Jan. 11, 1966 J. E. GUTRIDGE ETAL 3,228,354

RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

Filed Dec. 11, 1961 13 Sheets-Sheet 1

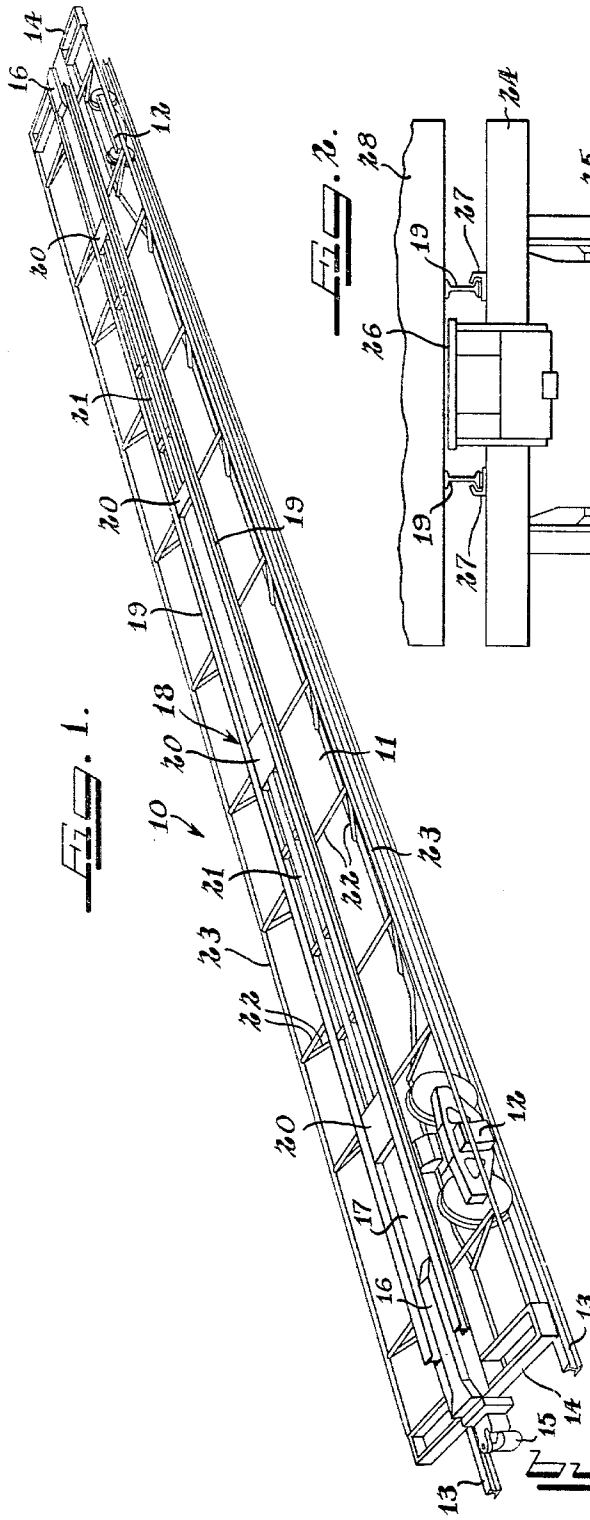


Fig. 1.

Fig. 2.

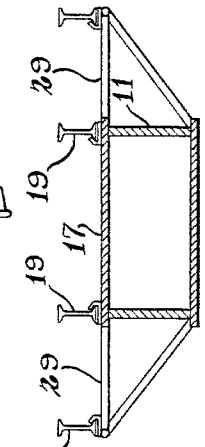


Fig. 5.

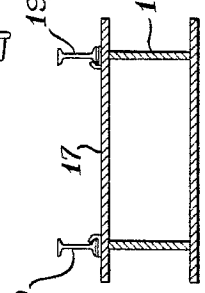


Fig. 3.

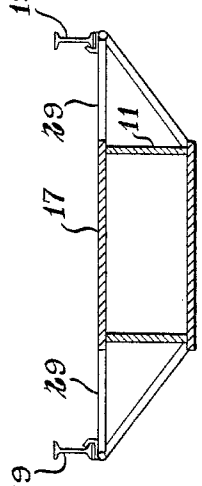


Fig. 4.

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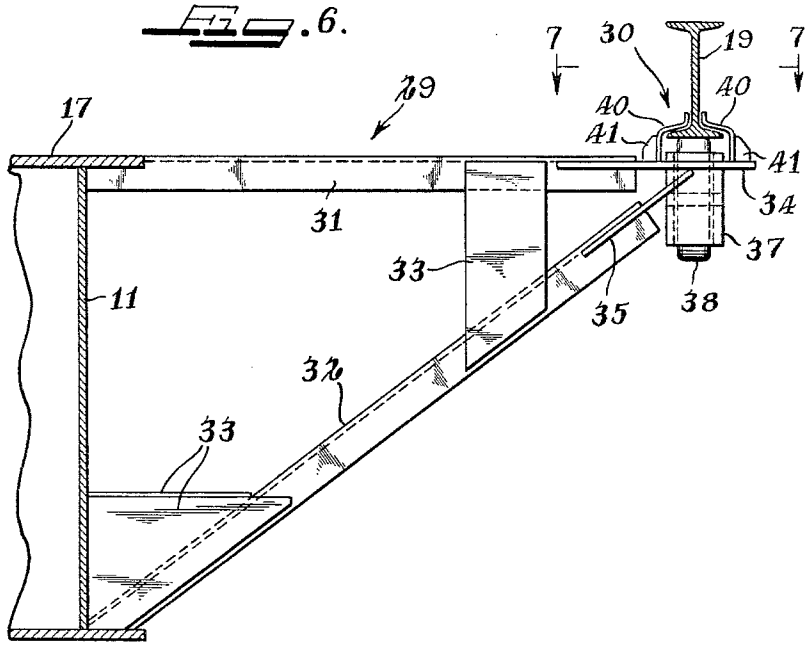
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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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Fig. 6.



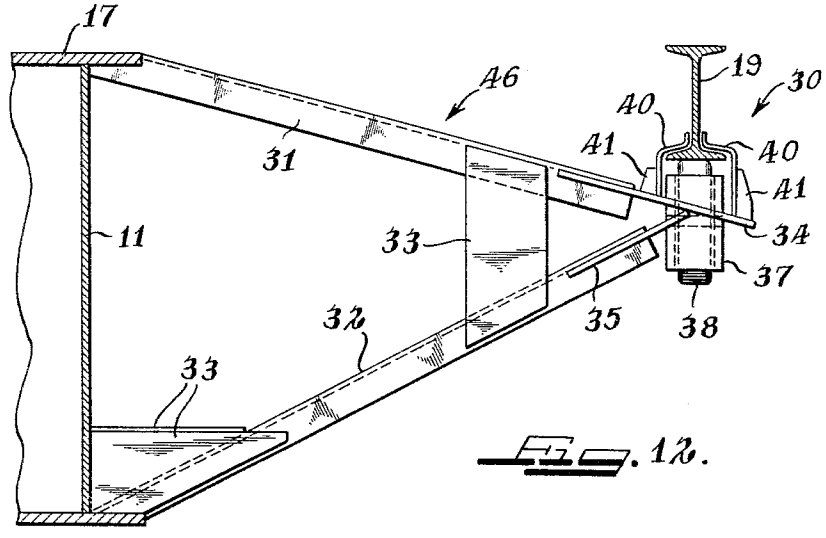


Fig. 12.

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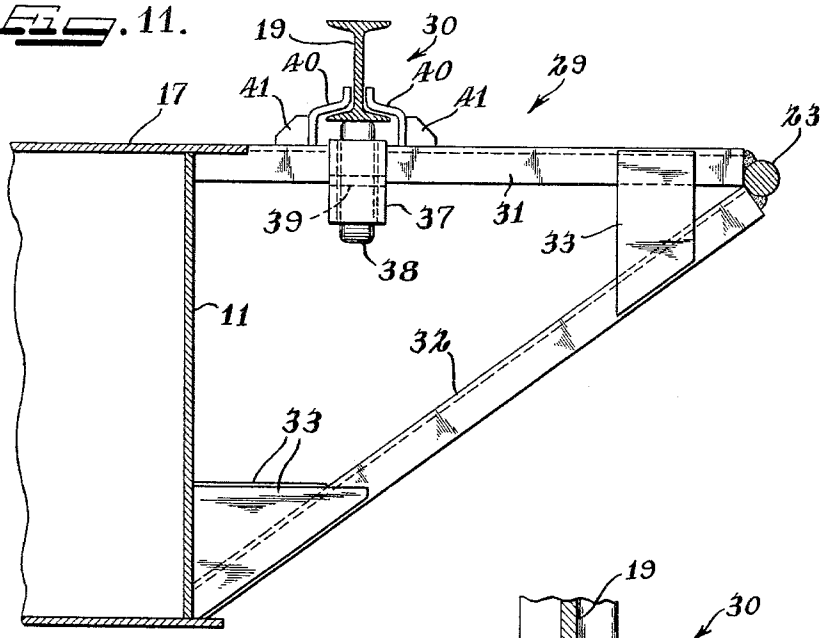
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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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Fig. 11.



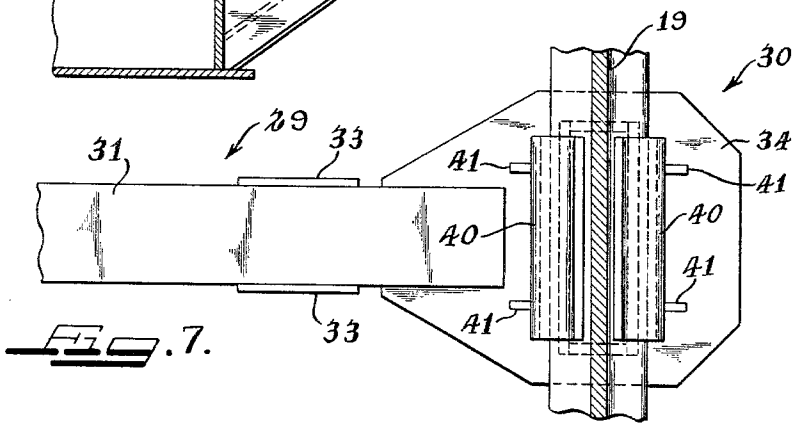


Fig. 7.

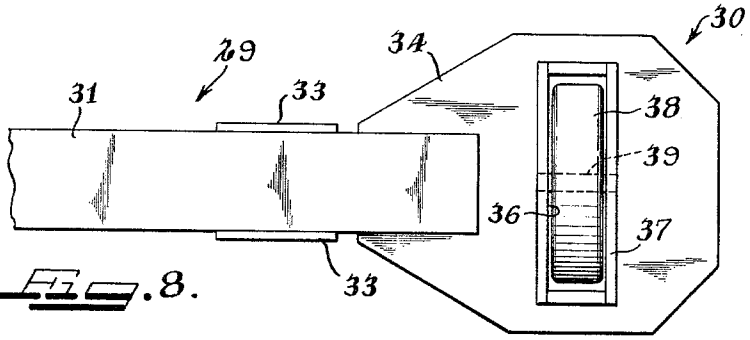


Fig. 8.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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Fig. 9.

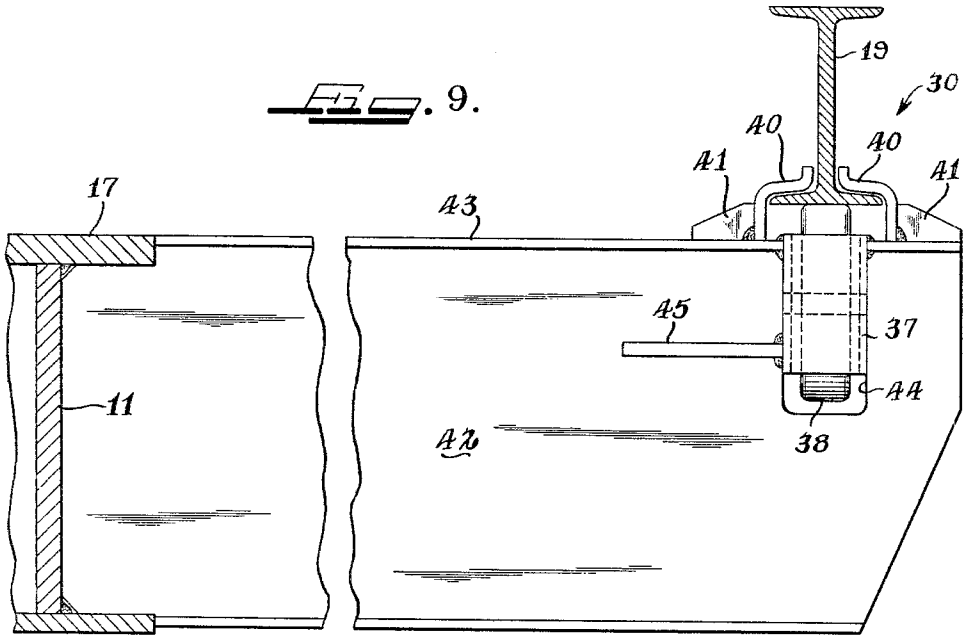
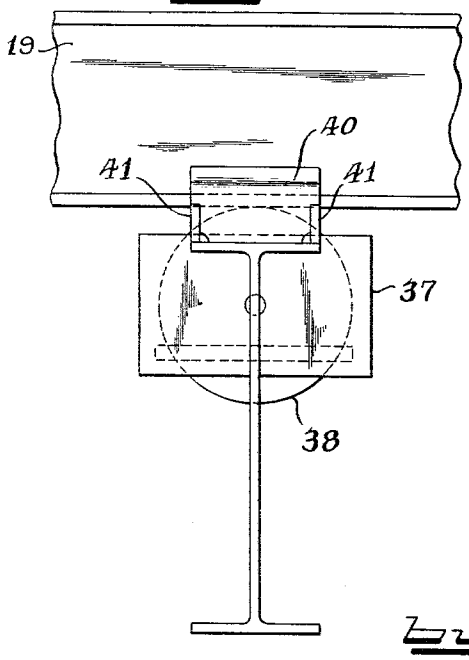


Fig. 10.



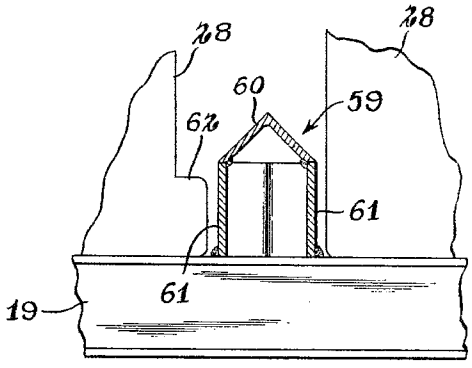


Fig. 19.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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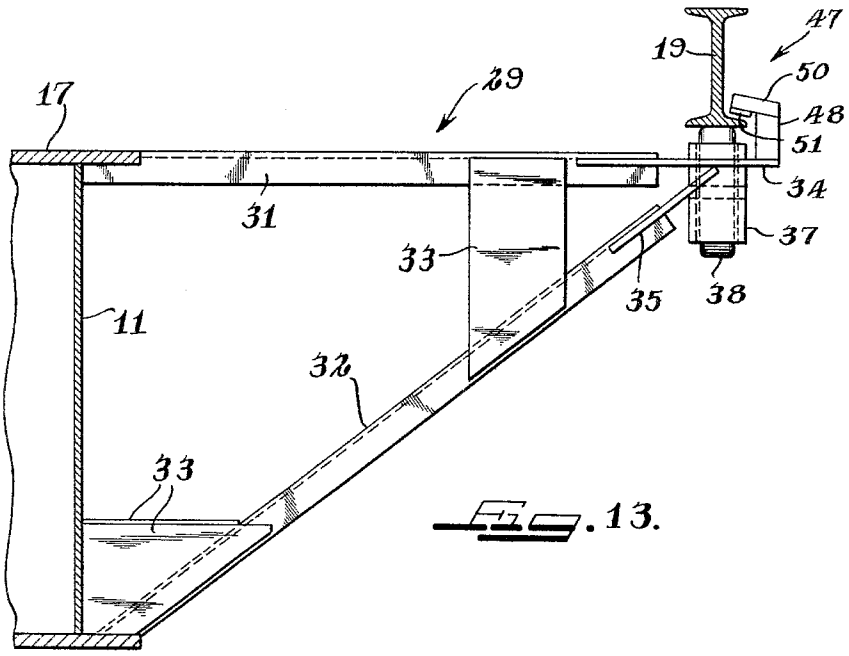


Fig. 13.

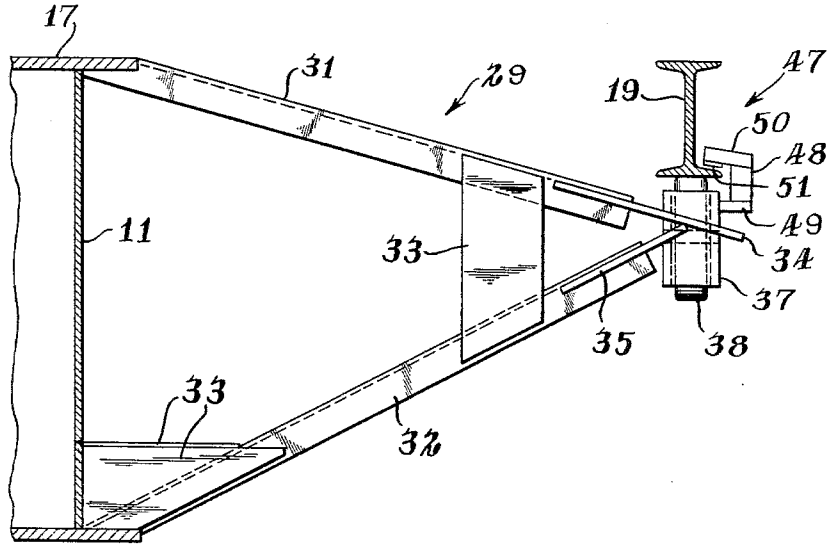


Fig. 14.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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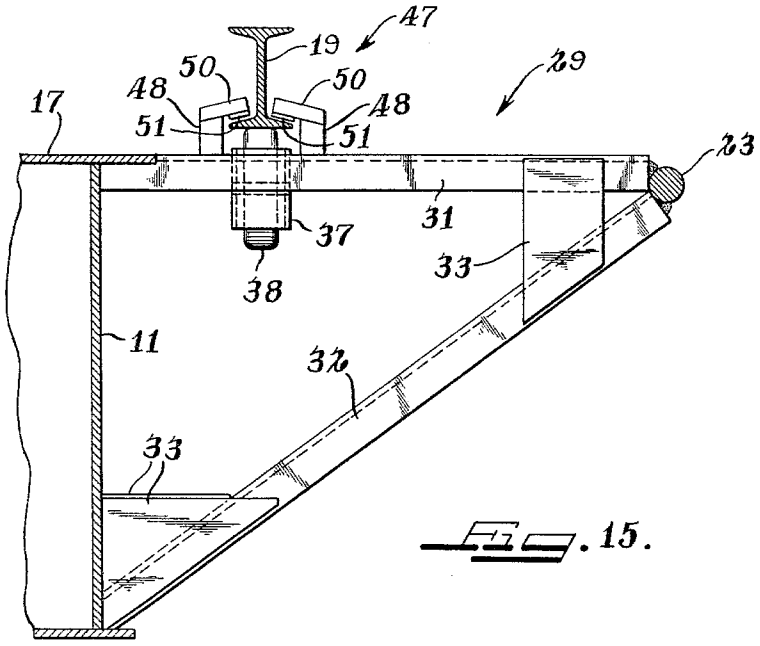


Fig. 15.

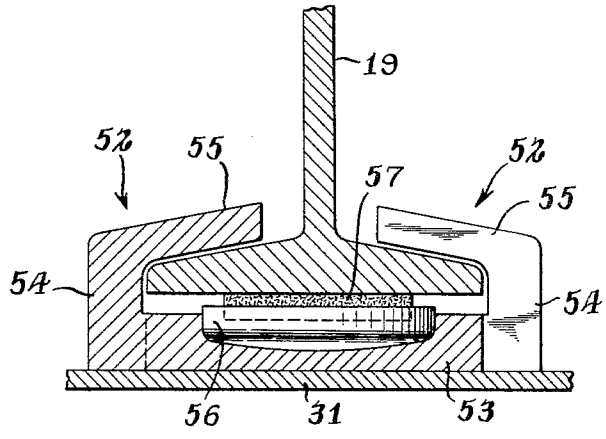


Fig. 16.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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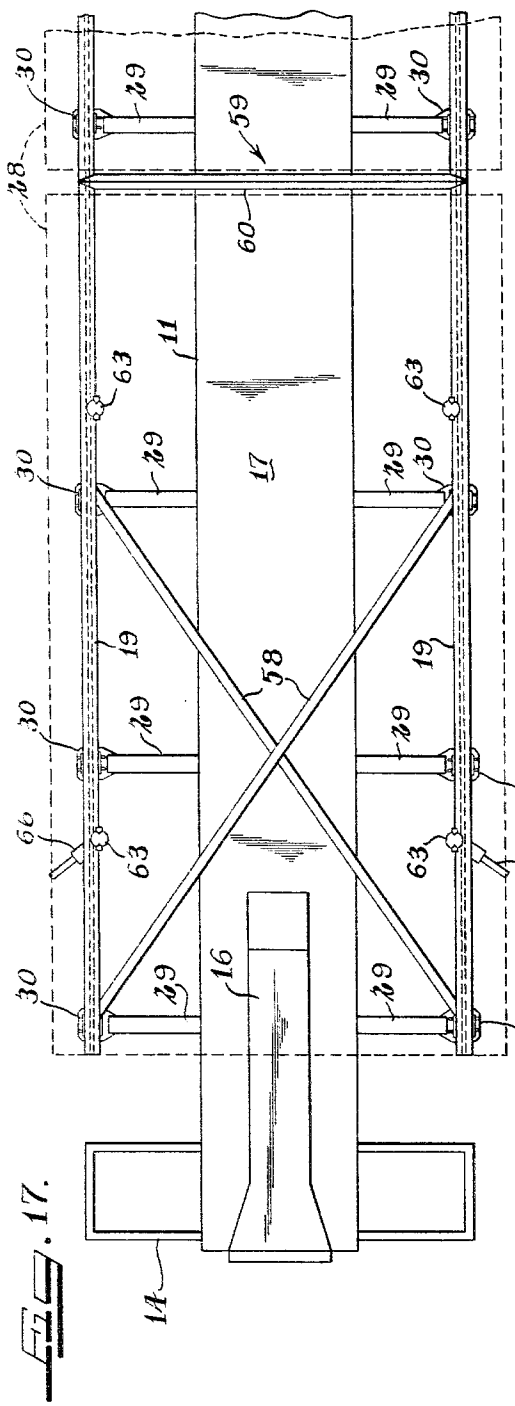


Fig. 17.

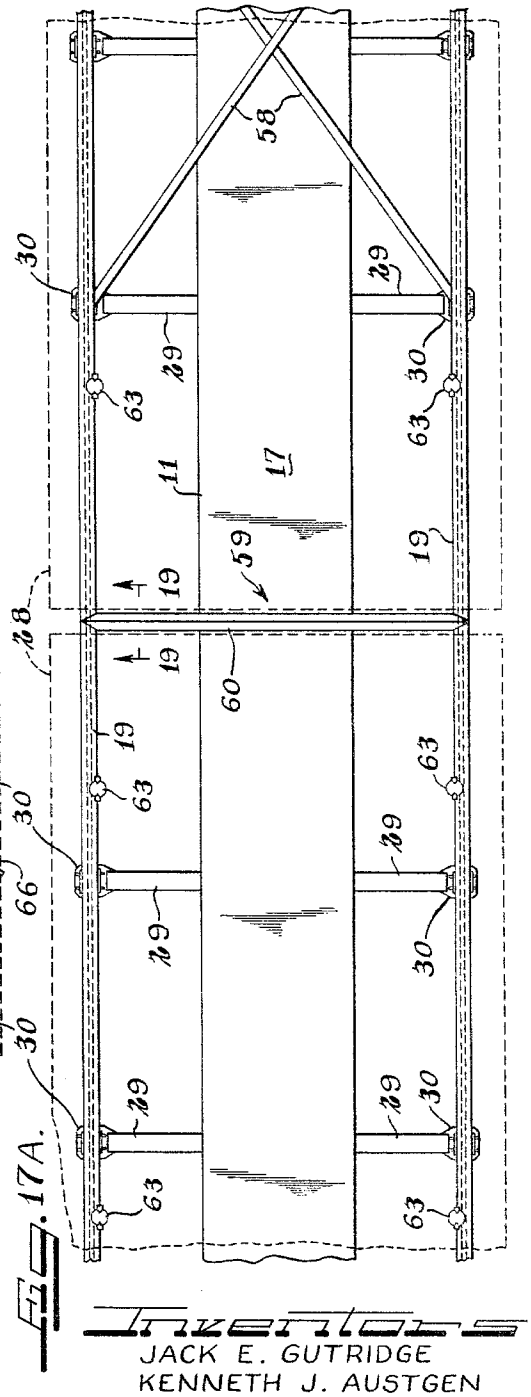


Fig. 17A.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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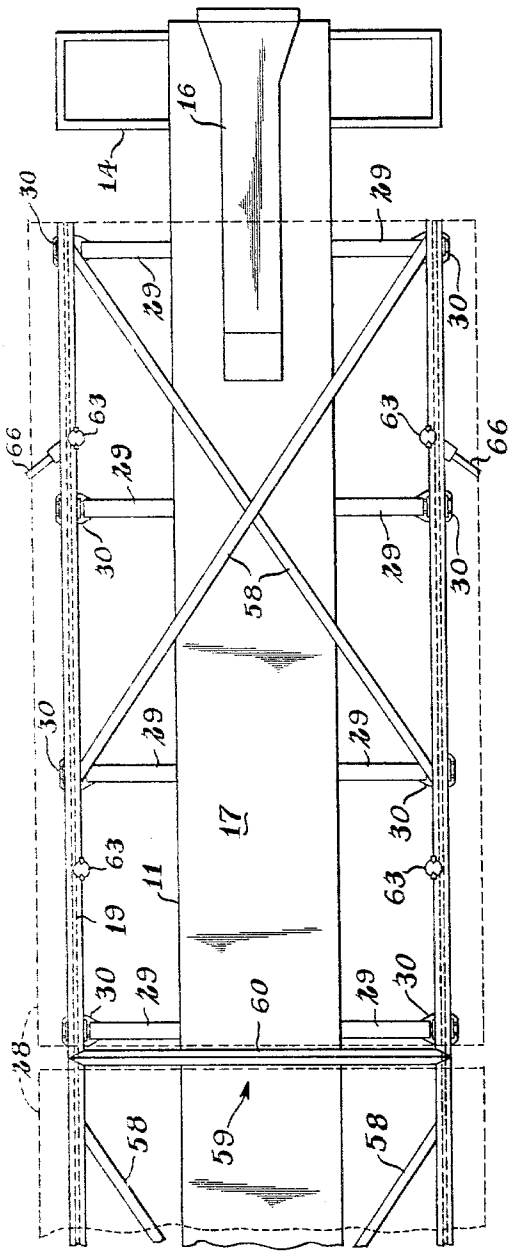


Fig. 17B.

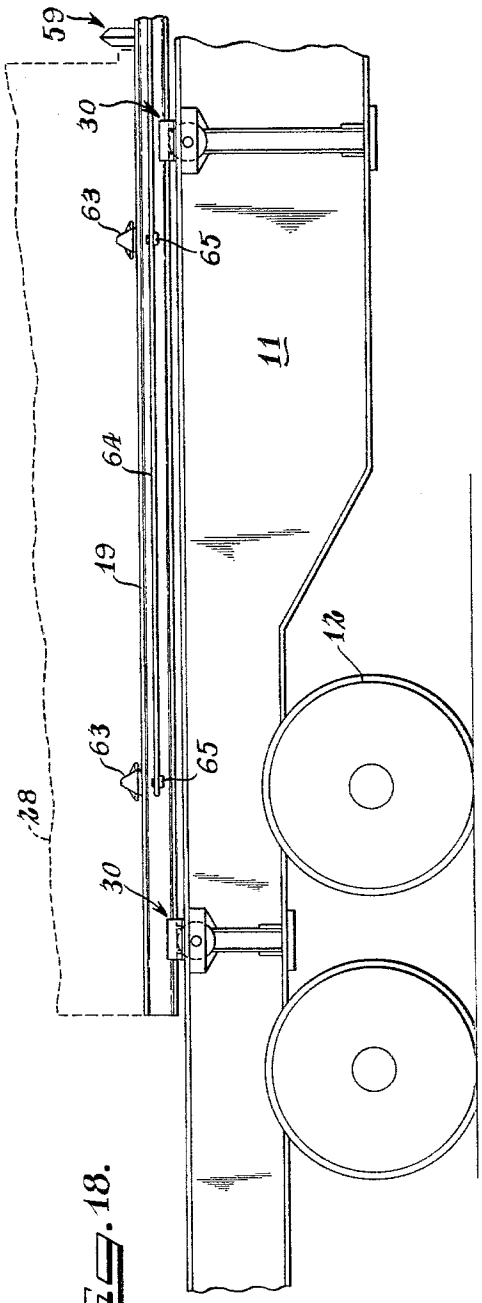


Fig. 18.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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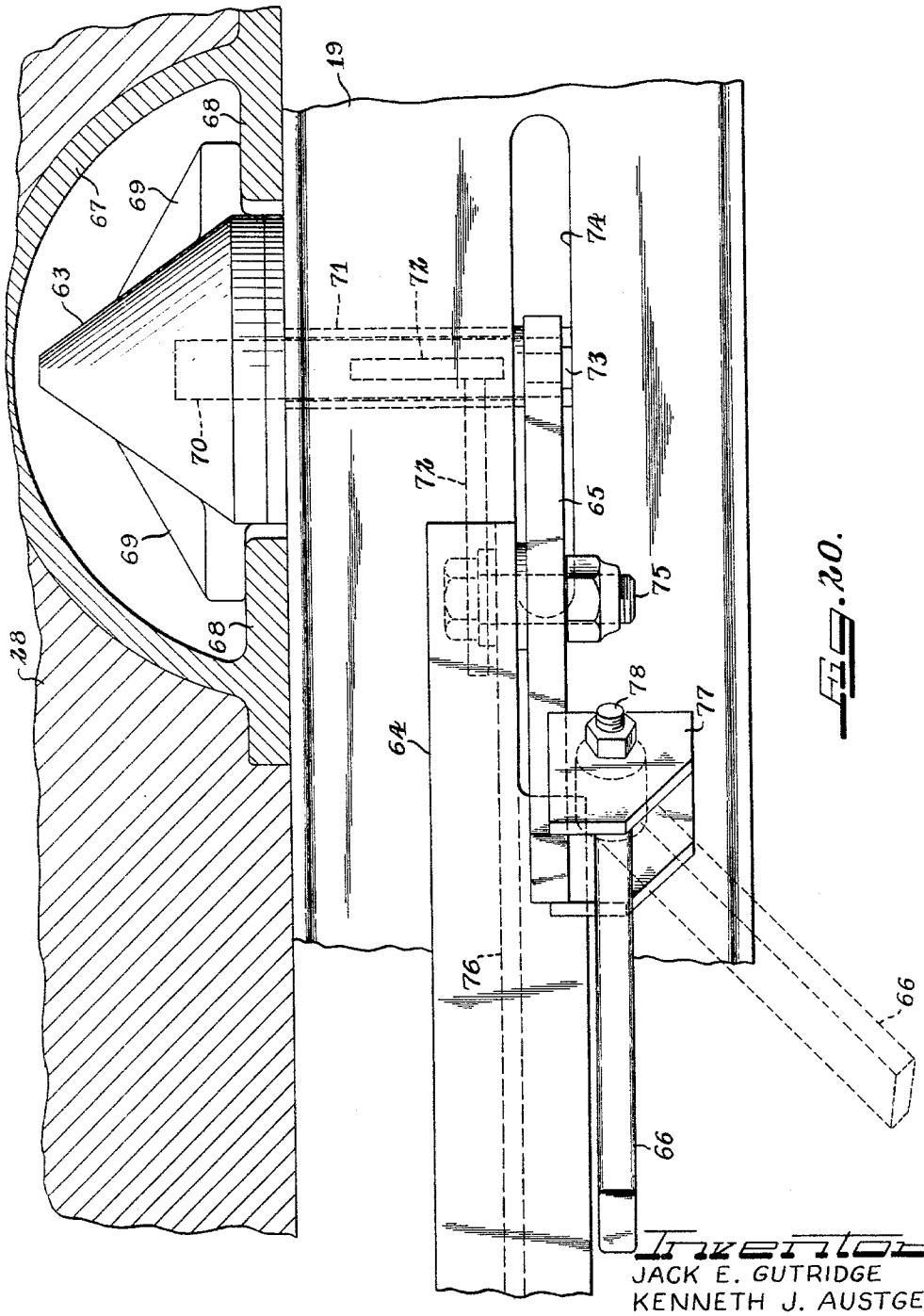


FIG. 20.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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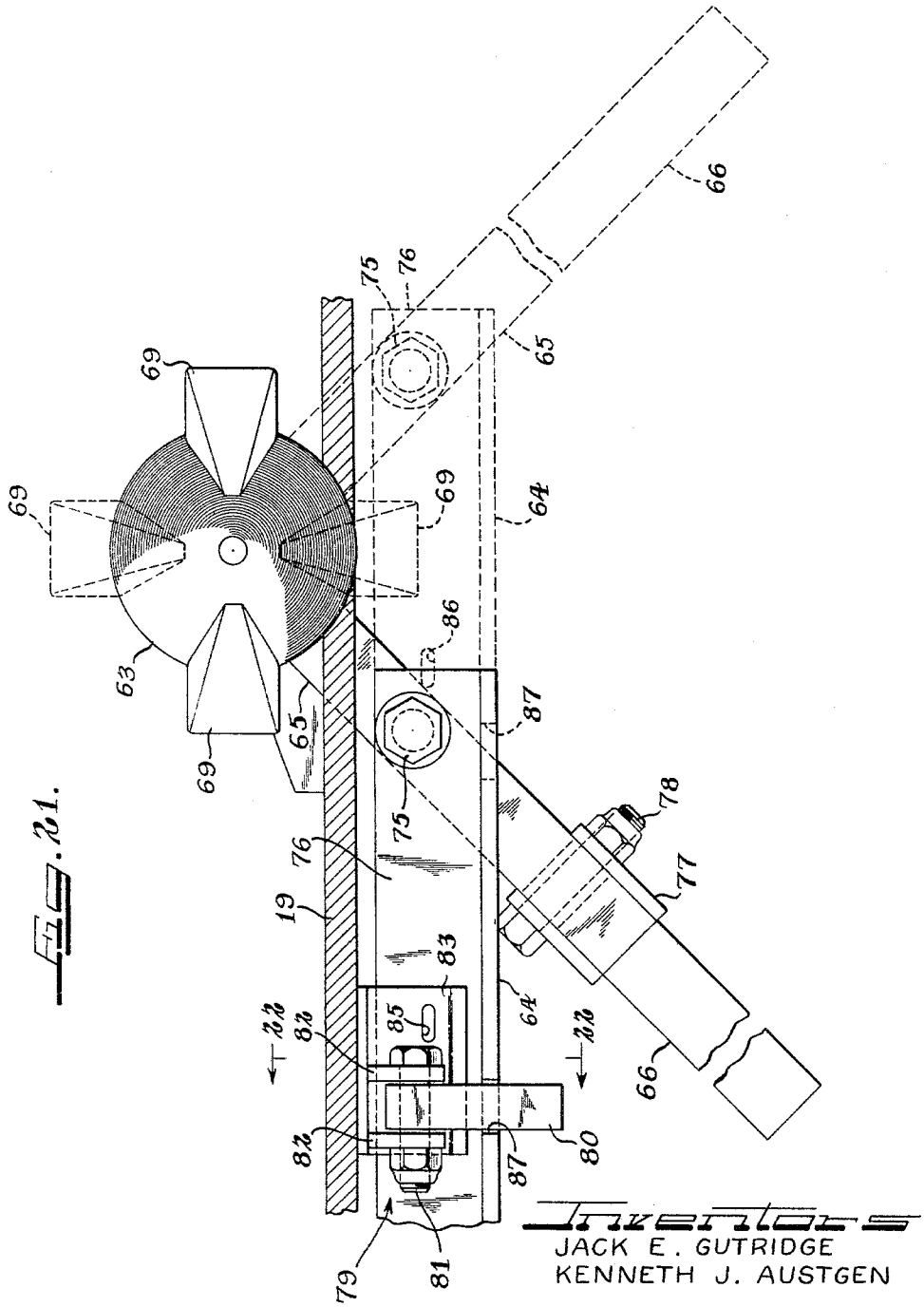


Fig. 21.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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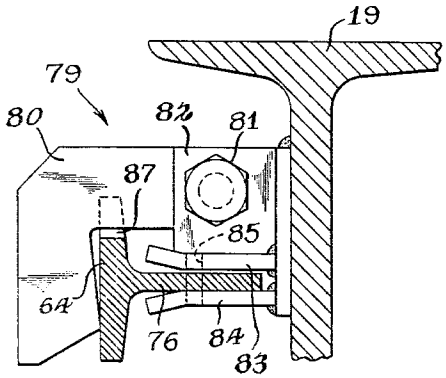


Fig. 22.

Fig. 23.

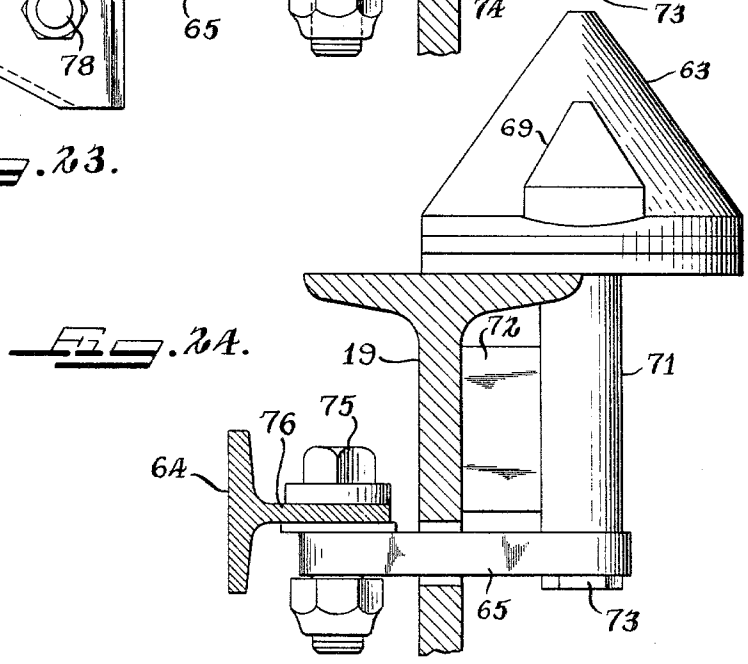


Fig. 24.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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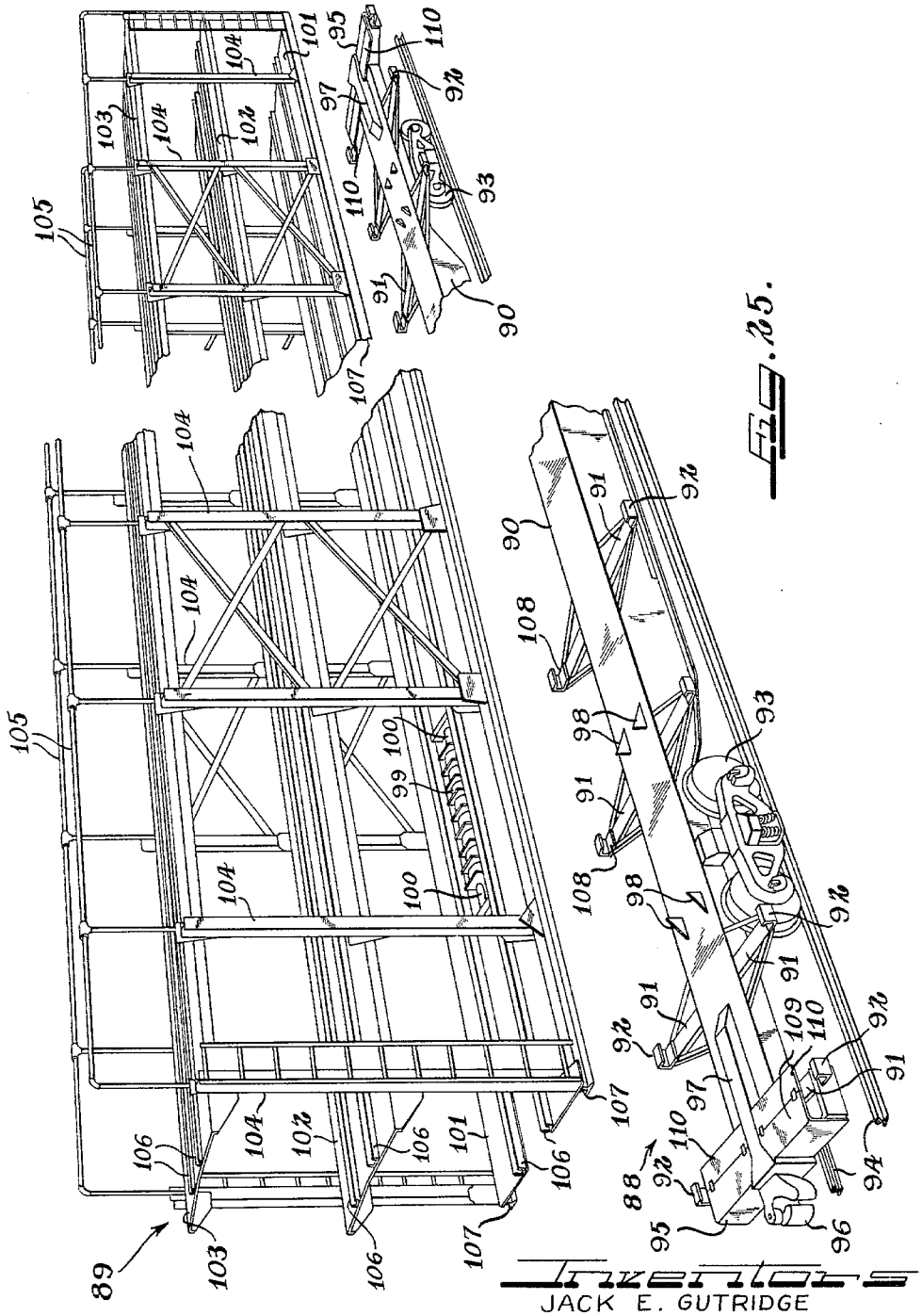


Fig. 25.

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RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

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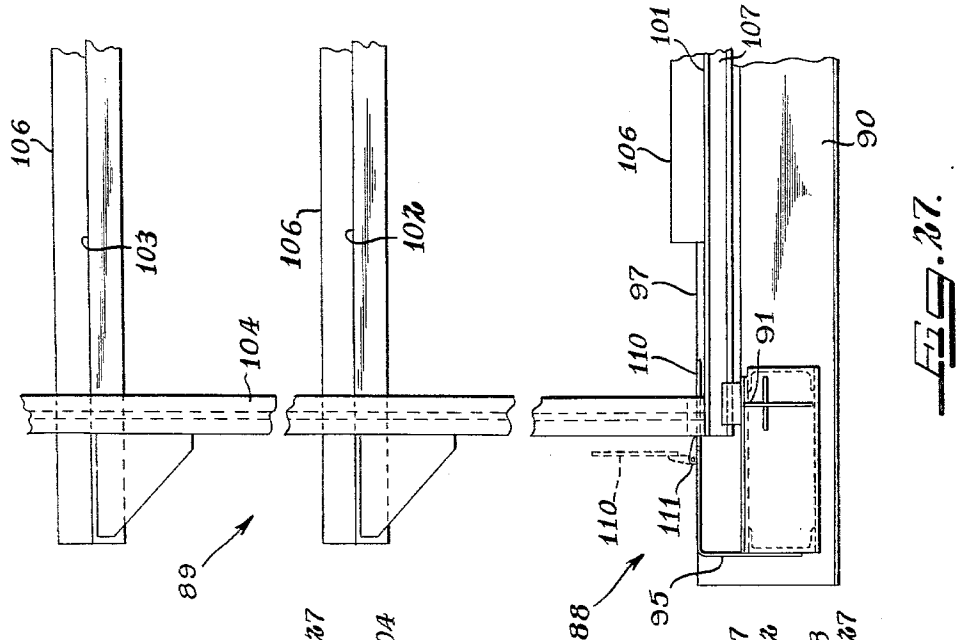


FIG. 27.

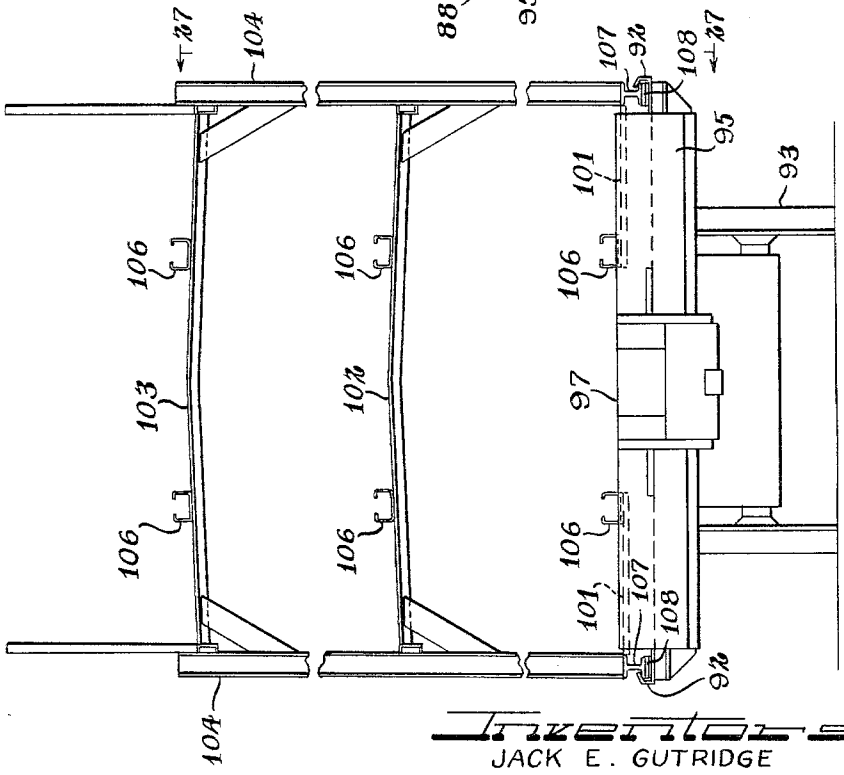


FIG. 26.

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United States Patent Office 3,228,354 Patented Jan. 11, 1966

3,228,354

RAILWAY CAR LADING SUPPORT AND ATTACHMENT ARRANGEMENTS

Jack E. Gutridge, Dyer, and Kenneth J. Austgen, Griffith, Ind., assignors to Pullman Incorporated, Chicago, Ill., a corporation of Delaware

Filed Dec. 11, 1961, Ser. No. 158,370
8 Claims. (Cl. 105—454)

The invention is directed to new and improved railway car designs and relates specifically to lading support and attachment arrangements applicable for use with different basic railway car structures and especially adapted for use with a new and improved form of skeletal-type railway car.

With the importance of piggyback lading operations in the railroad industry, considerations have been given to basic improvements in the design of railway cars intended for piggyback operation as well as in connection with improvements in lading support and attachment arrangements. As a result of these considerations, a basic skeleton car design has evolved, this design involving the utilization of a wheel truck supported center sill constituting the sole main structural member of the car and terminating in transverse end sills of conventional car width. This type of car is of lightweight design and adapted for high speed operation and incorporation in a passenger train consist for freight and mail shipping purposes. Cushion rack assemblies of known type, which basically include longitudinal rail members, have been mounted on the top relatively narrow surface of the center sill and interconnected thereto through known types of cushioning devices for controlled travel relative to the center sill. Containers have been mounted on the rack assembly and attached thereto while laterally overextending the center sill. In utilizing this type of design, it has been found necessary to limit the use of the car to the transportation of specially designed containers exhibiting the requisite strength characteristics in the bottom wall thereof to accommodate the localized center area support provided by the narrow rack assembly and center sill. Furthermore, container attachment to the car has constituted a problem in that the available area of attachment is rather limited and considerable care must be taken is providing an attachment arrangement of sufficient strength to permit high speed operation of the car without container displacement or damage.

It is an object of the present invention to provide new and improved railway car designs for piggyback container operational use, the designs involving new and improved container lading support and attachment arrangements.

Another object is to provide a new and improved railway car of skeletal design which overcomes the problems arising from limitations in container support and attachment areas.

A further object is to provide a new and improved skeleton-type railway car adapted to accommodate different types of cushioned lading support and attachment structures while retaining to a sufficient extent the advantages attendant to skeletal car design, the basic car design permitting ready modification to accommodate lading support and attachment arrangements of variable width and type.

Still a further object is to provide new and improved lading support and attachment arrangements for use with railway cars adapted for piggyback operation, these arrangements being especially adapted for use with the new and improved skeleton car design also constituting a part of the invention.

Other objects not specifically set forth will become apparent from the following detailed description of the invention made in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective of a basic type of skeleton car capable of improvement in accordance with the teachings of the present invention;

FIG. 2 is a diagrammatic end view of a flat deck car for use in illustrating certain principles of the invention;

FIG. 3 is a diagrammatic transverse section of the center sill of the skeleton car of FIG. 1;

FIG. 4 is a diagrammatic transverse section of the center sill portion of a car improved in accordance with the teachings of the invention;

FIG. 5 is a view similar to FIG. 4 illustrating modified uses of the principles of the invention;

FIG. 6 is a fragmentary elevation of one form of outrigger member of the modified car;

FIG. 7 is an enlarged plan section of rack attachment means carried by the outrigger member of FIG. 6 as viewed generally along the line **7—7** therein;

FIG. 8 is a view similar to FIG. 7 illustrating the rack support means of the outrigger member;

FIG. 9 is a fragmentary elevation of another form of outrigger member including the rack attachment means mounted thereon;

FIG. 10 is an end view of the outrigger member of FIG. 9;

FIG. 11 is a fragmentary elevation of another form of outrigger member for use with the car of the invention;

FIG. 12 illustrates still another form of outrigger member;

FIG. 13 illustrates a modified form of rack attachment means;

FIG. 14 illustrates the use of the modified rack attachment means with a modified form of outrigger member;

FIG. 15 illustrates the modified rack attachment means in a different location on an outrigger member;

FIG. 16 is a fragmentary section of a known type of rack attachment means adapted for use with the invention;

FIGS. 17, 17A and 17B are generally diagrammatic plan views of the railway car of the invention illustrating the use of a special rack assembly thereon;

FIG. 18 is an enlarged fragmentary side elevation of a portion of the car illustrating the rack assembly thereof;

FIG. 19 is an enlarged transverse section of the special container guide means of the invention as viewed generally along line **19—19** in FIG. 17A;

FIG. 20 is a fragmentary, partly sectioned view of a container attachment means of the invention;

FIG. 21 is a fragmentary plan view of the container attachment means of FIG. 20 illustrating operation thereof;

FIG. 22 is a fragmentary transverse section of lock means forming a part of the container attachment means as viewed generally along line **22—22** of FIG. 21;

FIG. 23 is a fragmentary elevation of the container attachment means;

FIG. 24 is a view similar to FIG. 23 of another portion of the container attachment means;

FIG. 25 is an exploded, fragmentary perspective of another form of improved railway car of the invention illustrating use thereof with special rack means;

FIG. 26 is a generally diagrammatic end elevation of the car and rack means of FIG. 25; and

FIG. 27 is a fragmentary section of an end portion of the car and rack means as viewed generally along line **27—27** in FIG. 26.

FIG. 1 illustrates a skeletal-type car **10** as including a longitudinal center sill **11** of box-like configuration and fishbelly design supported at opposite ends by conventional

wheel trucks **12** for operation along rails **13**. The center sill **11** is provided at opposite ends with transverse end sills **14** which project laterally therefrom on either side of a standard coupler **15**. Each coupler is mounted in a raised coupler housing **16** formed in the ends of the center sill **11** and projecting upwardly from a top plate **17** of the center sill centrally thereof. The coupler housings **16** are raised to place the couplers **15** at proper operative level with couplers of cars of conventional design, the skeleton car **10** being of low height design to accommodate the mounting of containers thereon of substantial height and permit overhead clearance of these containers during operation of the car.

With a skeleton car of the type described, a cushion rack assembly **18** can only be mounted on the top plate **17** of the center sill **11** and thus is limited with regard to effective width of supporting area afforded to containers and the like. The rack assembly **18** is of known design including a pair of spaced longitudinal rail members **19** which are laterally tied in by transverse members **20** for functioning as a unified structure. The rack assembly **18** is suitably mounted on the top surface of the center sill **11** for relative longitudinal movement therebetween in any suitable manner. This relative longitudinal movement is controlled by any suitable type of cushion assembly **21** including cooperating parts carried by the rack assembly **18** and the center sill **11**. The cushion assemblies **21** provide for controlled relative movement between the rack assembly **18** and the car to afford protection to the containers mounted thereon during car operation and protect lading from damage as a result of buff or draft forces. The car structure **10** is completed by the provision of non-load bearing outrigger safety bar structures on either side of the center sill **11**. These structures include cooperating transversely projecting rods **22** attached to the side plates of the center sill **11** at their inner ends and supporting at their outer ends a longitudinally extending safety rod **23**. The rods **23** are located just outwardly of the wheel trucks **12** and are attached at opposite ends to the end sill structures **14**. This safety arrangement prevents personnel from being caught between containers and the like or otherwise being harmed by reason of the narrow effective width of the car **10**.

FIG. 2 diagrammatically illustrates a conventional open deck-type car including a flat deck portion **24**, supported by wheel truck units **25** and having raised coupler housings **26** at opposite ends thereof. In this illustration the positioning of the rail members **19** of the rack assembly previously described are shown in relation to the coupler housings **26**. Suitable bracket-like rail member hold down means **27** of known type are also illustrated to show the manner in which the rail members are attached to the car. A container **28** is supported along the central bottom portion thereof by the rail members **19** and sub stantially laterally overextends the same in overlying relation with the relatively wide flat deck portion **24** of the car.

The close central positioning of the rail members **19** on a flat deck car of conventional width such as shown in FIG. 2 leaves the remaining outer surface portions of the deck **24** available for use as wheel track areas for wheel supported lading such as trailers and the like. This type of arrangement is desirable where the railway car is to be used with lading other than containers, such as wheel supporting lading. However, when such a car is used solely with containers, the containers must be specially designed to exhibit the requisite strength in the bottom wall thereof to permit limited central support by the closely spaced rail members **19**. Furthermore, if the car of the type shown in FIG. 2 is ultimately used solely with containers, the overall weight of the car including the unused edge portions of the deck **24** is unnecessarily excessive.

FIG. 3 illustrates the basic lading supporting arrangement of the car **10** of FIG. 1 with the rail members **19** being limited to transverse spacing as controlled by the

width of the center sill **11**. The only advantage obtained from such an arrangement is the elimination of the additional outer edge deck plate portions of the car of FIG. 2. While this reduces the cost of the car **10** and the operational weight thereof, the disadvantage of special container construction is still present.

It is proposed by the present invention that a car of basic skeleton design be improved by the provision of special vertical load transmitting outrigger members which mount thereon, at any desired interval or location, longitudinally continuous outrigger stabilizing means preferably in the form of lading support means such as the rail members **19**. By use of load bearing outriggers in this manner, the overall weight and cost of the car is materially reduced as compared to a car having a deck plate of conventional width as shown in FIG. 2, and the advantages of basic skeleton car design are retained. FIGS. 4 and 5 schematically illustrate variable locations of rail members **19** which form a part of a conventional rack structure. Location of the container supporting means at the outer ends of the outrigger members **29** of FIGS. 4 and 5 places the rail members **19** in alignment with the vertical side walls of a container thus permitting full utilization of the strength characteristics of these side walls in effectively supporting the container. Plural intermediate locations for container support means, such as shown in FIG. 5, are also possible thus permitting accommodation of containers of different design and strength characteristics. In each selective location of the container support means the outrigger members transmit vertical load of containers or other lading to the center sill **11** of the skeleton car uniformly throughout the length of the car. Furthermore, where rail members **19** or other comparable longitudinally continuous members, such as the safety rods **23**, are suitably attached to the outrigger members in the manner to be described, the outrigger members are retained in their respective transverse vertical planes without undesirable distortion or displacement during normal car deflection under load. The rail members or such other equivalent longitudinal members stabilize the outrigger members longitudinally of the car permitting economical construction of the outrigger members essentially solely requiring vertical stability therein.

FIGS. 6–8 illustrate one form of outrigger member **29** and a preferred form of rail member support and hold down means **30**. The outrigger member **29** basically comprises a top horizontal channel member **31** extending outwardly from fixed attachment with the top plate **17** and adjacent side plate of the center sill **11**. A diagonal strut-like channel member **32** extends upwardly from attachment with the bottom plate of the center sill **11** and converges with the top channel member **31** laterally outwardly of the center sill **11**. Suitable gusset plates **33** interconnect the channel members **31** and **32** and the center sill **11** to reinforce the outrigger member **29**. The outer end of the top channel member **31** has attached thereto an outwardly projecting flat plate **34** which is recessed along the inner edge thereof to receive the outer end of the channel member **31** therein and for fixed attachment to the depending side flange portions thereof. The outer end of the diagonal channel member **32** may be provided with projecting reinforcing plates **35** (FIG. 6) which are suitably attached to the bottom surface of the flat plate **34** to rigidify and support the same adequately to permit transmission of vertical load to the center sill **11**.

The flat plate **34** is formed with a generally rectangular aperture **36** centrally thereof which has fixed therein a vertically directed, rectangular roller housing **37**. This housing as shown in FIG. 6 projects slightly above the top surface of the plate **34** and extends substantially downwardly below the plate **34**. A roller **38** is mounted therein on a shaft **39** suitably journaled at opposite ends in the roller housing **37**. The outer circumferential portion of the roller **38** projects from the top and bottom sur-

faces of the housing 37 and thus projects above the plate 34.

The bottom flat surface of the bottom flanged portion of a rail member 19 is in engagement with the roller 38 and is vertically supported thereby. The rail 19 is prevented from vertical and lateral displacement by inverted, generally L-shaped hold down members 40 which are in the form of flanged bracket-like plates and which are fixed to the top surface of the flat plate 34 to at least one side and preferably both sides of the roller 38. Reinforcing ribs 41 are attached to the outer surfaces of the bracket-like plates 40 and the top surface of the flat plate 34 to rigidly mount the plates 40 in operative position. The bracket-like hold down plates 40 extend upwardly from the flat plate 34 and inwardly partially over the roller 38 in vertically spaced overlying relation and are positioned in overlying relation relative to side margin flange portions of the rail member 19 but spaced therefrom to permit free longitudinal movement of the rail member relative to the car. The outrigger members 29 are mounted in paired relation on opposite sides of the center sill 11 and are longitudinally spaced along the car. Some or all of the outrigger members 29 may be provided with the roller assemblies described, these assemblies providing anti-friction means to permit relative movement between the rail members 19 of a rack assembly and a car longitudinally thereof. The tying of the rail members 19 to the outrigger members 29 not only prevents displacement of the rack assembly, but also imparts longitudinal stability to the outrigger members. Preferably, the outrigger members are stable vertically but are not necessarily rigid against lateral distortion. While the rail members will deflect with the car under load, the hold down members 40 will adequately prevent lateral displacement or excessive distortion of the outrigger members 29 longitudinally of the car.

With the basic fishbelly design of the center sill 11 described in connection with FIG. 1, the outrigger members will preferably be of modified design in the area of the wheel trucks 12. FIGS. 9 and 10 illustrate such a suitable outrigger member which is in the form of an I-beam 42 including a top flat flange portion 43. The outer end of the beam 42 is provided with a slot-like recess 44 in the top surface thereof in which the roller housing 37 is fixedly mounted. Horizontal gusset plates 45 extend from the center portion of the beam 42 into engagement with the projecting roller housing 37 to rigidify the same. In all other respects the rail member supporting and hold down assembly 30 is the same as that previously described.

The location of the rail member support and hold down assemblies 30 at the outer ends of the outriggers 29 and 42 in combination with the rack assembly as described above provides for container support along the outer side walls thereof as well as outrigger member stabilization. This arrangement further eliminates the necessity of using the side safety rods 23 of FIG. 1 as the longitudinally continuous rail members 19 are capable of performing the same safety function. Intermediate locations of the rail member support and hold down assemblies 30 along the outriggers 29 may be used where desired. FIG. 11 illustrates such an intermediate location wherein the assembly 30 is located just outwardly of the top plate 17 of the center sill 11 and is mounted in recessed relation in the top channel member 31. The converging outer ends of the channel members 31 and 32 are suitably connected to the longitudinal safety rod 23 previously described providing additional rail member support and hold down assemblies 30 are not mounted at the outer ends of the outrigger members as previously described. As shown in FIG. 11, the safety rods 23 are fixed to the outer ends of the outrigger members and are selected to permit tensioning thereof during car deflection to stabilize the outrigger members under load. This particular location of the assemblies 30 permits wider spacing between the rail members 19 depending upon the type of container to be supported on the car. Furthermore, it will be appreciated that the intermediate spacing may be used in conjunction with the spacing of similar assemblies 30 at the outer end of the outriggers as schematically illustrated in FIG. 5.

Another desirable use of the combined outrigger member and rail member support and hold down assembly described above is shown in FIG. 12. A slightly modified outrigger member 46 includes the same elements previously described which are identified with the same reference numerals. In this modification the top channel member 31 is inclined outwardly and downwardly in converging relation with the diagonal channel member 32 which is inclined upwardly at a lesser slope. The flat plate 34 is thus tilted but the elements of the rail member support and hold down assembly 40 remain substantially the same with the exception of proper dimensioning of the brackets 40 and reinforcing ribs 41. With the arrangement illustrated in FIG. 12, the top container engaging surface of the rail member 19 is located just slightly above the top surface of the plate 17 of the center sill 11. When containers are loaded on the car, the central bottom surface of each container is placed in slight vertical clearance with the top plate 17 of the center sill 11 to permit unimpeded relative movement therebetween. Howevr, the container is thus lowered to a substantial extent relative to the rails and the height of the container may be increased accordingly within limitations defined by the overpass clearance requirements of the car. This arrangement can be used either to lower the overall effective height of the car with containers thereon or permit an increase in height and capacity of containers mounted on the car.

FIG. 13 is similar to FIG. 6 but illustrates the use of a slightly modified rail member support and hold down assembly 47. FIG. 14 is similar to FIG. 12 while illustrating the use of the modified assembly 47. FIG. 15 is similar to FIG. 11 while illustrating the modified assembly 47. In each instance, similar reference numerals are used where applicable. Referring to these views, a different form of generally L-shaped rail member hold down bracket element 48 is used. This element includes an upstanding block member which in FIG. 13 is illustrated as being fixedly mounted on the outer edge portion of the flat plate 34. The upstanding block member in FIG. 14 is mounted on a transverse plate 49 fixedly attached to the roller housing 37 and extending outwardly therefrom. In FIG. 15 the use of a pair of bracket elements 48 positioned on opposite sides of the rail member 19 is illustrated, the vertical block-like members of these elements being fixedly attached on the flat top surface of the channel member 31. The top of each vertical block member has attached thereto an inwardly directed and upwardly inclined top block member 50 which extends over the adjacent bottom marginal flange of the rail member 19 in vertically spaced overlying relation. The undersurface of each block member 50 carries thereon a strip 51 of anti-friction material such as polytetrafluoroethylene. With this arrangement all surfaces likely to engage the rail member 19 are in the form of anti-friction surfaces thus permitting efficient longitudinal movement of the rail member relative to the car. Furthermore, the top block members 50 may be removably attached to the vertical block members to provide for ready assembly and disassembly of the rack structure on the car.

The foregoing deals with the use of roller means in providing anti-friction attachment of the rail members to the outrigger members of the car. It will be appreciated that other suitable anti-friction attachment means may be used in carrying out the basic principles of the invention. By way of example, FIG. 16 illustrates a known type of rail member hold down means 52 which is in the form of a bracket member having a horizontal base portion 53, an upstanding side portion 54 and an inwardly and

upwardly extending top portion 55. The top surface of the base portion 53 is centrally recessed to receive therein a spheroidal bearing plate 56 having mounted in the flat top surface thereof a pad 57 of anti-friction material such as polytetrafluoroethylene. The bottom flat surface of the rail member 19 is in engagement with the pad 57 and the shape of the bearing plate 56 permits limited universal movement of the pad relative to the fixed base portion 53 to accommodate deflection of the rail member during operation of the structure. The top portion 55 over extends in spaced relation the side marginal flange portion of the base of the rail member 19 to restrain the rail member from vertical and lateral displacement. The hold down means 52 may be staggered to opposite sides of the rail member 19 as illustrated. The means 52 may be mounted in any of the locations described above on the outrigger members 29.

FIGS. 17, 17A and 17B schematically illustrate the general layout of the improved rack assembly of the invention mounted on the improved skeletal-type car. The rail members 19 are suitably attached through the assemblies 30 to the outrigger members 29 in the manner previously described and extend to either side of the raised coupler housings 16 at the opposite ends of the car. The rail members 19 terminate short of the end sills of the car to permit longitudinal movement of the rack assembly relative to the car without the ends of the rails projecting beyond the outer ends of the car. Diagonal bracing members 58 may extend from attachment with the inner surfaces of the rail members 19 across the top plate 17 of the center sill 11 to laterally interconnect and brace the rail members.

Additional transverse guide members 59 extend at spaced intervals across the rack assembly in fixed attachment with the rail members 19. Each guide member 59, as best shown in FIG. 19, is provided with an inverted V-shaped top surface portion 60 presenting sloped outer surfaces functioning to guide the containers 28 into proper positioning along the rail members 19 during top loading thereof on the car. The bottom portion of each guide member 59 is formed with vertical side walls 61 extending into bottom edge attachment with the top surfaces of the spaced rail members 19. Each container 28 may be of the type provided with a transverse bottom edge rib 62 which provides for proper spacing between containers throughout the length of the car. This rib 62 also functions to reinforce the bottom wall of the container 28 and provide means for abutment and guided sliding engagement with adjacent surfaces of a guide member 59 during container loading and unloading. Each guide member 59 may be of hollow configuration formed from structural material such as metallic plates. Opposite ends of each guide member 59 are preferably of beveled configuration as shown in FIGS. 17, 17A and 17B to present container guiding surfaces in the event that containers are loaded from the sides of the car onto the rack assembly. The guide members 59 not only function in providing proper spacing of the containers along the car for proper weight distribution thereon, but also function as bolsters to provide added strength and structural continuity to the rail members 19.

Container attachment to the rack assembly is obtained by any suitable means such as a plurality of longitudinally spaced locking cones 63 mounted relative to the rail members 19. FIG. 18 illustrates a rail member 19 in elevation and the locking cones 63 mounted thereon. A single operating lever 64 extends along the outer surface of the rail member and is attached to cone operating links 65 extending through the rail member 19 into operative attachment with each cone 64. Movement of the lever 64 longitudinally of the rail member 19 results in simultaneous operation of the plurality of cones 63 attached thereto into and out of container locking position as will be described. Lever operating handles 66 are mounted at opposite ends of the car along the outer surface of each rail member 19 as shown in FIGS. 17 and 17B.

FIGS. 20, 21 and 23 specifically illustrate the locking cone arrangement including the operating means therefor. Each container 28 in a bottom surface portion thereof which extends over the rail members 19 is formed with a lock housing 67 as particularly shown in FIG. 20, this housing being generally concave and provided with horizontal spaced locking ledges 68. Each cone 63 is formed with at least a pair of oppositely directed latch-like locking flanges 69 adapted to overextend and engage the locking ledges 68 as shown in FIG. 20 to fixedly hold the container 28 in engagement with the rails 19. Rotation of the cone 63 90° to the position shown in broken lines in FIG. 21 places the flanges 69 in the space between the locking ledges 68 to permit ready vertical removal of the container out of engagement with the cone.

FIG. 23 best illustrates the manner in which each cone 63 is pivotally mounted on a rail member 19. The cone 63 is fixed to a spindle 70 which extends downwardly through a sleeve 71 which is fixedly mounted along the inner surface of a rail member 19 by plates 72. The bottom end of the spindle 70 projects outwardly from the bottom of the sleeve 71 and is provided with a suitable number of flat surfaces 73 so as to be shaped as a hex head or the like. The cone operating link 65 extends inwardly through a longitudinal slot 74 formed in the center vertical web portion of the rail member 19, this slot being of substantial length as best shown in FIG. 20. The inner end of the link 65 is suitably apertured for attachment to the flatted surfaces 73 of the bottom end of the spindle 70 for rotation thereof and rotation of the cone 63 upon movement of the link within the slot 74. The link 65 for each cone 63, as best shown in FIGS. 23 and 24, is pivotally attached through a bolt-like fastener 75 to the operating lever 64 which extends longitudinally along the outer surface of the rail member 19. This lever is of generally T-shape including a vertical outer portion and a horizontal inner flange portion 76. Movement of the lever 64 longitudinally of the rail member 19 results in pivoting the links 65 attached thereto and rotation of the cones 63 into and out of and out of container locking position.

The handle means 66 located at opposite ends of the car are, as best shown in FIGS. 20, 21 and 23, pivotally mounted at their opposite ends to bracket members 77 by fasteners 78. The bracket members 77 are fixedly mounted to outer extensions of adjacent cone operating links 65. The handle means, as best shown in FIG. 20, are arranged to be positioned vertically downwardly when not in use and, by reason of their pivotal attachment, can be raised into a horizontal position by the operator for simultaneous operation of all of the cones mounted on a single rail member 19 into or out of container locking position.

FIGS. 21 and 22 best illustrate a detent locking arrangement 79 which prevents inadvertent operation of the cones 63 when containers are locked thereby onto the car. A right angled locking finger 80 is pivotally mounted by a fastener 81 between ear-like flanges 82 mounted on a top guide plate 83 which overlies the top surface of the horizontal flange portion 76 of the operating lever 64. A bottom guide plate 84 is located below the flange portion 76, the guide plates 83 and 84 being fixedly mounted on the outer side surface of the center web portion of the rail member 19. Each guide plate 83 and 84 has formed therein a car seal aperture 85 adapted for alignment with a corresponding car seal aperture 86 formed in the flange portion 76 of the lever 64. The top edge of the outer vertical portion of the lever 64 is provided with a recessed slot 87 which is positioned directly below the locking finger 80 when the cones 63 are in container locking position. In this position the car seal slot 86 of the horizontal flange portion 76 of the lever 64 is aligned with the car seal slots 85 of the guide

plates 83 and 84. A suitable car seal may then be inserted through these aligned slots for shipping purposes. To unlock the cone operating system, it is necessary merely to remove the car seal and lift the locking finger 80 followed by operation of the lever 64 through a handle means 66.

Advantageous utilization of the basic principles of the present invention involving vertical load outrigger support of lading engaging means is shown in FIGS. 25–27. Referring particularly to FIGS. 25 and 26, a car 88 is illustrated as having mounted thereon a tiered multiple deck auto rack 89 which is indirectly of generally flexible construction. The car 88 includes the longitudinal center sill 90 and a plurality of oppositely directed vertical load receiving outrigger members 91 carrying at their outermost ends bracket-like rack support and engaging means 92. The center sill 90 is supported by spaced wheel trucks 93 for operation on rails 94 and opposite ends thereof carry transverse end sills 95 including couplers 96 mounted in raised coupler housings 97. The top surface of the center sill 90 has mounted thereon pairs of spaced abutment plates 98 of known type for use with a cushioning device 99 mounted in the lower deck of the auto rack 89. Any suitable cushioning device may be utilized, the device illustrated including a plurality of rubber cushions separated by metal plates and confined between abutment members 100 carried by the auto rack 89. When the rack is mounted on the car 88, the abutment plates 98 and abutment members 100 cooperate at opposite ends of the cushion assembly 99 to provide for controlled cushioned travel of the auto rack relative to the car longitudinally thereof.

The auto rack 89 is illustrated as including three decks 101, 102 and 103. These decks are vertically spaced by side frame members 104 suitably braced to provide adequate strength and rigidity to the rack. Guard rails 105 extend upwardly along the sides of the top deck 103. The bottom deck 101 is formed from a pair of spaced deck plates including along their inner margins longitudinal channel beams 106 defining guide surfaces for automobile loading thereon and means by which automobiles may be attached to the rack. The split bottom deck structure accommodates the raised coupler housings 97 at opposite ends thereof. The decks 102 and 103 as illustrated are formed from continuous deck plates including the longitudinal channel beams 106 attached thereto. The outer bottom side margins of the spaced deck plates of the bottom deck 101 have attached thereto longitudinally extending I-beams 107 of the same general configuration as the rail members 19 previously described. The I-beams 107 are adapted to be supported and retained by the hold down bracket means 92 as best shown in FIG. 26.

The hold down bracket means 92 constitute a continuation of the top plate members of the outrigger members 91 and are in the form of upstanding and inwardly projecting plate portions which overextend the outer bottom flange portion of each I-beam 107. Suitable anti-friction pad assemblies 108 are located between the bottom surfaces of the I-beams 107 and the outrigger member top plate portions to provide for efficient longitudinal relative motion between the auto rack 89 and the car 88. During such motion, the auto rack will of course change its position relative to the end sills 95 of the car 88. The auto rack 89 is of a length less than the distance between the end sills 95 to permit relative movement between the auto rack and the car without the rack overextending the couplers 96. As best shown in FIGS. 25 and 27, each end sill 95 is formed with an upstanding end sill plate which is joined with a horizontal rearwardly directed top plate portion 109 defining a recessed area below the same and the adjacent outriggers 91. The plate portion 109 is higher than the lever lower deck 101 of the auto rack 89 to permit an end of this lower deck to move therebeneath during cushioned travel. To provide for continuity between the top plate portion 109 and the deck plates of the bottom deck 101, a pair of spanning or bridge plates 110 are pivotally mounted to the top plate portion 109 at opposite ends of the car and are dimensioned to overextend the spaced deck plate portions of the lower deck 101. FIG. 27 best illustrates the design features described, it being understood that the spanning plates 110 permit ready loading and unloading of automobiles from the bottom deck 101. Furthermore, the spanning plates 110 may be pivoted upwardly into the vertical position illustrated in broken lines in FIG. 27 during assembly or disassembly of the auto rack 89 relative to the car 88. Relative movement of the auto rack 89 on the car 88 provides for movement of the bottom deck 101 beneath the spanning plates 110 and the adjacent top plate portion 109. Any suitable type of hinge connection 111 may be used in attaching the spanning plates 110 to the adjacent plate portion 109.

The auto rack mounting arrangement described is illustrative of utilization of a flexible container-type system on a skeletal-type car thus reducing the total weight and cost of the assembly. The auto rack flexes or deflects with the center sill 90 under load and is uniformly supported longitudinally of the car by the outrigger members 91 which in turn provide for uniform loading of the center sill. In addition, the auto rack stabilizes the outrigger members longitudinally of the car in the manner described above with regard to the rack assembly 18. This arrangement further permits full space utilization of the bottom deck 101 of the auto rack by eliminating the necessity of having curved or angled side frame portions to accommodate side sill structures on the supporting car. The advantages of supporting the auto rack along the vertical side wall areas thereof are present similarly as with the container supporting arrangements described above.

Obviously certain modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. A railway car of skeletal design comprising a longitudinal center sill supported by spaced wheel trucks and constituting the sole main structural member of said car to accommodate operational forces applied thereto, a plurality of longitudinally separated and spaced laterally projecting rib-like outrigger members mounted on said center sill along opposite sides thereof continuously along said car to transmit vertical load to said center sill uniformly therealong, longitudinally continuous and structurally non-rigid members mounted on said outrigger members for movement relative thereto and to said car longitudinally thereof, said non-rigid members adapted to receive a load carrying structure thereon for movement therewith along said car and to transmit localized vertical load through said outrigger members to said center sill, anti-friction hold down means mounted on said outrigger members and engaging said non-rigid members to vertically and laterally confine the same but permit movement thereof along said car, and cushion means interconnecting said non-rigid members and said car to control longitudinal relative movement therebetween.

2. The car of claim 1 wherein said non-rigid members are a part of a container supporting sliding rack assembly, said non-rigid members being in the form of laterally interconnected longitudinally extending rail members having bottom surface portions in engagement with said anti-friction hold down means.

3. The car of claim 1 wherein said non-rigid members are a part of a container supporting sliding rack assembly, said non-rigid members being in the form of laterally interconnected longitudinally extending rail members having bottom surface portions in engagement with said anti-friction hold down means, the lateral interconnec-

tions of said rail members including upwardly projecting and longitudinally spaced container guide means extending transversely of said rack assembly.

4. The car of claim 1 wherein said non-rigid members are a part of the bottom framework of a multiple deck flexible frame structure which overlies said center sill and outrigger members.

5. In a railway car of skeletal design comprising a longitudinal center sill supported by spaced wheel trucks and constituting the sole main structural member of said car to accommodate operational forces applied thereto, the improvement comprising a plurality of longitudinally separated and spaced laterally projecting rib-like outrigger members mounted on said center sill along opposite sides thereof continuously along said car to transmit vertical load to said center sill uniformly therealong, and longitudinally continuous and structurally non-rigid members mounted on said outrigger members adapted to receive a load carrying structure thereon to transmit localized vertical load through said outrigger members to said center sill, said outrigger members being continuously interconnected longitudinally of said car at least adjacent the outermost end portions thereof by means which stabilize said outrigger members against distortion relative to said center sill during transmission of vertical load.

6. A railway car of skeletal design comprising a longitudinal center sill supported by spaced wheel trucks and constituting the sole main structural member of said car to accommodate operational forces applied thereto, a plurality of longitudinally separated and spaced laterally projecting rib-like outrigger members attached to said center sill along opposite sides thereof continuously along said car to transmit vertical load to said center sill uniformly therealong, a non-rigid rack assembly formed from at least a pair of laterally spaced and interconnected rail members mounted on said car and extending continuously longitudinally thereof, cushioning means interconnecting said rack assembly and said car for controlled longitudinal relative movement therebetween, and anti-friction support means mounted on said outrigger members and engaging said rail members in vertically supporting relation while permitting relative longitudinal movement between said rack assembly and car, each of said support means comprising a roller rotatably mounted in partially recessed relation on a top plate portion of an outrigger member, and rail member tie-down means in the form of substantially inverted L-shaped members located to at least one side of each roller and extending above and over the same into overlying relation with the bottom flange portion of a rail member to confine a rail member to an outrigger member.

7. A railway car of skeletal design comprising a longitudinal center sill supported by spaced wheel trucks and constituting the sole main structural member of said car, a plurality of longitudinally separated and spaced laterally projecting rib-like outrigger members attached to said center sill along opposite sides thereof continuously along said car to transmit vertical load to said center sill uniformly therealong, a flexible vertically tiered multiple deck rack assembly mounted on said car longitudinally thereof and laterally overextending said center sill in overlying relation with said outrigger members, bottom side margins of said rack assembly being provided with longitudinally continuous rail-like members having outwardly projecting bottom edge longitudinal flange portions, rack assembly tie-down means mounted on said outrigger members and extending upwardly and inwardly over said bottom edge flange portions of said rail-like members to prevent vertical and lateral displacement of said rack assembly from said car and distortion of said outrigger members while permitting longitudinal relative movement between said rack assembly and car, and cushion means interconnecting said rack assembly and car and providing for controlled longitudinal relative movement therebetween, each of said tie-down means including anti-friction means on which said rack assembly rests in vertically spaced relation to said center sill and outrigger members.

8. A railway car of skeletal design comprising a longitudinal center sill supported by spaced wheel trucks and constituting the sole main structural member of said car to accommodate operational forces applied thereto, a plurality of longitudinally separated and spaced laterally projecting rib-like outrigger members attached to said center sill along opposite sides thereof continuously along said car to transmit vertical load to said center sill uniformly therealong, a flexible vertically tiered multiple deck rack assembly mounted on said car longitudinally thereof and laterally overextending said center sill in overlying relation with said outrigger members, bottom side margins of said rack assembly being provided with longitudinally continuous rail-like members having outwardly projecting bottom edge longitudinal flange portions, rack assembly tie-down means mounted on said outrigger members and extending upwardly and inwardly over said bottom edge flange portions of said rail-like members to prevent vertical and lateral displacement of said rack assembly from said car and distortion of said outrigger members while permitting longitudinal relative movement between said rack assembly and car, cushion means interconnecting said rack assembly and car and providing for controlled longitudinal relative movement therebetween, each of said tie-down means including anti-friction means on which said rack assembly rests in vertically spaced relation to said center sill and outrigger members, and spanning plates pivotally mounted at opposite ends of said car in overlying relation with the end portions of the bottom deck of said rack assembly, the end portions of said bottom deck being slidable under said spanning plates during relative longitudinal movement between said rack assembly and car.

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