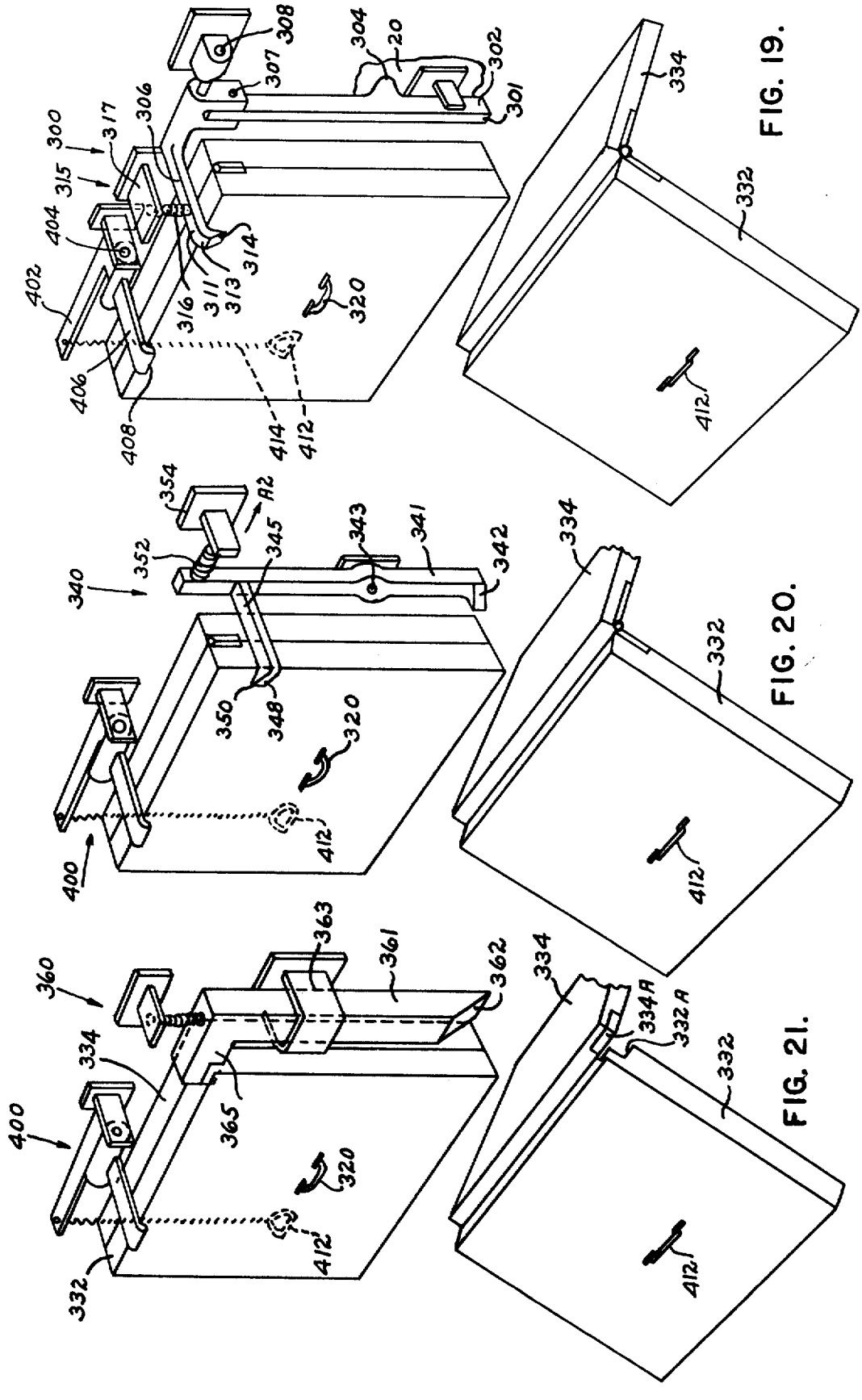


FIG. 19.

FIG. 20.

FIG. 21.

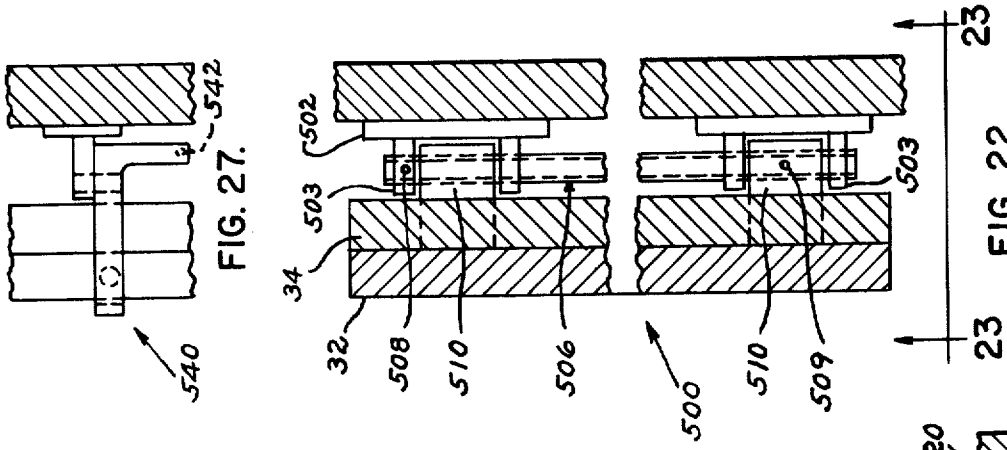


FIG. 27.

FIG. 22.

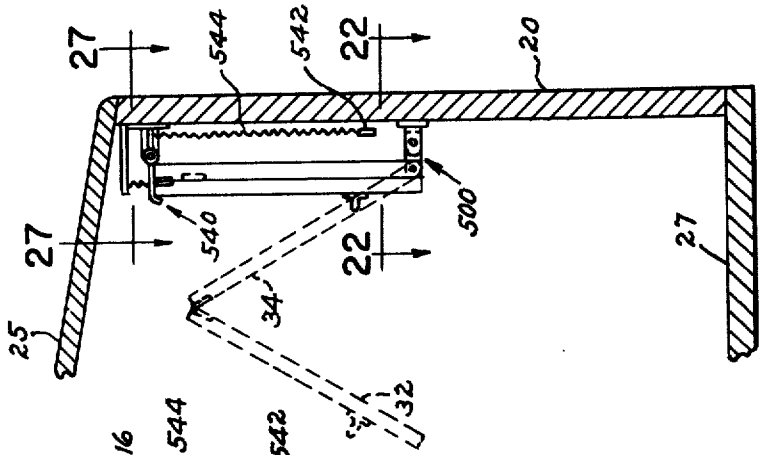


FIG. 26.

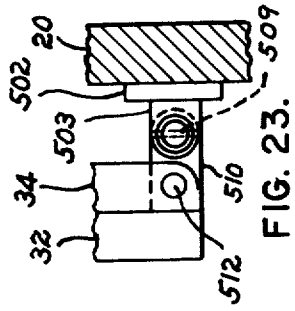


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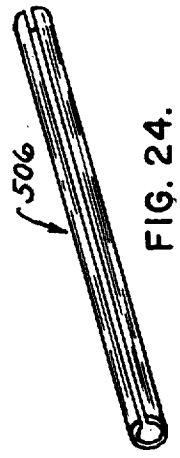


FIG. 24.

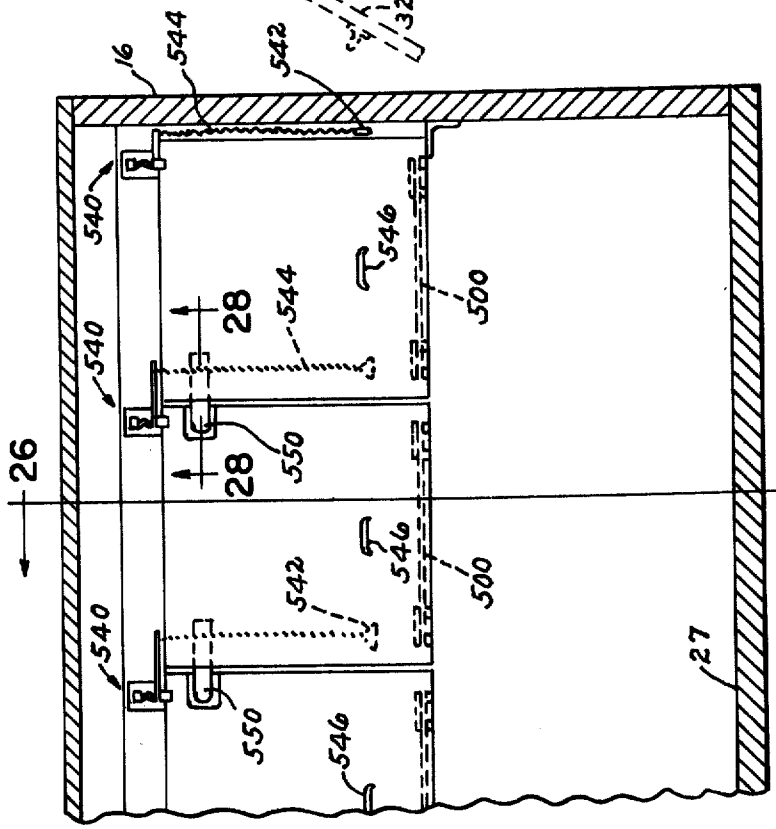


FIG. 25.

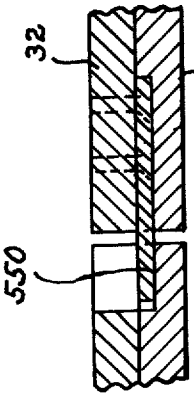


FIG. 28.

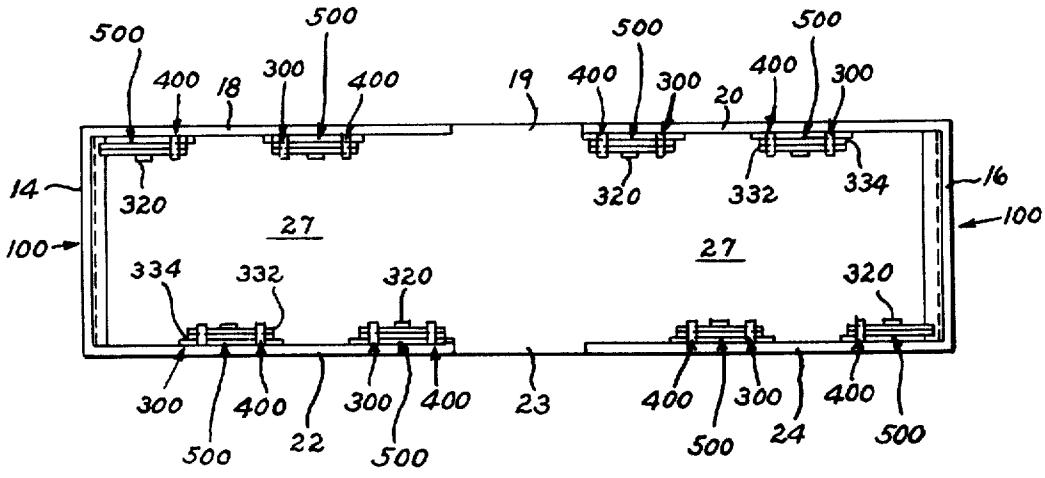

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FIG. 29.

MULTI-LEVEL TRANSPORTATION VEHICLE

BACKGROUND OF THE INVENTION

There is current interest in multi-level loading of box cars. Rubber manufacturers, for example, are interested in such a car because certain types of baled synthetic rubber are extremely sensitive to cold flow (time dependent deformation under load). Unit loads of synthetic rubber of this type cannot be stacked unless they are either contained in a rigid package, or supported independently, for example, by a system of racks.

Other ladings which are particularly adaptable to multi-level loading include, for example, furniture and light bulb containers, which have limited stacking capability. With two or more levels of loading, a box car can be loaded to its full capacity easily.

It has already been proposed in the art to provide a box car with optional levels in which deck members fitting across the car may alternately be stored, for example, in the floor portion and then when the optional level is to be utilized, the deck members put into place. See, for example, Stiles U.S. Pat. No. 382,843 (1888). One disadvantage of this type of optional level is that it is difficult for one man to handle such heavy individual pieces. From the point of view of cost and convenience, it would be better to have a system utilizing deck sections which could be handled by one man.

One solution to this problem is to provide foldable deck sections. See, for example, Sweeley, et al., U.S. Pat. No. 2,077,650 (1937). Deck sections are privoted along both walls and fold down to make the supplementary level. Support members are folded upwardly from the floor at the jointure of the deck sections. This construction suffers from the disadvantage that the lading must be loaded around the support members. Furthermore, the support members may be damaged by the lading and vice versa.

Other proposals for foldable sections have usually required extra support for the foldable sections at their joining point. See, for example, Howd U.S. Pat. No. 1,230,484 wherein T-beam supports are utilized.

Therefore it is an object of the present invention to provide a box car which has one or more optional floors or levels.

It is another object of the present invention to provide a box car in which ladings have limited stacking capability may be easily loaded and at the same time nearly all available space in the car utilized.

It is another object of the present invention to provide a box car wherein ladings, which have limited resistance, to stress or deformation under load, can be easily and quickly loaded without imposing excessive stresses, and without the use of complicated or expensive containers or crates.

It is another object of the present invention to provide a box car wherein all available space in the car may be easily and quickly utilized.

It is another object of the present invention to provide a box car having supplementary flooring which can be installed and put into storage position by a single operator.

It is another object of the present invention to provide supplementary flooring which is simple and inexpensive to manufacture.

It is another object of the present invention to provide supplementary flooring which does not have vertical support members which interfere with the loading and unloading of the lading, and which may damage the lading during transit, or which may be damaged by the lading during transit

SUMMARY OF THE INVENTION

The foregoing objects are achieved by providing a freight carrier such as a railroad car having sections which fold either upwardly or downwardly and inwardly from a stored position to an operational position which provides a supplementary level. Means are provided on the sections for supporting a subsequent section to be installed to aid a single operator in installing the supplementary floor. In the installed position, the sections having joining means which self-support the load so that additional supports from the floor are not required. In one embodiment the lowering into position of one section acts to disengage a subsequent section from a stored position so that it is ready for movement into the installed position. Several embodiments are disclosed directed to safety means to avoid the platens releasing and harming the operator or others in the car.

THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of a multi-level box car according to the present invention;

FIG. 2 is a schematic sectional view of a multi-level box car according to the present invention;

FIG. 3 is a plan view of one embodiment of a supplementary box car level;

FIG. 4 is an elevational view of one locking arrangement for locking the platens in place in accordance with the present invention;

FIGS. 4A, 4B and 4C are views respectively along the lines 4A, 4B, and 4C in FIG. 4;

FIG. 5 is an elevation of another platen locking arrangement according to the present invention;

FIGS. 5A; 5B and 5C are sectional views respectively along the lines 5A, 5B and 5C of FIG. 5;

FIG. 6 is an elevational view of another platen locking arrangement according to the present invention;

FIG. 6A is a sectional view along line 6A of FIG. 6;

FIG. 7 is a view of an automatic platen locking arrangement according to the present invention;

FIGS. 7A and 7B are views respectively along the lines 7A and 7B of FIG. 7;

FIG. 8 is a view of a pin locking arrangement according to the present invention;

FIG. 8A is a view along the lines 8A-8A of FIG. 8;

FIG. 9 is an elevation of another platen locking arrangement according to the present invention;

FIGS. 9A and 9B are sectional views respectively along the lines 9A and 9B of FIG. 9;

FIG. 10 is an elevational view along the lines 10-10 of FIG. 3;

FIG. 11 is an enlarged plan view illustrating supporting means for the platens in operative position according to the present invention;

FIGS. 12A, 12B and 12C are plan views illustrating various storing arrangements for the platens in stored position;

FIG. 13 is a perspective view of another embodiment of a multi-level box car according to the present invention;

FIG. 14 is a detailed perspective view of a supplementary level of the embodiment shown in FIG. 13;

FIG. 15 is a perspective detailed view of an exemplary engagement assembly according to the present invention;

FIG. 16 is an elevational view illustrating the engagement assembly and the guide means according to the present invention;

FIG. 17 is an elevational view illustrating the transfer of lading weight to the platen support means by the engagement assembly according to the present invention;

FIG. 18 is a view along the lines 18—18 of FIG. 14;

FIG. 19 is a perspective view showing a structure for holding the platens in stored position according to the present invention;

FIG. 20 is a perspective view showing another structure for holding the platens in stored position according to the present invention;

FIG. 21 is a perspective view showing another structure for holding the platens in stored position according to the present invention;

FIG. 22 is a sectional view along line 22—22 of FIG. 26;

FIG. 23 is a sectional view along line 23—23 of FIG. 22;

FIG. 24 is a perspective view of a torsion rod;

FIG. 25 is a view showing another structure for storing platens according to the present invention;

FIG. 26 is a sectional view along line 26—26 of FIG. 25;

FIG. 27 is a sectional view along line 27—27 of FIG. 26;

FIG. 28 is a sectional view along line 28—28 of FIG. 25;

FIG. 29 is a sectional view illustrating a structure for operating an arrangement of platens from a stored position to a position to receive lading.

DETAILED DESCRIPTION

Referring to the drawings, a freight car indicated generally at 10 is illustrated having a conventional center sill 11 which houses conventional coupling apparatus indicated generally at 12.

As shown in FIG. 1, the car further comprises end walls 14 and 16 and side walls 18, 20; and 22, 24 which are separated by conventional doors 19 and 23, respectively, on either side of the car. A conventional roof 25 and a conventional floor 27 are also provided.

According to the present invention, means for providing a supplementary floor indicated generally at 30 are provided. The means comprise a plurality of platens 32, 34 which are mounted in storing position on the car wall and which are folded into engagement as shown in FIG. 1. As shown schematically in FIG. 2, the platens may be mounted so as to fold upwardly or downwardly, as desired, into operational position for providing a supplementary floor, from a storing position in which platen latch means 35 maintains the platens in storing position until it is desired to unfold them to form the supplementary floor. The platens 32, 34 may be made of suitable construction material such as metal, wood, or synthetic constructional material. The platens are pivotally mounted by suitable platen hinge means 36 to the side of the car. Hinge means 36 may comprise, for example, a plurality of bracket-type members 37 mounted upon the car side wall and affixed to the platen, as shown in FIG. 4. A pin 39 may then be inserted within bracket members 37 to provide pivotal movement.

A feature of the present invention is the provision of locking means 40 between the platens which is self-supporting and will transmit lading shear and bending moment between the platens, and thus become essentially integral beams in the extended position so that additional supports from the floor or additional channel members, I-beams or T-beams are not required. For example, as shown in FIGS. 4 through 4*c*, a locking means 50 may be provided in which a panel 51 may be provided with a first channel 52 which has a larger cross-sectional opening than an adjacent channel 54 in panel 53. Thus, after the first panel 51 is rotated from a stored position about hinge means 36, the panel 53 is then rotated upwardly into position and its channel 54 passes through the opening in channel 52. Then a locking assembly 55 which may include a wedge 56 and appropriate actuating means such as moving a lever 58 to the right in FIG. 4 following cam opening 59 in panel 51 is utilized to maintain panels 51 and 53 in engagement while the supplementary floor is utilized. After movement of lever 58 to the left in FIG. 4, panels 53 and 51 may be returned to their stored positions.

According to another embodiment, locking means 60 for panels 61 and 63 is shown in FIGS. 5-5*c*. Each of the panels have openings therein respectively 62 and 64 and rotate from a stored position about hinge means 36. Panel 64 would be rotated upwardly from a stored position below hinge means 36. Then appropriate actuating means 65 such as a lever 66 is moved to the right in FIG. 5 along cam opening 68 to move a locking block 69 into place to hold platens 61 and 63 in engagement. Lever 66 is moved to the left to move block 69 out of engagement and free panel 63.

In another embodiment of the panel latching means panel in FIGS. 6 and 6*a*, a latching means 70 is shown for members 71 and 73. In this embodiment the panel member 71 has a channel portion 72 of large opening cross section. Panel member 73, which folds down from above hinge means 36, has a channel member of smaller cross section 74. After channel member 74 is in place within channel member 72, lock actuating means 75 is actuated, for example, by a lever 76 to move a member 77 having flanges thereon 77 which engage corresponding flanges 72*a* on channel member 72. Movement of lock actuating means 75 in the opposite direction will, of course, relieve panel members 71 and 73 for replacement in the stored position on the side of the car.

The locking member 75 may be provided with a lock pin 79 shown in FIG. 6B, spring loaded with a spring 79A which in the unlocked position engages an opening 71A in channel 71 as shown in FIG. 6.

In still another embodiment, an automatic locking means 80 is illustrated in FIGS. 7, 7*a* and 7*b*. A first panel member 81 which may either be mounted above or below hinge means 36 is first moved into position. A second panel member 82 is brought down from the hinge position above hinge means 36. The channel section 84 of panel member 82 is made larger than the cross section of a lock member 85 as shown in FIG. 7*a*. The locking means 86 includes the locking member 85 together with a resilient means such as a coil spring 87 and a lock disengagement means 88. Spring 87 is biased to urge locking member into the extended position shown in FIG. 7. However, lever 88 which is pivoted about a point 89 may be actuated to remove locking member 85 from panel 82 along appropriate guide

means **83** including, for example, a bottom portion **83***a* and flanges **83***b*.

The embodiment shown in FIG. **7** could also be utilized if panel member **82** is mounted below the hinge means **36** if locking member **85** is placed in the stored position when panel member **82** is brought up from below hinge means **36** and then locking means **88** actuated to move locking member **85** into channel portion **84** of panel member **82.**

In general, when panel member **81** is placed in the stored position along the side of the car, locking means **86** will be in the stored position in which locking member **85** does not extend significantly beyond the end of panel member **81.**

FIGS. **8** and **8A** illustrate a pin locking means indicated generally at **90.** Panel member **91** has a channel portion **92** of cross section greater than the channel portion **94** of panel member **93.** Both channel members **92** and **94** have openings **95** therein for insertion of a pin **96,** preferably having an appropriate flange **96***a* and retainer **97** to hold pin **96** in place. To release the lock, retainer **97** is merely removed and pin **96** manually removed by grasping flange **96***a*.

Pin **96** must be made of high strength material for many applications so that no support members will be required when the lading is loaded onto the supplementary deck. In general, high strength steel is the preferred material for pin **96.**

In general, the use of wedge or block locking means, such as shown in FIGS. **4–7,** is preferred over the pin type locking means such as shown in FIGS. **8** and **8***a* for applications involving high lading stress on the supplementary level. Wedge and block type locking means in general provide greater bearing areas for transfer of load. Furthermore, pin type locking means usually require holes in the deck members which can weaken the members. Also, pin type locking means exert considerable pressure on the walls of panel members which can nucleate cracks in the holes in the panel members under the influence of vehicle vibrations.

For illustrated purposes only, the panel members on the left have been illustrated as having larger cross section and panel members on the right the smaller. Obviously, this could be reversed. Similarly, the locking member has been illustrated as being mounted on the left panel. Obviously, it could also be on the right. Furthermore, the locking member need not always be located on the same side as the panel member having the larger cross section. Such modifications are clearly within the skill of the art.

In another embodiment of the panel latching means shown in FIGS. **9, 9***a*, **9***b* and **9***c*, the latching means **130** is shown for members **132** and **134.** In this embodiment the panel members **132** and **134** have channel opening cross sections **136** and **138** of approximately the same size. The panels can be folded down from above hinge means **36** and locking means **140** can be actuated. Channel **136** has a slot **142** as shown in FIG. **9** terminating in bored holes **143** and **144.** Locking means **140** is used to move a lock member **148** into locking position along a bottom portion **149** of channel **136** into end section of channel **138** along bottom portion **150.**

Locking means **140** comprises a threaded pin **152** which in assembly is threaded into lock member **148.** The other end of pin **152** has a head or shoulder **154** which restrains spring **156.** Pin **152** and spring **156** have an outer housing **158** as shown in FIG. **9***c*. The operator, by grasping the enlarged knurled end **160** of sleeve **158** and pulling will overcome the resistance of spring **156** and pull sleeve **158** out of circular opening **144.** Locking member **148** can now be moved to the left with pin **152** guided by slot **142** thus unlocking panels **132** and **134** for replacement in the stored position on the side of the transporting vehicle.

Sleeve **158** will seat in bored hole **143** thus retaining lock member **148** in a stored position. The process can be reversed by actuating end **160** and moving lock member to the right.

It will be apparent from the foregoing that a wide variety of locking means may be utilized according to the present invention.

Means **100** preferably are provided at either end of car for supporting the first panel unfolded. For example, as shown in FIGS. **3, 10** and **11,** a bracket or support ledge **101** is mounted on the rear wall by suitable fasteners or welding. It will be apparent that the end of car panel support means need only be provided for the first panel to be put in operative position, for example **32** in FIG. **3**; although if desired support can be provided for the first of both panel members **32** and **34.**

Means **110** are also provided on one of the platens, for example on platens **32,** for supporting platen **34** when it is unfolded. For example, overlap blocks **111** may be mounted on platen **32** for this purpose. Moreover, means **120** are provided for supporting a subsequent platen **32** to be unfolded on the first platen **32** after it is folded into position. For example, overlap blocks **121** may be provided for this purpose. Furthermore, if desired, means **123,** such as overlap blocks, may be provided on platens **34** for supporting a subsequent platen to be unfolded. Also, if desired, overlap blocks **121** may also partially support panel **34** in addition to a subsequent panel **32** to be folded into position, so long as the operation of platen locking means **40** is not interfered with. Thus, after folding the second platen **32** into position, the platen is supported and the operation can then use his strength in unfolding platen **34.** After platen **34** is unfolded, it is also supported and the operator can then actuate the interlock means **40** to hold the panels in engagement. In this way, if desired, a single operator can carry out the entire operation of installing a supplementary floor. Similarly, if desired, a single operator may remove the supplementary floor by carrying out the reverse procedure to place the panels in the stored position on the sides of the car.

A loading sequence for a two layer device illustrated at the righthand of FIG. **1** would include, for example, positioning the first unit of lading on car floor **27** at this end of car, and lowering the first platen **32** into place supported by support means **100** and then loading the first platen **32.** Then one or more additional units of lading may be placed below the portion which would be occupied by second platen **34.** The second platen is lowered into place, being supported by support means **100** and/or support means **110.** Interlock means **40** is actuated and the second platen is loaded with lading. This procedure is continued until this end of the car is loaded. If the entire car is a two floor level car, the opposite end should then be loaded in the same manner.

If desired, lading strap holes or anchors (not shown) may also be provided for additionally securing the load. Suitable lading restraint equipment (not shown) may be provided in the doorway during loading.

If three level loading is utilized, an exemplary loading sequence may include the following: Positioning the first unit of lading on the car floor at one end of the car, lowering the platen **32** of the first supplementary level in place above the lading on the floor and loading this platen with lading. Next, lower the first platen of the second supplementary level in place above the first platen of the first supplementary level and load the second supplementary level platen. Then lower platen **34** of the first supplementary level, actuate the locking means **40** between platens **32** and **34**, and then load platen **34**. Then lower platen **34** from the second supplementary level, actuate the locking means **40**, and load platen **34** on the second supplementary level. This loading sequence should be continued to the car doorway. The outer end should be loaded in a similar fashion.

It will be apparent to those skilled in the art that two, three, or even more layers could be provided following the same principles as described herein above.

Another embodiment of the present invention is shown in FIGS. **13–18**. In this embodiment, a freight car indicated generally at **210** is illustrated having a conventional center sill **211** which houses conventional coupling apparatus indicated generally at **212**.

As shown in FIG. **13**, the car further comprises end walls **214** and **216** and side walls **218, 220**; and **222**, 224 which are separated by conventional doors **219** and **223**, respectively on either side of the car. A conventional roof **225** and a conventional floor **227** are also provided.

The optional flooring structure is indicated generally at **230** and comprises a plurality of platens **232, 234**, made of suitable construction material such as metal, wood, or synthetic construction material. The platens are pivotably mounted by suitable platen mounting means **236** to the side of the car. Platen mounting means **236** may comprise, for example, a plurality of bracket-type members **237** (FIG. **18**) mounted upon the car side wall and affixed to the platen. A pin **239** may then be inserted within bracket members **237** to provide pivotal movement.

Platens **232** and **234** are joined together by interlocking means indicated generally at **238** (FIG. **14**). Interlocking means **238** preferably comprise hinge means **238***a* the travel of which limits platens to an angle of bending of up to about 180°.

As shown best in FIGS. **14–17**, the platens further comprise at one edge guide means **240**. Guide means **240** may comprise, for example, a channel **241** which may be a part of the panel, or it may be fabricated separately and affixed to the panel, for example, by welding or appropriate fasteners. The channel members may comprise a track portion **242**, a side support **244**, and a cover **246**. A second side support **248** may have an opening **249** therein. When the panels are in the extended position, guide means **240** may be used to support adjacent panels to be moved from the stored to the extended position.

Alternate ones of the platens, for example platens **232**, have mounted thereon a follower assembly **250**. Follower assembly **250** may comprise a roller or caster member **252** which is mounted or journalled in a support member **254** which is pivoted about a pin **256**. Pin **256** is appropriately supported, for example, within blocks **257** and **258**. While a roller has been illustrated as the member within the channel, it will be apparent to those skilled in the art that non-roller members could be utilized. For example, a member having an elongated point could be utilized, particularly if materials are utilized for the sliding member and channel member, respectively, which have a low coefficient of friction between them. The engagement assembly also includes means for urging the roller or sliding member into engagement with channel **241**. Such means may include, for example, a resilient means **260** such as a spring or suitable elastomeric pad (not shown). For instance, a spring **262** may be mounted between support **254** and the upper surface **233** of the platen, biased to urge roller **252** into engagement with channel **241**.

Mounted opposite the platen mounting means **236** is a platen support means **270**. For example, a suitable bracket **272** may provide this support. Alternatively, the side of the car may be appropriately contoured with appropriate ridges and/or grooves to provide this support.

With regard to the end portion of the car, ridges or grooves may be provided in the car wall or affixed thereto, as indicated at **274** in FIG. **1** so that the end panels may ride therein when the end panels are put into use to provide floors in the car. Alternatively, support means such as **100** in FIGS. **3** and **10–12** may be used.

To hold the platens in the stored position, a plurality of holder members **280** are provided. This may comprise, for example, a spring loaded latch **282** including a vertical projection **284** to hold the platens in place.

A loading sequence for a two layer device illustrated at the righthand of FIG. **13** would include, for example, positioning the first unit of lading on car floor **227** at this end of car, and lowering the first set of platens **232** and **234** into place with sliding member or roller **252** following a groove similar to **274** in the rear wall **216**, and then loading the installed platens. Then one or more additional units of lading may be placed below the portion which would be accupied by the second set of platens. The second set of platens is lowered into place by moving caster **252** through guide means **240** and the second set of plates is loaded with lading. As shown in FIG. **17**, as platen **23** is loaded with lading, the bias of resilient means **260** is overcome and the lading weight is substantially transferred to support **270** rather than to follower means **250** and guide means **240**. This procedure is continued until this end of the car is loaded. if the entire car is a two floor level car, the opposite end may be loaded in the same manner.

If desired, lading strap holes or anchors may also be provided for additionally securing the load. For example, a lading strap hole is illustrated in FIG. **14** at **276**. Suitable lading restraint equipment (not shown) may be provided in the doorway during loading.

It will be apparent to those skilled in the art that two, three, or even more layers could be provided following the same principles as described herein above. For example, as shown on the left side of FIG. **13**, two additional layers L1 and L2 are illustrated.

If three level loading is utilized, an exemplary loading sequence may include the following: positioning the first unit of lading on the car floor at one end of the car, lowering the first set of platens of the first supplementary level in place above the lading on the floor and loading this set of platens with lading. Next, lower the first set of platens of the second supplementary level in place above the first set of platens of the first supple-

mentary level and load the first set of platens of the second supplementary level platen. This loading sequence should be continued to the car doorway. The other end may be loaded in a similar fashion.

Various platen storage patterns could be utilized. For example, all platens could be placed on one side of the car, as shown in FIG. 12A, or all platens on end may be stored on one side of the car, and all platens on the other end of the car stored on the other side as illustrated in FIG. 12B. Alternatively, it is possible to stagger the platens during storing as illustrated in FIG. 12C. The arrangements in FIGS. 12B and 12C are often preferred since they provide good balance in weight distribution for the car. Where conservation of space must be maximized the arrangement shown in FIG. 12B is preferred.

As an operational sequence utilizing the safety features outlined and as shown by FIGS. 19 through 24, the following procedure can be followed to apply lading to the transportation vehicle. Lading can be placed on floor 27 of vehicle shown in FIG. 29, which has platens stored similar to FIG. 12C and end platens 32–34 lowered into loading position. To achieve this, the operator in one instance goes to end of car and loads the floor, then releases manual latch 400. Operator then pulls grab handle 320 and lowers platens 32–34 being assisted by restraining torsion arrangement 500, which will be described hereinafter. Platens will rest at end of vehicle on ledge 100.

As above was performed lowered leading corner of platen, either 32 or 34, contacted base portion 301 of lever 302 which fulcrumed and raised latch arm 306. Latch 300 will remain released or open as platen is forcing it to an open position. The operator can now release manual latch 400 and lower another set of platens. This can continue until vehicle is loaded both on floor and on platen decks until doorway is reached. The same procedure can be followed on the other end of the vehicle.

In accordance with another feature of the present invention means are provided which prevent the deck in upright position from falling upon the operator. Means are provided so that the deck cannot be lowered until the adjacent deck is lowered. As shown in FIG. 19 platens 332 and 334 are shown being lowered into position. A means 300 is indicated generally for preventing the deck segments from being removed until engaged by a previous platen. The means may comprise, for example, an arm 302 pivoted at a fulcrum point 304 and engaging a latch arm 306 with appropriate fasteners 307. Latch arm 306 is pivoted about a latch arm pivot 308 so that when platen 334 engages the base portion 301 of arm 302, latch arm 306 will move upwardly and outwardly so that the next set of platens 332 and 334 may be lowered.

Latch arm 306 preferably comprises an extended portion 311 and an engagement portion 313 having a taper thereon 314. Thus, when it is desired to replace the platens 332, 334 in the upright position as shown in FIG. 19, the platen 332 will be cammed by the tapered surface 314 and will then be held in engagement by the engagement portion 313. For many applications, gravity may be a sufficient means to hold engagement member 313 in place. If desired, however, a compression resilient means 315 may be provided. For example, including a compression spring 316 appropriately mounted between a support 317 and latch arm 306. Thus, in the event of impact on the transportation vehicle, the platens will remain in the stored position.

Another embodiment of the safety latch provision of the present invention is shown in FIG. 20. In this embodiment the safety latch means 340 comprises a lever 341 which is pivoted about a pivot point 343 and engages a latch 345 with appropriate fasteners (not shown). Latch 345 comprises an extended portion 347 and a platen engagement portion 348. Thus, in order to release a subsequent set of platens, platen 334 will engage tapered lug 342 and pivot lever 341 about the pivot 343. Latch 345 will move in the direction of the arrow A2 and another set of platens 332, 334 will be disengaged to be placed in operative position on the deck. As was the case in regard to the embodiment shown in FIG. 19, latch engagement portion 348 may be tapered as shown at 350 and a spring 352 provided mounted upon the transportation vehicle side 354 and engaging lever 341. Thus, after the platens 332 and 334 have been released and they are lowered into position, the latch arm 347 will return to its normal position. When it is desired to relatch the platens in the stored position, platen 332 will engage the taper 350 counteracting the action of compression spring 352 until such time as both platens 332, 334 are in position wherein the engagement portion 348 will hold them in the stored position until it is again desired to utilize the supplementary floor.

Still another safety latch embodiment is illustrated in FIG. 21. In this embodiment a safety latch system 360 is illustrated comprising a vertically moving latch member 361 having a tapered engagement portion 362. A strap or flange 363 is affixed to the transportation vehicle side by appropriate fasteners (not shown). Thus, as platen 334 is moved into position it engages tapered portion 362 and moves latch 361 vertically. Thus, platens 332 and 334 are free to be moved into operative position. It will be noted in this embodiment that a notch is provided in platens 332 and 334 as illustrated at 332A and 334A. In order to reengage the platens in the stored position, platen 332 engages a taper 365 and moves latch member 361 vertically until the platens fall into place.

It is therefore apparent that the safety features shown in FIGS. 19–21 are designed to help protect the operator against unintentional unlatching of the platens from the stored position.

In accordance with another feature of the present invention, means are provided which prevent the deck or platens, in an upright position, although they have been automatically unlatched, from falling on the operator. A manually operated latch on means 400 is indicated generally in FIGS. 19, 20 and 21. The means may comprise, for example, and arm 402 pivoted at 404 and engaging a latch arm 406. Arm 406 has an engagement portion 408 for restraining platens until operator pulls on grab handle 412 which is attached to chain 414 which in turn is attached to arm 402. The platens 32 and 34 are now completely unlatched and the operator can be fully aware of the fact. He can now grasp handle 320 and lower said platens, being assisted by restraining torsion arrangement 500 which will be described later.

If desired, manually operated latch 400 can be further urged or held in latched position by spring loading it as was described for automatic latch 300.

Another embodiment of the present invention is shown in FIGS. **22, 23,** and **24.** This embodiment utilizes a torsion arrangement that will allow the platens **32** and **34** to be lowered in a constantly decreasing rate of speed and give the operator full benefit of time to position said platens for loading. A torsioning arrangement **500** is shown in FIGS. **22, 23,** and **24** comprising trunnions or brackets **502** mounted upon the transportation vehicle side **20** and having spaced lugs **503.** Lugs are made to receive a torsion member **506.** Platen **34** is furnished with hinge type members **510** which are held in place by pins **512** as shown in FIG. **23.** These hinge type members are also made to receive the torsion member **506.** At assembly the torsion rod **506** is inserted and pinned at one end by pin **508** to the trunnion lug **503,** and at the other end by pin **509** to hinge member **510** in platen **34.** If this assembly is completed with platens **32** and **34** in a raised position, it is apparent that when said platens are attempted to be lowered, the torsion arm will furnish resistance. This fact will assist operator in positioning platens in a lowered position for applying lading.

Another embodiment of the method of holding platens in a raised position as shown in FIGS. **12A** and **12B,** is shown in FIGS. **25, 26, 27** and **28.** In this embodiment the platens at either end of the transportation vehicle are stored on one side. To insure safety of operator and not having platens lower without guidance, FIG. **25** shows an embodiment for safety application. With an empty vehicle the operator can only start with the pair of platens at the end of the car, then work toward the door. A manually operated safety latch **540** partly hidden by platens **32** and **34** comprising a spring loaded engagement portion as described by means **400** is opened by pulling handle **542.** Chain **544** actuates or opens the latch. Operator can then grasp handle **546** and lower platen, again assisted by torsioning arrangement **500,** if desired.

The next platen is now ready to be lowered. The safety latch **540** which will allow this platen to lower was safely hidden behind the first panel and only after the first panel has been lowered can it be operated. This safety feature will prevent careless unlatching of platens.

The first or end platen when lowered will rest at vehicle end on ledge **548.** Also provided on the front half of the lowered panel near the center is a projection **550** which will provide, when panel is lowered, a resting plate for the second panel. This projection, when panels are in raised position, will help hold panels in an upright position.

What is claimed is:

1. A multi-level transportation vehicle comprising:

a vehicle having a floor and at least two spaced apart walls;

a plurality of platens pivotally mounted on opposite ones of said walls;

means mounted within said vehicle for holding a distal portion of said platens adjacent said walls in a storing position;

said platens being movable inwardly from said walls from said storing position to an extended position to at least partially define a supplementary floor;

said platens having interlocking means thereon for interlocking said platens at a point removed from said spaced apart walls;

said platens having means thereon for supporting an adjacent platen in extended position after it is moved from the storing to the extended position;

said spaced apart walls providing substantially the sole support for said panels in the extended position;

said interlocking means and platens having sufficient strength to transmit lading shear and bending moment between the platens and provide the sole support for lading placed thereon while the supplementary floor is in use.

2. A transportation vehicle according to claim **1** wherein at least two supplementary floors are provided.

3. A transportation vehicle according to claim **1** wherein means are provided on said interlocking means for disengaging the locking means before said platens are placed in storing position.

4. A transportation vehicle according to claim **3** wherein said interlocking means automatically engage when said platens are moved into storing position.

5. A transportation vehicle according to claim **4** wherein said automatically engaging interlocking means comprise a locking member and a resilient member biasing said locking member into the locked position.

6. A transportation vehicle according to claim **3** wherein means are provided on said interlocking means for engaging locking means after said platens are placed in extended position.

7. A transportation vehicle according to claim **6** wherein the interlocking means comprise a lock actuating member and a locking member and the actuating member in a locking position holds the locking member in engagement with the platens spanning the spaced apart walls.

8. A transportation vehicle according to claim **7** wherein said locking member is a wedge type member.

9. A transportation vehicle according to claim **7** wherein said locking member is a block type member.

10. A transportation vehicle according to claim **7** wherein said locking member is a pin type member.

11. A transportation vehicle according to claim **7** wherein each of said spanning panel members comprise a channel in cross section, the channel of one panel member being smaller than another spanning panel member, the panel member having the smaller cross section filling within the panel member having the larger channel section, and said locking means holding said channel sections in engagement in extended position.

12. A transportation vehicle according to claim **11** wherein means are provided on said vehicle to support the first panel placed in extended position.

13. A transportation vehicle according to claim **7** wherein means are provided on said vehicle to support the first panel placed in extended position.

14. A transportation vehicle according to claim **7** wherein the means for supporting an adjacent panel in extended position comprises means mounted along a side edge of said panel.

15. A transportation vehicle according to claim **14** wherein said means supporting an adjacent panel comprises at least one overlap block.

16. A transportation vehicle according to claim **14** wherein said panel also comprises means for supporting an oppositely mounted panel in the extended position prior to actuating of the interlock means.

17. A transportation vehicle according to claim 16 wherein the means which supports an adjacent panel also supports an oppositely mounted panel.

18. A transportation vehicle according to claim 17 wherein the means supporting an adjacent panel and an oppositely mounted panel is at least one overlap block.

19. A transportation vehicle according to claim 16 wherein the means supporting an oppositely mounted panel is at least one overlap block.

20. A transportation vehicle according to claim 7 wherein the means supporting said platens adjacent said walls in stored position comprises a spring loaded latch means.

21. A transportation vehicle according to claim 1 wherein said vehicle has separate means affixed to the walls to prevent said platens from disengaging from the stored position.

22. A transporation vehicle according to claim 21 wherein automatic release means are provided whereby one platen in engaged position releases a subsequent panel for movement to operative position.

23. A transportation vehicle according to claim 22 wherein in addition to said automatic release means manual release means are also provided.

24. A transportation vehicle according to claim 22 wherein the automatic release means comprise an arm pivotally mounted upon the vehicle side wall adapted to be engaged by the platen and a latch which holds platens in stored position.

25. A transportation vehicle according to claim 24 wherein said arm pivots vertically.

26. A transportation vehicle according to claim 24 wherein said arm pivots horizontally.

27. A transportation vehicle according to claim 24 wherein said arm moves vertically.

28. A transportation vehicle according to claim 24 wherein means are provided which automatically restore the arm to its original position.

29. Apparatus according to claim 28 wherein means are provided on said latch for allowing automatic engagement of said platens when they are again placed in stored position.

30. A transportation vehicle according to claim 21 wherein safety means are provided mounted on one panel for preventing a subsequent panel to be lowered until actuated manually by the operator.

31. A transportation vehicle according to claim 30 wherein said safety means are associated with latch means holding the platens in stored position.

32. A transportation vehicle according to claim 21 wherein said vehicle is a railroad car.

33. A transportation vehicle according to claim 1 wherein a torsion bar is provided in said hinge means to assist in moving the panels into position.

34. A multi-level transportation vehicle comprising:

a vehicle having a floor and at least two spaced apart walls;

a plurality of platens pivotally and supportably mounted on at least one of said walls;

means mounted within said vehicle for holding a distal portion of said platens adjacent said one wall in a storing position;

said plurality of platens being movable inwardly from said wall from said storing position to an extended position to at least partially define a floor, said platens having interlocking means hinging said platens at a point inward from said spaced apart walls;

said interlocking means having a sufficient strength to transmit lading shear and bending moment between said platens;

said platens having a first transverse edge portion which when said platens are extended is generally parallel to said floor;

said first edge portion having means for guiding at least a part of a second transverse edge portion of adjacent platens when the same are moved from the storing position to the extended position;

and platen support means mounted on said walls providing substantially the sole support for said platens in their extended position so as to at least partially define a supplementary floor to support lading.

35. A vehicle according to claim 34 wherein follower means are provided on said second edge portion to follow said guiding means on said first edge portion.

36. A vehicle according to claim 35 wherein the guiding means on said first edge portion is a channel.

37. A vehicle according to claim 36 in which said follower means is pivotably mounted within one of said panels spanning said spaced apart walls.

38. A vehicle according to claim 37 wherein means are provided on said platens associated with said follower means for applying vertical loads to said platen support means in their extended position.

39. A vehicle according to claim 38 wherein said means for applying vertical loads resiliently urge said follower means into engagement with a lower track of said channel.

40. A vehicle according to claim 39 wherein said means for applying vertical loads comprises resilient means mounted on said follower means between the pivot of said follower means and said channel.

41. A vehicle according to claim 39 wherein said interlocking means hinging said platens allow bending up to about 180°.

42. A vehicle according to claim 34 wherein said platens define more than one level above said floor.

43. A multi-level railway freight car comprising:

a railway car having a floor and at least two spaced apart walls; a plurality of platens pivotally and supportably mounted on at least one of said walls; means mounted within said car for holding a distal portion of said platens adjacent said one wall in a storing position;

said plurality of platens being movable inwardly from said wall from said storing position to an extended position to at least partially define a floor, said platens having interlocking means hinging said platens at a point spaced from said walls; said interlocking means having sufficient strength to transmit lading shear and bending moment between said platens;

said platens having a first transverse edge portion which when said platens are extended is generally parallel to said floor,

said first edge portion having channel means for guiding at least a part of an adjacent panel member when the same is moved from the storing position to the extending position;

said adjacent panel member having follower means pivotably mounted within said panel for following during extension of the guiding means in said first edge portion;

platen support means mounted on said walls providing substantially the sole support for said panel members in their extended position so as to at least

partially define an additional level or floor to support lading; and resilient means associated with said follower means for transferring a substantial portion of vertical lading loads to said platen support means.

44. A railway freight car according to claim **43** wherein said platens are pivotally mounted on each of said spaced apart walls.

45. A railway freight car according to claim **44** wherein said platens are mounted on each of said spaced apart walls in a staggered fashion.

46. A railway freight car according to claim **43** wherein all of said platens are mounted on one of said spaced apart walls.

47. A multi-level freight car according to claim **43** wherein said follower means comprises a roller which rides in said channel.

48. A multi-level freight car according to claim **47** wherein said car comprises means for supporting at least the first platens moved from storing to extended positions.

49. A multi-level freight car according to claim **47** wherein said car comprises means for supporting at least the first platens which span said spaced apart walls.

50. A multi-level freight car accoding to claim **43** wherein said follower means comprises a sliding member which moves within said channel.

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