March 23, 1971 R. E. SLAGER 3,572,254

BRIDGE PLATE CONSTRUCTION

Filed Dec. 16, 1968 3 Sheets-Sheet 1

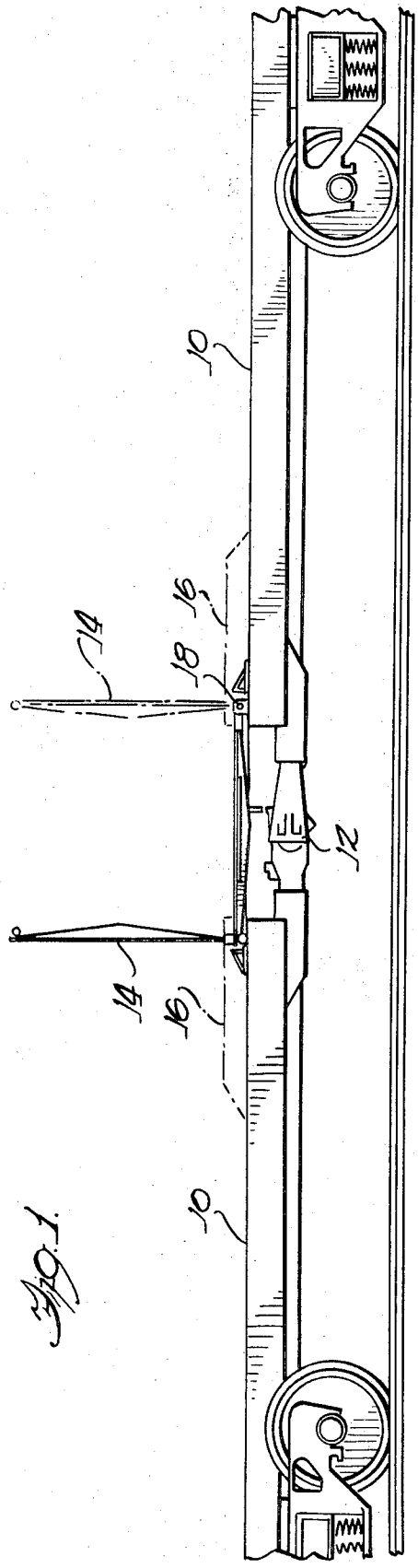


Fig. 1.

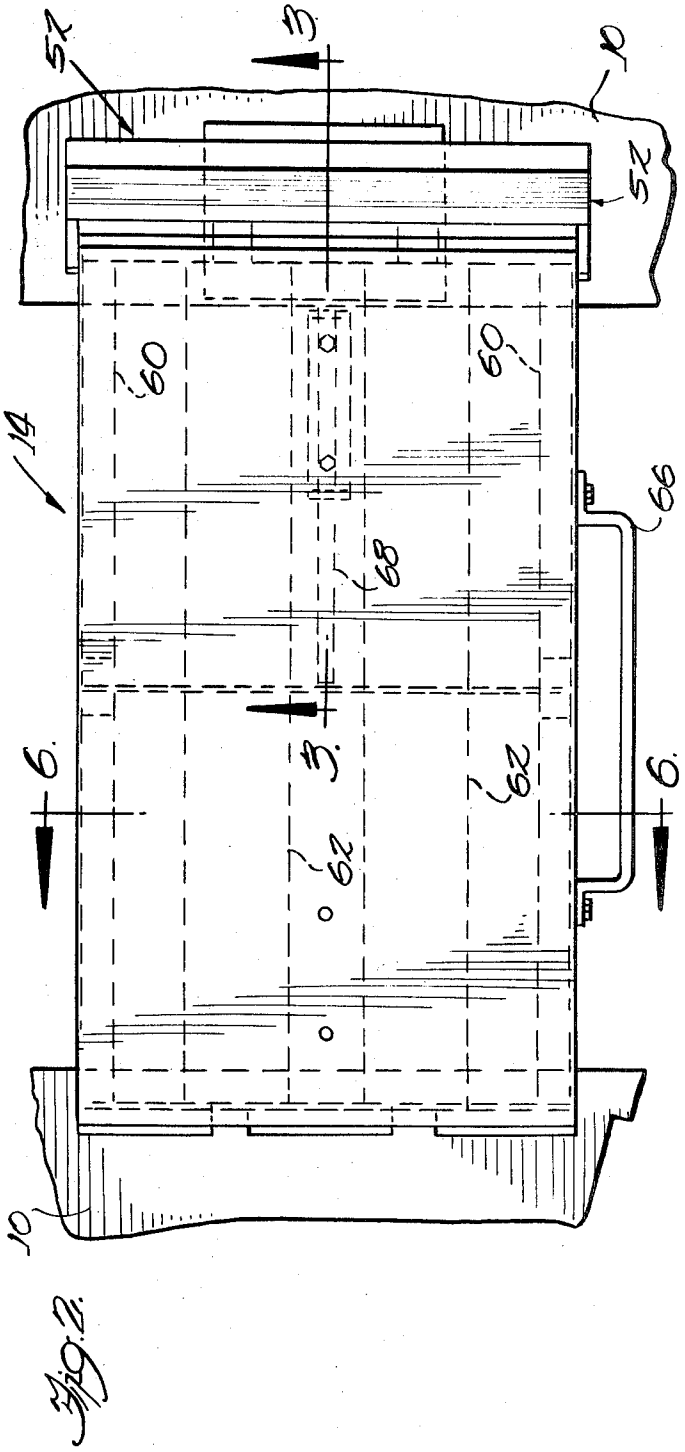


Fig. 2.

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Fig. 3.

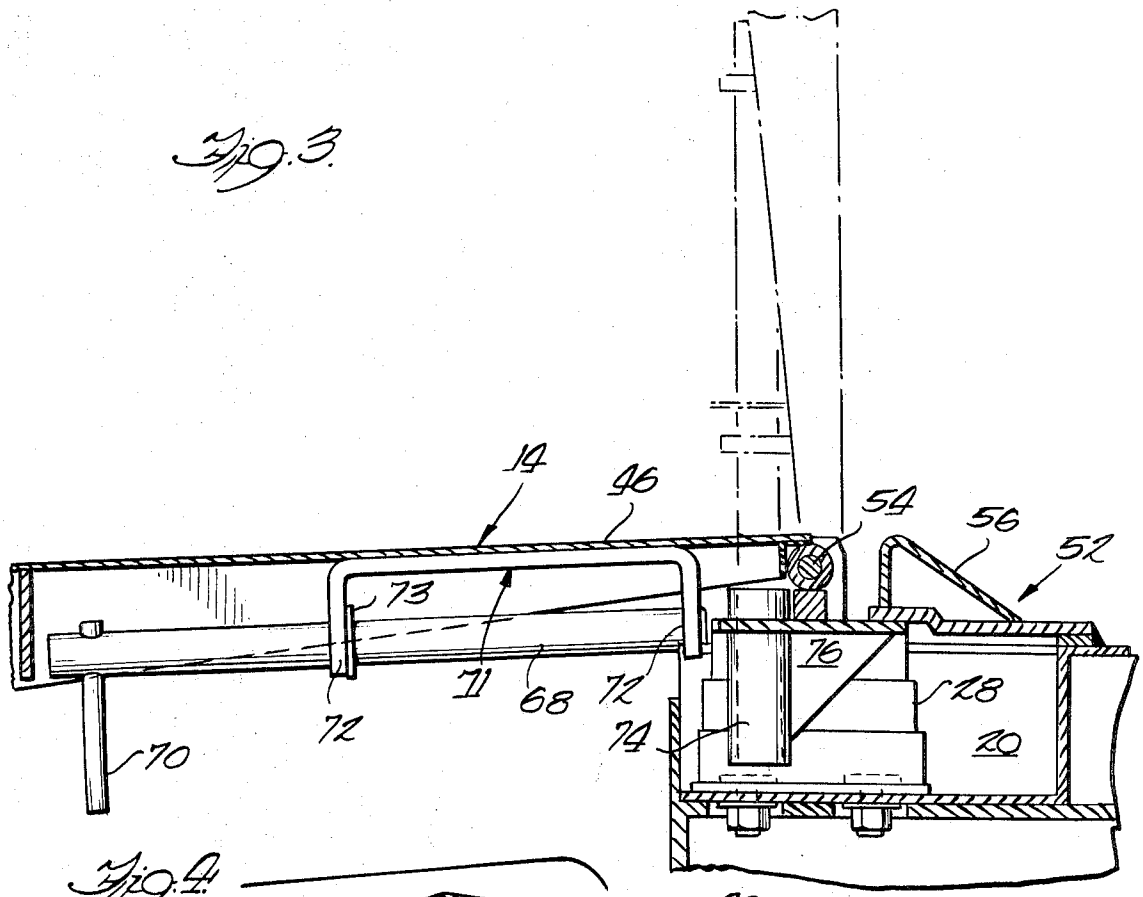
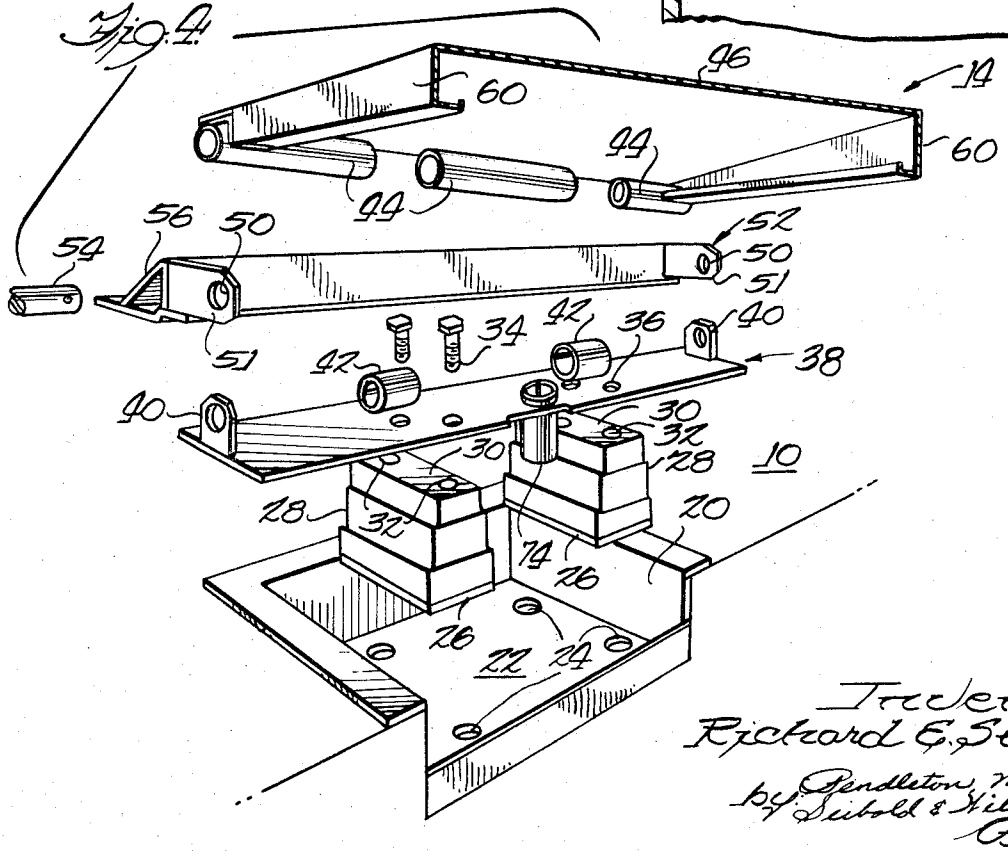


Fig. 4.



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Fig. 5.

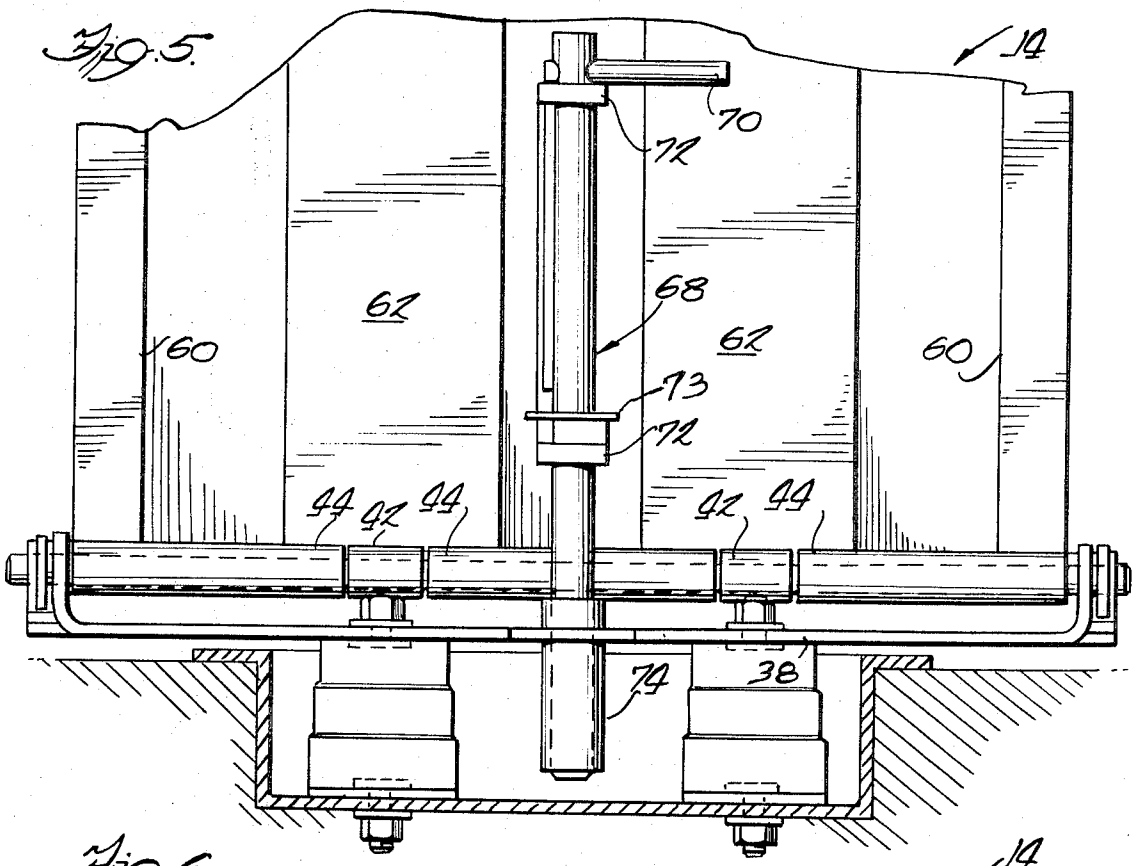


Fig. 6.

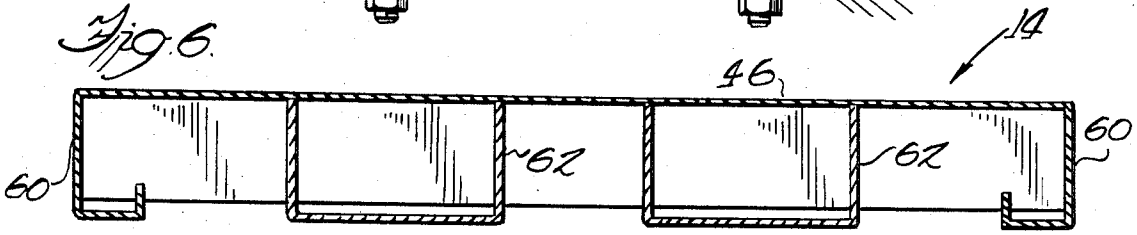
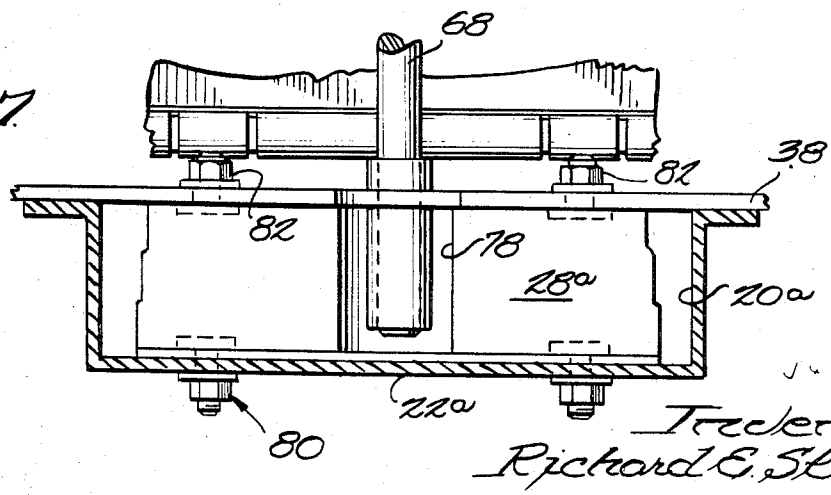


Fig. 7.



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BRIDGE PLATE CONSTRUCTION

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U.S. Cl. 105—458 3 Claims

ABSTRACT OF THE DISCLOSURE

A bridge plate adapted to span the interval between two railway flatcars or the like when in a lowered horizontal position is pivotally mounted on an end corner portion of each of such cars. The bridge plate pivotally engages a hinge plate which is secured to a resilient mounting anchored to a suporting flatcar surface. The resilient mounting enables the bridge plate and connected hinge plate to rotate while such plate is in a horizontal lowered position, as when the two cars negotiate a curved track section.

BACKGROUND OF THE INVENTION

This invention relates to a bridge plate assembly for use on a flatcar, and more particularly relates the use of resiliently mounted plates which provide for novel rotary movement which obviates plate damage.

The railroad industry has long been confronted with a breakage problem relating to bridge plates employed between flatcars adapted to haul loaded trailers and other vehicles. In these "piggy-back" flatcars the trailers to be transported by rail are moved by a positioning cab from flatcar to flatcar over spaced tracks or bridge plates which bridge the gap between the flatcars and are then fixed in position on the flatcars. One plate is mounted on each end of each flatcar and is pivotally movable into a substantially vertical position during nonuse as when the flatcars are in motion over the rails.

Each bridge plate when in a lowered position lies between raised side railings employed for guiding the trailers in moving from car to car. The bridge plates are necessarily of substantial weight to afford desired strength and oftentimes left in a lowered position of use by the workman after the trailers have been loaded onto the flatcars. As a consequence of such negligence, the pivotal connections of the plates are sheared, or the plates bent or otherwise damaged and at times lost when the trains negotiate curved sections of track.

In accordance with this invention a novel bridge plate assembly is provided which enables the hinged connection of the bridge plate to the flatcar to rotate and laterally move when torque is imparted to such connection. The latter "give" prevents damage to the plate or hinged connection. The resilient bridge plate mounting also permits limited axial movement of the plate and hinge assembly in the horizontal plane without damage as will hereinafter be explained in greater detail.

It is an object of this invention, therefore, to provide a novel bridge plate for a railway car which is adapted to bridge the gap between railway cars when in a lowered position and which is adapted to laterally move relative to the base of its resilient mounting when the cars on which disposed move out of axial aligment.

It is another object of this invention to provide a novel mounting for a bridge plate or the like for use on a railway car which may resiliently move in a number of axial directions without damage to the plate or such mounting.

It is a further object of this invention to provide a resilient mounting for a railway bridge plate or the like which is simple in details of construction, possesses high strength characteristics and is substantially impervious to damage in the normal course of use thereof.

The above and other objects of this invention will become more apparent from the following description when read in the light of the accompanying drawings and appended claims.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side elevational view illustrating bridge plates formed in accordance with this invention mounted on adjacent ends of coupled flatcars;

FIG. 2 is a top plan view of one of the bridge plates illustrated in FIG. 1 in the lowered position of use;

FIG. 3 is a fragmentary setcional view of a bridge plate made in accordance with this invention;

FIG. 4 is an exploded view illustrating the components employed in the construction of a bridge plate made in accordance with this invention and the resilient mounting therefor;

FIG. 5 is a fragmentary elevational view illustrating a bridge plate made in accordance with this invention in the vertical position of nonuse with a locking pin in place;

FIG. 6 is a sectional view taken on line 6—6 of FIG. 2; and

FIG. 7 is a fragmentary sectional view partly in elevation illustrating a modified type of resilient mounting adapted to be employed with the bridge plate of this invention,

DESCRIPTION OF THE INVENTION

Referring now more particularly to FIG. 1, two flatcars **10** are illustrated coupled together by coupling **12** which are adapted to haul trailers, trucks, or other vehicles for purposes of effecting what is known as a "piggy-back" service wherein vehicles are driven onto the flatcars and when reaching the destination point, are driven off for normal trailer use including delivery of goods which may be in the trailer during rail transport. In such "piggy-back" service quite often many cars of a train are flatcars having mounted thereon the trailers, trucks, or other vehicles transported.

To enable the vehicles to pass from flatcar to flatcar it is necessary that a means be employed so that the vehicles may be driven from the end of one car onto the adjacent end of the next car of the train. To permit such passage from car to car each of the cars of such a "piggy-back" train is equipped with a bridge plate which is pivotally mounted on one end of the car. When the car ends are coupled as the cars **10** of FIG. 1, each bridge plate of each car is lowered so as to engage the end of the adjacent car. It is apparent that each bridge plate will be disposed on a lateral end portion of the car so that when the two cars are coupled the two plates in the lowered position will define spaced track members over which the vehicles may be driven. It will be noted from FIG. 1 that when the bridge plates **14** are in the lowered position spanning the gap between the two flatcars **10**, each plate will be disposed between opposed, raised railing portions **16** illustrated in dotted lines in FIG. 1, which function as guides for assisting the movement of the vehicles from flatcar to flatcar.

In the normal course of car loading, the vehicle is driven onto the end of the terminal flatcar of the "piggy-back" train and driven to the farthest flatcar. If an automobile, it is driven onto a supporting rack or the like to which the vehicle may be secured in place in the course of rail movement. No supporting rack is employed if the vehicles are large trailers. In the course of the loading, the bridge plate such as the plates **14** illustrated in FIG. 1, are in the lowered position such as the position assumed by the right-hand plate of FIG. 1. After the loading is completed it had heretofore been necessary that the bridge plate be raised to an elevated position such as that assumed by the left-hand bridge plate **14** of FIG. 1.

Inasmuch as the bridge plates are of sturdy construction in order to support the weight of loaded trailers passing between cars, they are necessarily of great weight. As a consequence, quite often in the past a bridge plate which was intended to be raised into the vertical position in the course of train movement was left in the lowered position of use with the train in motion and after the vehicles had been loaded onto the flatcars.

As a result, as such a train negotiated curved sections of track, adjacent coupled cars such as the cars **10** of FIG. 1 would no longer be in axial alignment as on a straight section of track, and in the course of moving over such a curved section of track, the lowered bridge plates would be sheared from their hinge pins or the plates would be bent or otherwise damaged. In some instances the plates would fall between the cars of the trains and result in derailing of a portion, if not all, of the train.

In accordance with this invention, a bridge plate is provided which is resiliently mounted whereby the bridge plate may laterally move or "give" in the event that same is inadvertently left in the lowered horizontal position of use while the train is in motion and negotiating curved sections of track. The latter deformation of the resilient mounting will prevent shearing of the hinge or pivot pin of the bridge plate, resulting in deformation only of the resilient mounting in the absence of any damage to the bridge plate or other hinged components of the bridge plate assembly.

The exploded view of FIG. 4 provides a clear understanding of the elements of the resilient mounting provided in the bridge plate assembly of this invention. Disposed in each end of a flatcar is a well **20** such as is illustrated in FIG. 4, comprising a plate-lined recess in the floor of the flatcar at the site at which the bridge plate is to be pivotally mounted. The well **20** may have a metal plate bottom **22** which is suitably apertured as at **24** for purposes of receiving the threaded end of a stud or bolt. As is also seen in FIG. 4, the apertures **24** are arrranged in two spaced pairs which are adapted to coincide with apertures formed in a bottom attaching plate **26**, such plates being fixedly secured as by an epoxy adhesive or the like to the bottom surface of resilient mountings **28**.

Attached to the top surface of mounting members **28** is an upper attaching plate **30** having tapped openings **32** adapted to engage the threaded end limits of an attaching means such as illustrated bolt members **34**. Bolt members **34** are adapted to engage the threaded apertures **32** after traversing openings **36** disposed in hinge plate **38**. Hinge plate **38** has attached thereto at opposed ends projecting lugs **40** as well as spaced collar portions or knuckles **42** adapted to inter-fit between collar portions or knuckle portions **44** welded or otherwise secured to the undersurface of top plate **46** of bridge plate **14** as shown in FIG. 4.

After the knuckle portions **44** and **42** are placed in axial alignment, lug apertures **50** of lugs **51** of approach ramp **52** are also placed in axial alignment with the knuckle portions so that a hinge pin such as hinge pin **54** fragmentarily illustrated in FIG. 4, may traverse the aligned openings in the lugs **51**, lugs **40**, knuckle portions **44** of the bridge plate, and knuckle portions **42** of the hinge plate **38**. The pin is locked in place by cotter pins or other suitable locking means not illustrated.

It will be noted from FIG .4 that inclined surface portion **56** of the approach ramp **52** projects in an opposite direction from the interposed hinge pin **54** than does the bridge plate **14**. As will be seen from FIG. 3, a vehicle in the course of moving over bridge plate **14** will first move over inclined portion **56** of the approach ramp **52** and onto the potrion of the bridge plate **14** which is hinged adjacent the connection with hinge plate **38** by means of the pin **54**.

It will also be noted from FIG. 4 that each bridge plate **14** has integrally formed with the top plate portion **46** thereof opposed side-reinforcing channel portions **60**.

Such integral construction obviates the necessity of welding side reinforcing channels to the top plate portion thereby preventing sites of corrosion and failure in the bridge plate assembly. Such integral construction also reduces to a desirable minimum the weight of the bridge plate **14** which must be raised by the trainmen.

Additional reinforcement may be afforded to the bridge plate **14** by means of longitudinal reinforcing channels **62**, most clearly seen in the sectional view of FIG. 6, which may be welded or otherwise suitably secured to the undersurface of the top plate portion **46** of the bridge plate **14**. To facilitate raising of the pivotally mounted bridge plate **14**, handle portion **66** such as are illustrated in FIG. 2, may be bolted or otherwise suitably secured to portions of the reinforcing channel portions **60** integrally formed with the top plate portion **46** of the bridge plate **14**.

After the bridge plate has served its intended function in the loading of a train with vehicles, it should be raised into the vertical position illustrated in FIG. 1 and in dotted lines in FIG. 3. FIG. 5 most clearly illustrates locking pin members **68** having a handle portion **70** which is retained to the undersurface of the bridge plate **14** by means of retaining bracket **71** having spaced arm portions **72** (see FIG. 3). Locking ring **73** secured to a peripheral portion of pin **68** prevents disengagement of the pin from bracket **71**. It is the function of the terminal portion of locking pin **68** to be received in the locking tubular portion **74** which is welded or otherwise suitably secured to hinge plate **38** in the manner most clearly seen in FIGS. 3 and 4. Locking tube **74** is fixedly secured to the hinge plate **38** with the assistance of a reinforcing web **76** most clearly seen in FIG. 3.

It has been found that by employing the spaced resilient mountings **28**, hinge plate **38** may pivot or rotate relative to the resilient mountings **28** on which supported in the event that the bridge plate is inadvertently left in a lowered horizontal position of use as the train negotiates a curved section of track. Inasmuch as the bridge plate **14** and the connected hinge plate **38** will rotate as a unit together with approach ramp **52** and hinge pin **54**, no damage will result to the various components of the hinge plate assembly, but instead any shear force will be absorbed by the deformed bodies of the resilient mountings **28**.

In accordance with this invention it is intended that the resilient bodies **28** be capable of rotating to either side of a longitudinal axis coincident with the central longitudinal axis of the bridge plate **14**, through an angle of at least about 21 degrees. Such capability to rotate will prevent damage to opposed edge portions of the bridge plate **14** by bending, jamming, etc. with the raised railing portions **16**, see FIG. 1, of the flatcars as the flatcars travel a curved section of track. Also, as above pointed out, inasmuch as the turning movement of the train will be absorbed by the resilient mountings, no shear forces will be exerted on the hinge pin **54**. As a result, it is seen that even should the bridge plate **14** be left in a lowered position of use while the train is in motion, no damage will result to any component of the hinge plate assembly.

FIG. 7 illustrates a modified resilient mounting for a bridge plate member in which a single integral resilient mounting **28***a* having a central recess **78** may be fixedly secured to bottom **22***a* of illustrated well **20***a* by means of nut and bolt assemblies **80** having the bolt portions thereof fixedly embedded in the bottom portion of the integral mounting **28***a*. Similarly, nut and bolt assemblies **82** having the bolt portions thereof fixedly secured to the upper surface portions of the integral resilient mounting **28***a* may function to secure hinge plate **38** to the upper surface portion of the integral resilient mounting **28***a*.

Regardless of whether the integral mounting **28***a* of FIG. 7 or two or more mountings are employed, it will be seen that as the hinge plate and attached bridge plate rotate relative to such resilient mounting, a torque will develop in the body of the resilient mounting, developing a turning couple at the two points of attachment tending

to return the rotated bridge plate and hinge plate assembly to the original position in which the bridge plate is in axial alignment with the axis of the flatcar.

In addition to obviating damage to the bridge plate when the same is in a lowered horizontal position as the train negotiates curved sections of track, it should be appreciated that due to the variance in the heights of the beds of flatcars, it is desirable that the bridge plate be capable of deflecting above or below the horizontal position a distance of about at least 8 inches. Thus it will be seen in FIG. 3 that the lowered bridge plate is not in a true horizontal position. The bridge plate **14** is capable of depending below the horizontal position by virtue of its resilient connection to the illustrated resilient mounting **28** as seen in FIG. 3.

Still further, it should be appreciated that in train start-ups quite often the interval between cars is such as the car adjacent the engine moves prior to the car farther from the engine, resulting in dropping of the unsupported edge of a bridge plate, which has been left in a down position, between cars. As the plate-bearing car receives a pulling force, the gap between the cars is closed and an axial thrust is imparted to the downwardly inclined bridge plate because of its engagement with the end of the car closer to the driving engine. If such bridge plate were not resiliently mounted so as to provide for axial movement, the bridge plate would be damaged and even sheared free from its hinge connection with the hinge plate portion of the plate assembly. By virtue of the fact that the resilient mounting provides resilient twisting movement and also axial movement in any direction, no damage will result to the plate under the aforesaid circumstances.

Also, assuming that the bridge plate is in a vertical position of nonuse, in the event of such start-ups of the train from a stationary position, the resilient mountings will prevent shearing action from being effected at the point of engagement between the locking pin and its locking tubular member **74**.

It is seen, therefore, from the foregoing description that a novel bridge plate assembly has been provided which is of maximum strength and minimum weight and so mounted as to substantially obviate damage of any kind when the bridge plate is inadvertently left in a lowered position of use after loading of vehicles thereover has been completed and the train is moving over a track. Upon negotiating curved sections of track, the resilient mountings enable rotary relative movement to be effected between the hinge plate portion and the bridge plate on the one hand, and the resilient mounting on the other. As a result, there will be a complete absence of any shear forces tending to break the pin or otherwise damage the bridge plate **14**.

It is apparent that a number of modifications may be made in the illustrated apparatus such as the elimination of discrete nut and bolt securing means for securing the resilient mountings to the well bottom and to the hinge

plate portion of the assembly. Conceivably an adhesive may be used to secure the hinge plate directly to the upper surface portion of the resilient mounting and may also be employed for securing the bottom surface of the resilient mountings to the bottom of the well portions formed in the flatcars. Other attaching means may be used and will suggest themselves to those skilled in the art.

I claim:

1. In a bridge plate assembly for a railway car or the like having a substantially planar upper surface the combination comprising a bridge plate, a resilient mounting for one end of said bridge plate, said mounting having a lower portion thereof fixedly secured in a recess disposed in said railway car whereby the upper end of said mounting is substantially coplanar with said upper surface, a hinge plate positioned between said bridge plate one end and said resilient mounting; said hinge plate engaging said bridge plate and said mounting whereby said bridge plate may pivot to a position substantially perpendicular to said railway car planar surface, said resilient mounting being deformable between the points of attachment to said bridge plate and said recess whereby said bridge plate and connected hinge plate may rotate and move axially relative to said railway car on which mounted; and an approach ramp rotatable with and connected to said bridge plate comprising an inclined surface portion leading from said railway car planar surface to said bridge plate.

2. The bridge plate assembly of claim **1** in which the means for connecting said bridge plate with said hinge plate and said approach ramp rotatable with said bridge plate comprises a hinge pin.

3. The bridge plate assembly of claim **1** in which an axially movable locking pin is secured to the undersurface of said bridge plate, and a tubular member secured to said hinge plate is disposed in said recess and adapted to receive an end of said pin when said bridge plate is in said perpendicular position.

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14—71; 105—368(B)