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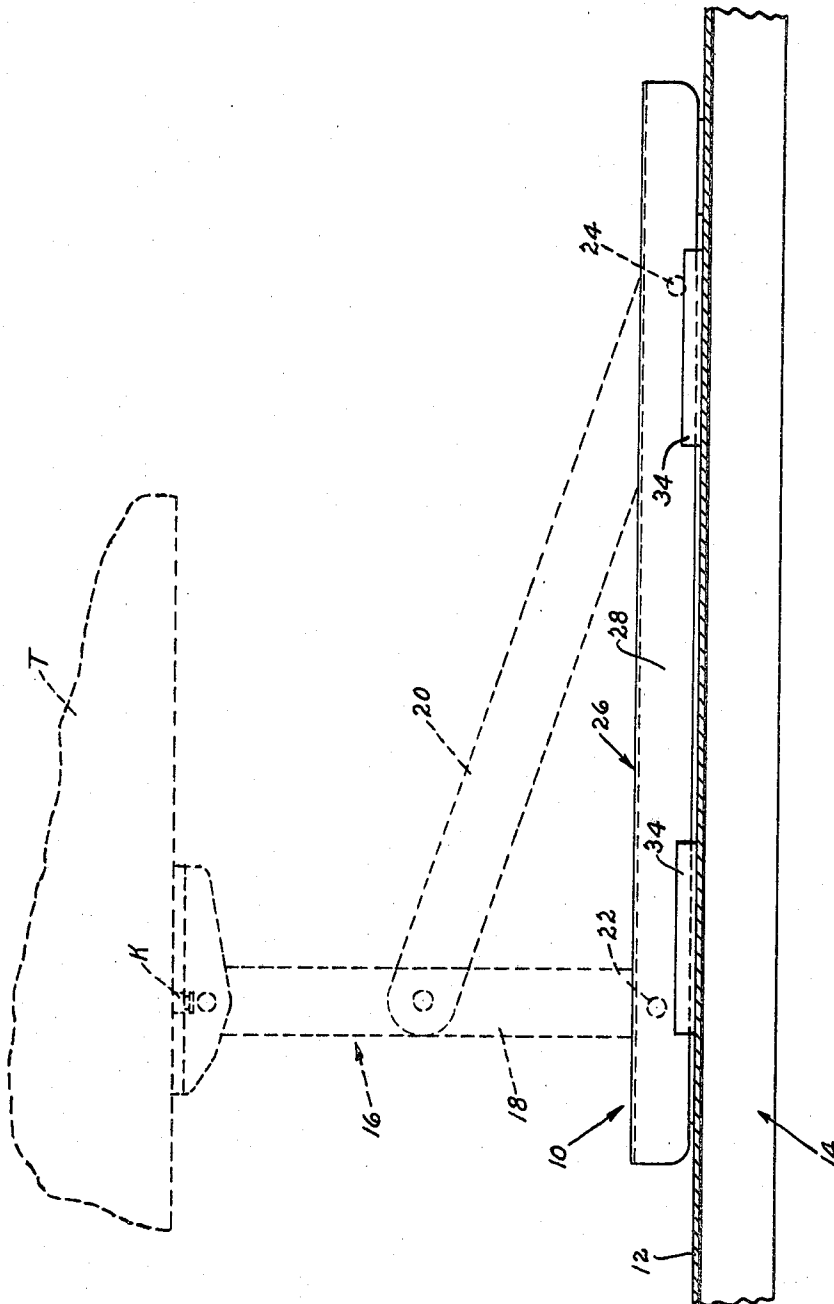
J. C. HAMMONDS

3,479,969

CUSHIONED SUPPORT STRUCTURE FOR RAILWAY CAR

Filed Nov. 24. 1967

6 Sheets-Sheet 1



INVENTOR.
JAMES C. HAMMONDS

Eugene N. Biddle

ATTORNEY

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J. C. HAMMONDS

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CUSHIONED SUPPORT STRUCTURE FOR RAILWAY CAR

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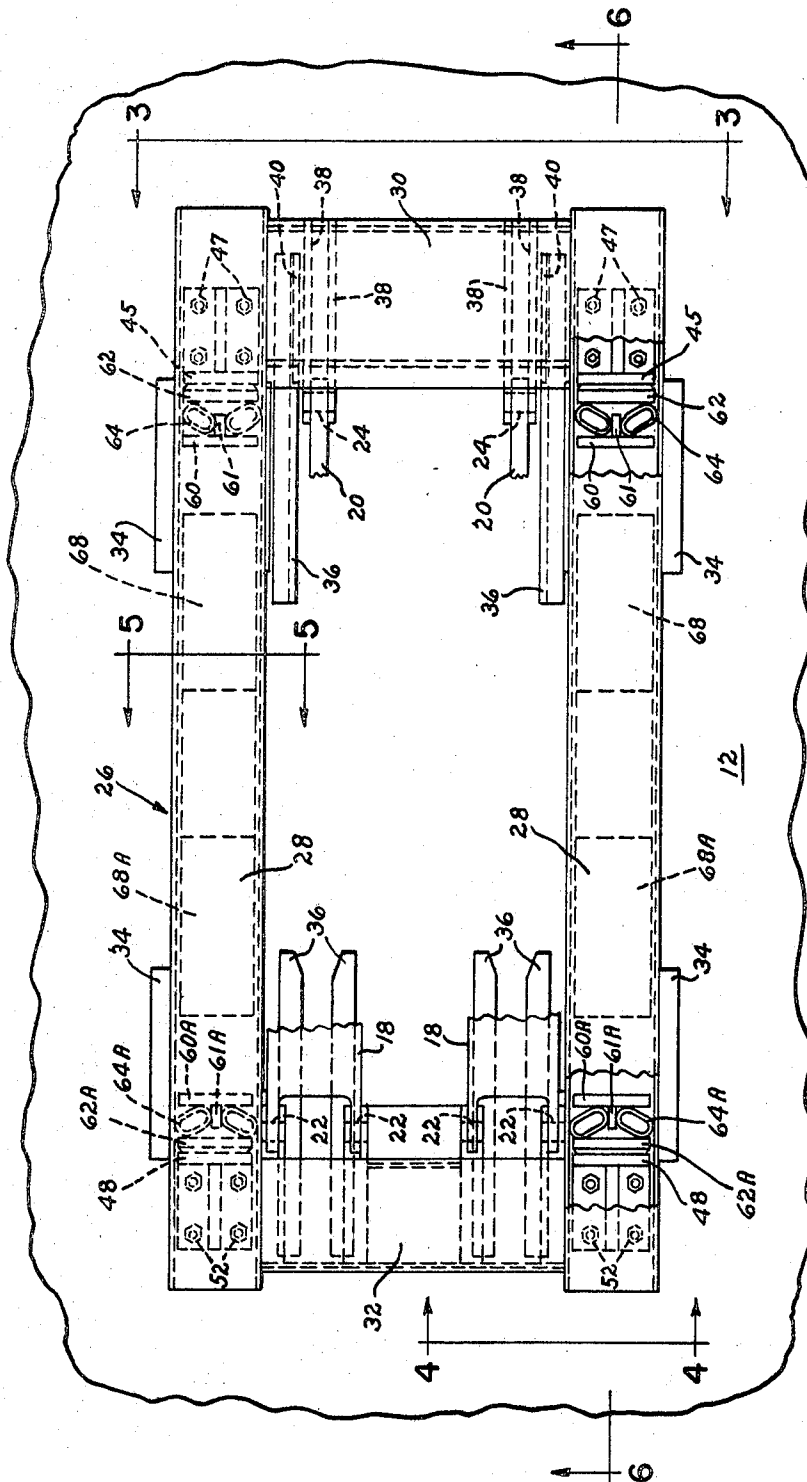


FIG. 2.

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CUSHIONED SUPPORT STRUCTURE FOR RAILWAY CAR

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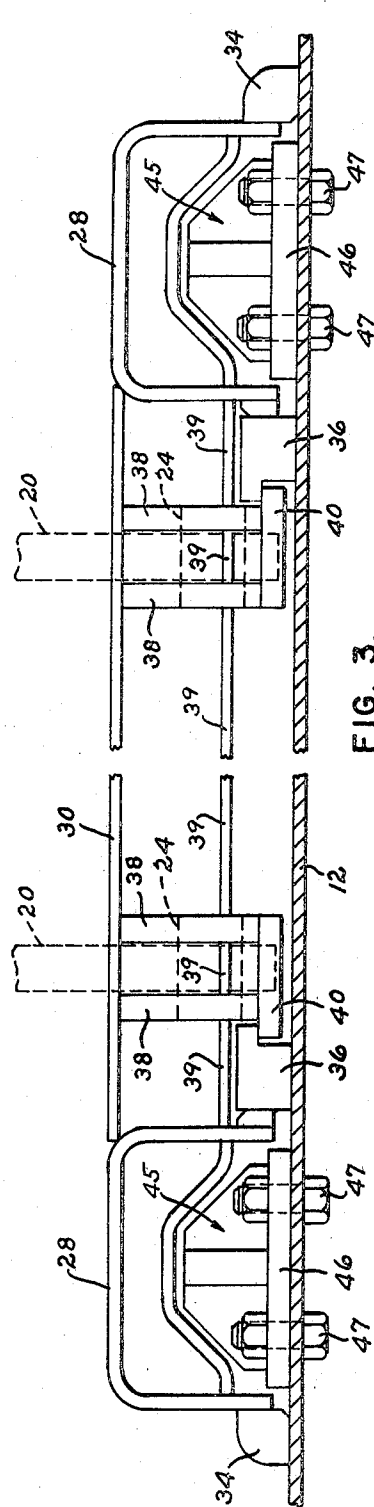


FIG. 3.

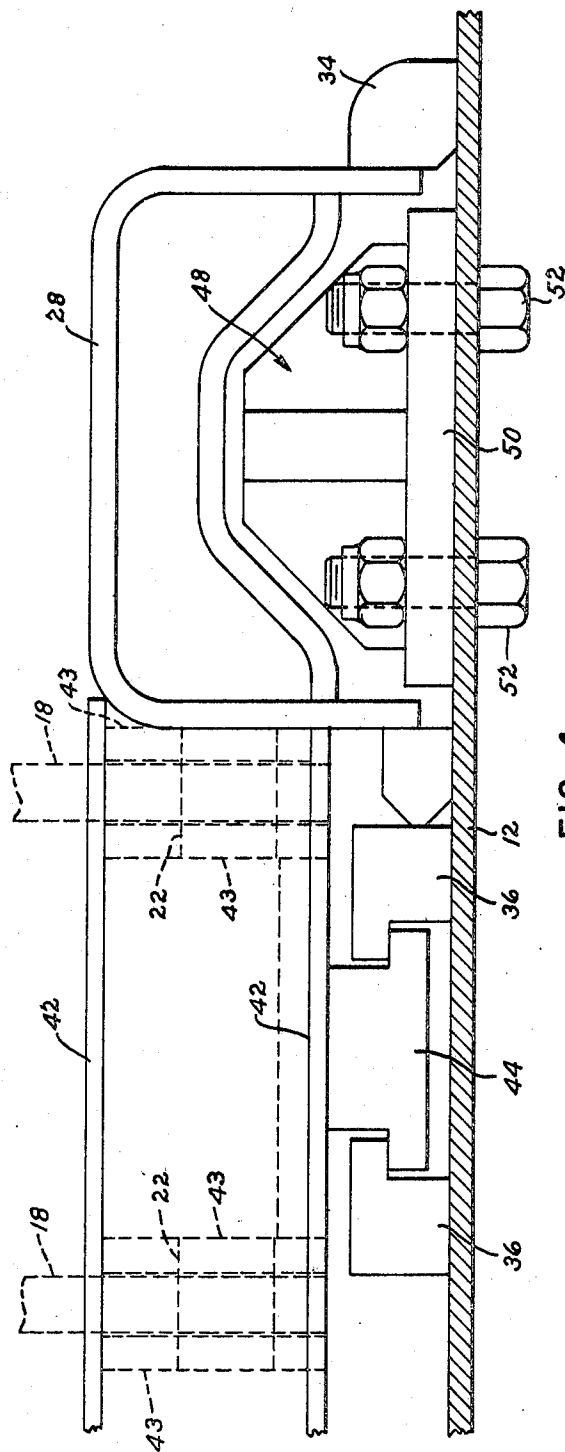


FIG. 4.

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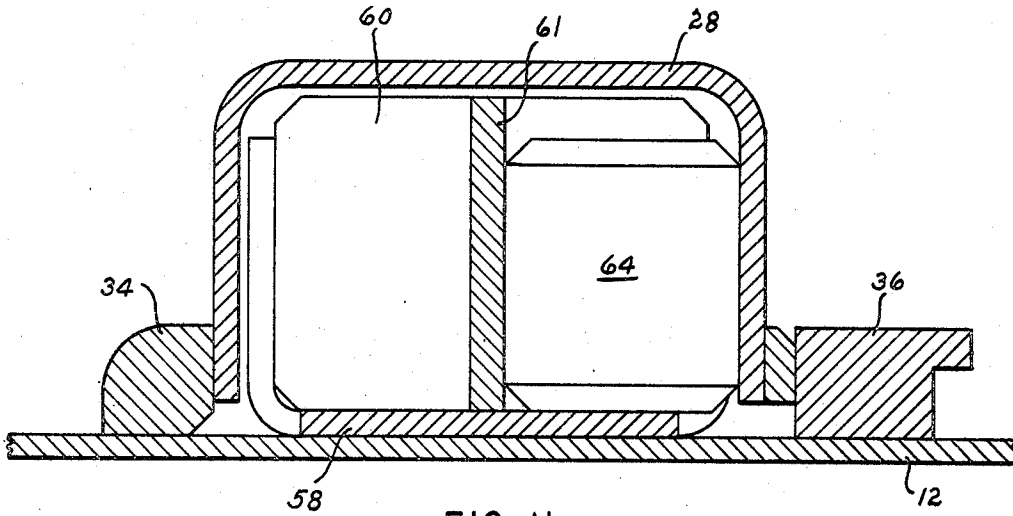
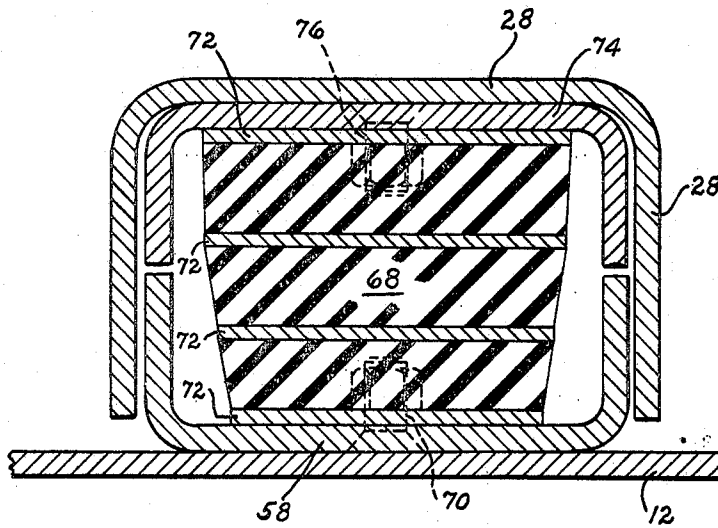
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CUSHIONED SUPPORT STRUCTURE FOR RAILWAY CAR

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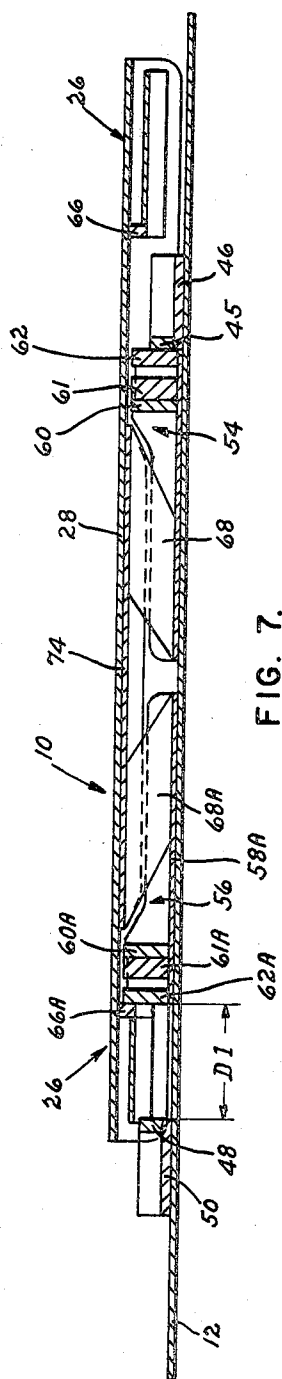
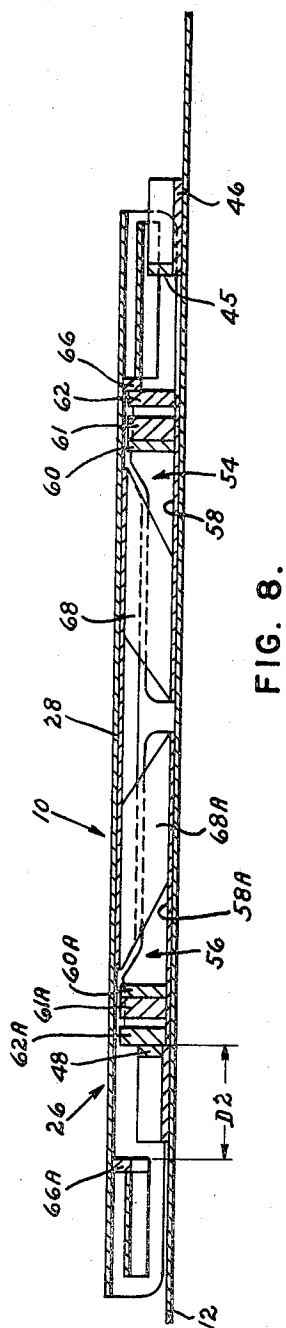
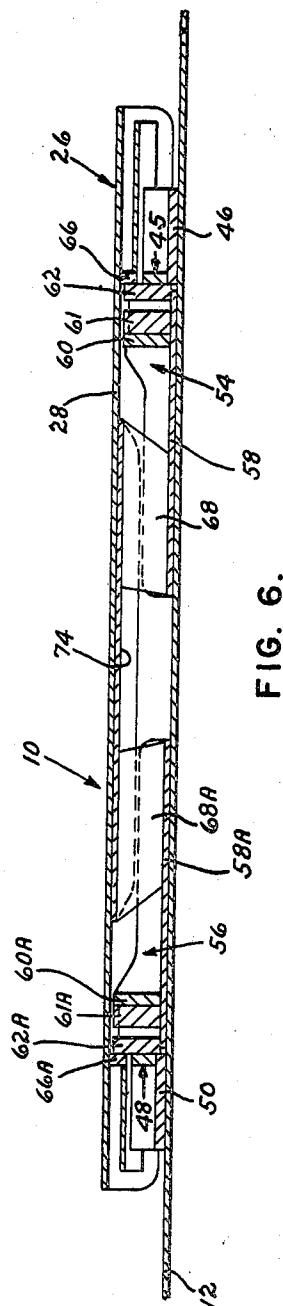
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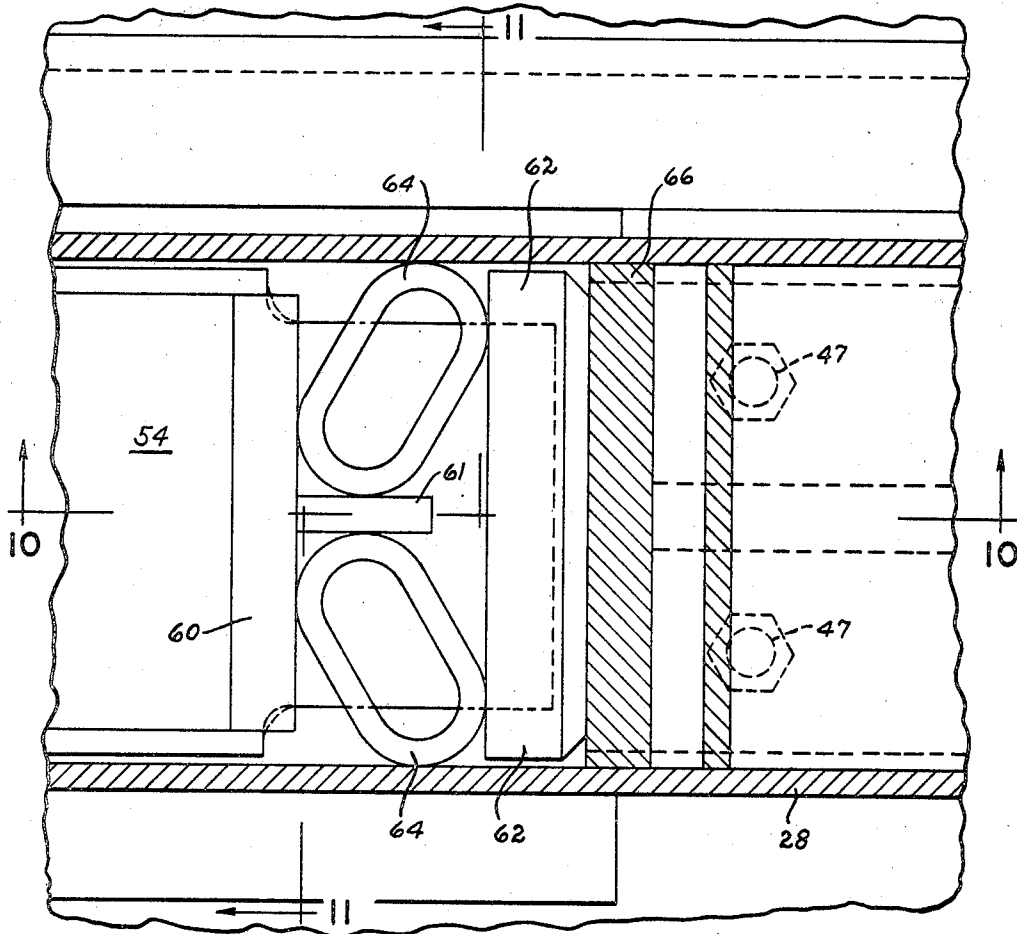


FIG. 9.

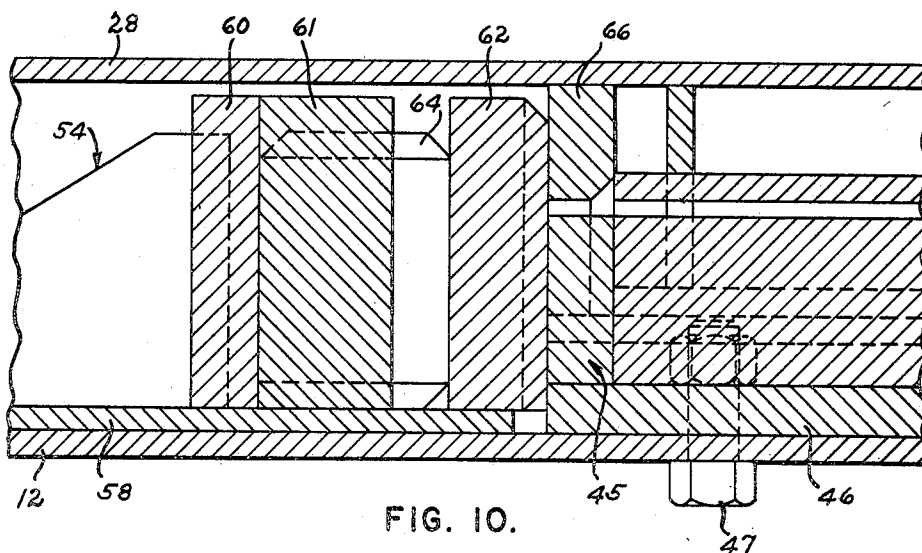


FIG. 10.

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CUSHIONED SUPPORT STRUCTURE FOR RAILWAY CAR

James C. Hammonds, St. Charles, Mo., assignor to ACF Industries, Incorporated, New York, N.Y., a corporation of New Jersey

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U.S. Cl. 105—368

8 Claims

ABSTRACT OF THE DISCLOSURE

A load support mounted on the deck of a railway flat car for cushioned back and forth movement relative to the deck upon impact forces being exerted against the car. Elastomeric shear pads are positioned in series between the deck and the load support in unsecured relation thereto and are spaced from each other longitudinally of the deck. Means interconnect the pads to the deck and load support in such a manner that the cushioned movement of the support structure along the deck upon impact loads being exerted against the car is twice the deflection of either shear pad to provide an increased total cushioned travel of the support structure. The elastomeric shear pads are preloaded in shear in opposite directions to recenter the load support after its cushioned travel. Friction wedge-like members are provided between the deck and support structure to assist the shear pads in dissipating the impact forces. The wedge-like members exert a frictional force proportional to the shearing forces developed in the shear pads and increasing with an increase in shear forces.

Background and description of the invention

Cushioned load supports on the deck of a railway flat car have been employed heretofore, such as to support a container or a hitch thereon. Upon impact forces exerted against the railway car, prior load supports have moved in a cushioned travel longitudinally of the deck and have returned to their original position after dissipation of the impact forces. For cushioning load supports, resilient shear pads have been employed heretofore with the deflection of the resilient shear pads being the same as the cushioned movement of the supports. Thus, when employing shear pads having a deflection of eight (8) inches, the total cushioned travel of the load supports heretofore has been eight (8) inches. Thus, the prior arrangements have limited the total travel of the load supports as well as requiring a relatively large number of total shear pads for adequately cushioning the load supports, especially when high impact forces are encountered.

The present invention provides cushioning means for a load support in which a minimum number of elastomeric shear pads is provided. The total travel of the load on the support structure during cushioned movement thereof is at a maximum while the deflection in each individual shear pad is substantially less than the total travel. This is provided by connecting a pair of pads to each other in series with the total travel of the load support being twice the shear deflection of each pad.

As the load and load support must be returned to the neutral or rest position after cushioned movement thereof upon impact forces being exerted against the railway car, the elastomeric pads may be preloaded with some of the pads being preloaded in one direction and other pads being preloaded in an opposite direction thereby to positively recenter the load and support after cushioned movement thereof.

To aid in dissipating the impact forces, separate friction members may be positioned between the load support and

the deck of the car to assist the elastomeric members in dissipating impact forces. The friction members increase their frictional resistance to the relative movement of the load support in proportion to the shear forces developed in the elastomeric members. The friction members dissipate a substantial portion of the impact forces and as much as around fifty percent (50%) of the impact forces may be dissipated by friction. Thus, the number of shear pads required is held to a minimum.

Briefly described, the invention comprises a support structure mounted on a deck of a railway car and having at least a pair of elastomeric shear pads horizontally spaced longitudinally of the deck and mounted in series between the deck and the load support to permit cushioned movement of the support in opposite directions longitudinally of the deck upon impact forces exerted against the railway flat car. The pads are unsecured to the deck and connected along their lower faces to separate housings. The upper faces of the pads are connected together for transmitting forces therebetween upon movement of the support longitudinally of the car. The cushioned movement or travel of the load support longitudinally of the car is substantially twice the shear deflection of either shear pad.

For recentering the load support after cushioned movement thereof at least one of the elastomeric members is preloaded or prestressed in shear in one direction to deflect at least around one inch and another of the elastomeric members is preloaded in shear in an opposite direction to deflect at least one inch thereby returning and accurately recentering the load and load support after the impact forces have been dissipated. Separate friction members are positioned between the support and deck to assist the elastomeric members in dissipating the impact forces. The frictional members exert a frictional force against the support upon travel of the support, and means urge the frictional members into frictional contact with the support with a force proportional to the shear forces developed in the shear pads. Thus, a substantial portion of the impact forces may be dissipated by friction which aids the shear pads in dissipating the impact forces.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIGURE 1 is a side elevation of the load support forming the present invention shown mounted on a deck of a railway car and supporting a hitch for securing the kingpin of a trailer;

FIGURE 2 is a top plan of the load support shown in FIGURE 1;

FIGURE 3 is an elevation of the load support shown in FIGURE 2 taken generally along line 3—3 of FIGURE 2;

FIGURE 4 is an end elevation of one side of the load support shown in FIGURES 1—3 taken generally along line 4—4 of FIGURE 2 and showing the opposite end of the load support;

FIGURE 5 is a section taken generally along line 5—5 of FIGURE 2 and showing a shear pad mounted between the deck and the load support;

FIGURE 6 is a section taken generally along line 6—6 of FIGURE 2 and showing the load support in a neutral or rest position on the deck of a railway car;

FIGURE 7 is a section similar to FIGURE 6 but showing the load support after a cushioned movement of around ten inches in one direction upon impact forces exerted against the railway car;

FIGURE 8 is an elevation similar to FIGURE 6 but showing the load support after a cushioned travel of

around ten inches in a direction opposite that shown in FIGURE 7;

FIGURE 9 is an enlarged fragment of FIGURE 2 with certain parts broken away and showing the friction members for exerting a frictional resistance to the movement of the load support in one direction of travel;

FIGURE 10 is a section taken generally along line 10—10 of FIGURE 9; and

FIGURE 11 is a section taken generally along line 11—11 of FIGURE 9.

Corresponding reference characters indicate corresponding parts throughout the several drawings of this invention.

The load support comprising the present invention is indicated generally at 10 and is shown mounted on a deck 12 of a railway car partially illustrated at 14. A hitch 16 having legs 18, 20 may be mounted on load support 10 about respective pivots 22, 24. Hitch 16 is adapted to secure a kingpin K of a trailer T in transit on railway car 14. As an example of a suitable hitch 16 which may be mounted on load support 10, reference is made to U.S. Patent No. 3,225,707 dated Dec. 28, 1965, the entire disclosure of which is incorporated by this reference. It is to be understood that hitch 16 and trailer T are merely one example of loads which may be supported and cushioned by load support 10 upon impact forces exerted against railway car 14. Other loads, such as containers or bolsters, may be suitably mounted on load support 10, if desired, for a cushioned movement.

Upon impact forces exerted against car 14, trailer T exerts forces against hitch 16 from kingpin K and impact forces exerted against railway car 14 are dissipated by the cushioned movement of load support 10 as will be explained. Load support 10 includes a generally rectangular upper frame generally indicated 26. Frame 26 comprises a pair of inverted channel-shaped sides 28 connected by ends 30, 32 and is mounted for cushioned movement in a direction longitudinally of deck 12 and railway car 14. Outer guides 34 and inner guides 36 are fixed to deck 12 to guide the movement of upper frame 26 along the deck. As shown in FIGURES 2 and 3, a pair of projections 38 adjacent each side of end 30 are secured to the underside of end 30 and diagonal legs 20 are pivotally mounted thereto at 24. A laterally projecting lug 40 adjacent each pair of legs 38 is engaged by an adjacent guide 36 to limit the vertical movement of frame 26 relative to deck 12. Horizontal webs 39 are secured beneath end 30 between projections 38.

Referring to FIGURE 4 in which the opposite end of load support 10 is shown, end 32 has upper and lower horizontal plates 42 with vertical webs 43 secured therebetween. Legs 18 which are bifurcated adjacent their lower ends are pivotally mounted to webs 43 at 22. A T-shaped lug 44 is secured to the underside of plate 42 and engages spaced inner guides 36 to limit the vertical movement of load support 10 and to aid in guiding load support 10.

Upon impact loads exerted against railway car 14, trailer T which is supported on deck 12 tends to move and thereby exerts forces against hitch 16 from kingpin K. This causes upper frame 26 to move within fixed guides 34, 36. To limit and cushion the movement of upper frame 26, a floating cushioning structure is positioned between deck 12 and upper frame 26 beneath each side 28. Reinforced angle-shaped abutments 45 adjacent end 30 have lower legs 46 bolted at 47 to deck 12 as shown in FIGURE 3. Reinforced angle-shaped abutments 48 adjacent end 32 have lower legs 50 bolted at 52 to deck 12. As shown in the neutral or rest position of load support 10 in FIGURE 6, the floating cushioning structure includes a pair of opposed housing 54, 56 urged into engagement with the respective facing abutments 45, 48. Housings 54, 56 are generally identical but face in opposite directions. Housing 54 includes a lower generally U-shaped member 58 supported on deck 12 as shown in FIGURE 5. Referring

also to FIGURES 9—11, an upwardly extending web 60 is secured within member 58 adjacent its rear end and includes an integral divider 61. A follower block 62 is positioned between adjacent abutment 45 and web 60. Positioned between follower block 62 and web 60 are a pair of friction wedge members or blocks 64 spaced by divider 61 and having upper and lower beveled edges. Side 28 has a lug 66 fixed thereto and engaging follower block 62 for moving follower block 62 and adjacent housing 54 upon travel of frame 26 in one direction.

Mounted within and secured to U-shaped member 58 as shown in FIGURE 5 by bolts 70 is an elastomeric block or pad 68. Pad 68 is preferably formed of rubber and includes a plurality of spaced horizontal metal plates 72 integrally bonded to the rubber. Mounted over the upper surface of pad 68 is an inverted U-shaped connecting member 74 secured by bolts 76 to pad 68. As shown in FIGURES 6—8, connecting member 74 fits over a second elastomeric pad 68A secured to a lower U-shaped member 58A similar to member 58. A follower block 62A is positioned adjacent one side of friction wedge members 64A, and lug 60A, having an integral divider 61A, is fixed to lower U-shaped member 58A adjacent the other side of wedge members 64A. Lug 66A fixed to the underside of side 28 engages the rear face of follower block 62A for moving housing 56. Housing 56A and associated parts are generally identical to housing 56.

As a specific but non-limiting example, each elastomeric pad 68, 68A may have dimensions of twelve (12) inches in length, six (6) inches in width, and four (4) inches in height. As shown in the neutral or rest position of FIGURE 6, pads 68 are preloaded in shear to deflect around two (2) inches to urge housing 54 into engagement with adjacent abutments 45. Housing 56 is urged into engagement with adjacent abutment 48 by preloading pads 68A in an opposite direction to deflect about two (2) inches.

Referring specifically to FIGURE 7, load support 10 is shown as moving to the right a distance D1 of around ten (10) inches, for example, under an impact load engaging railway car 14 from the right as viewed in FIGURES 1 and 6. Forces acting through legs 18, 20 of hitch 16 urge upper frame 26 to the right and lugs 66A engage follower blocks 62A to move housings 56 to the right. Housings 56 are connected to housings 54 through upper connecting members 74 but housings 54 are restrained against movement by abutments 45. Thus, elastomeric pads 68 and 68A deflect in shear. As pads 68 and 68A are connected in series by connecting members 74, each pad 68 and 68A deflects horizontally a distance of five (5) inches for a total travel of ten (10) inches of hitch 16 and upper frame 26 as indicated in FIGURE 7. During such movement, forces are transmitted from shear pads 68 to housings 54 which urges friction wedge members 64 against followers 62 and outwardly against the adjacent surfaces of sides 28. As the shear forces are transmitted to housings 54, friction members 64 are urged outwardly into frictional contact against sides 28 with a force proportional to the shearing forces in pads 68, 68A. Thus, friction members 64 provide a frictional resistance to the movement of adjacent sides 28 and dissipate a substantial portion of the impact forces exerted against railway car 14. Wedge members 64 engage the adjacent surfaces of sides 28 for the entire travel of upper frame 26 and may dissipate as much as fifty percent (50%) of the impact forces while shear pads 68, 68A dissipate substantially all of the remainder of the impact forces. Friction resulting from the sliding of frame 26 within guides 34, 36 dissipates only a negligible amount of the impact forces. Friction wedge members 64A adjacent end 32 do not dissipate any appreciable forces when support frame 26 is moved to the right as viewed in FIGURE 7, since housings 56 move with frame 26 thereby eliminating any appreciable relative movement between wedge members 64A and adjacent sides 28.

Referring specifically to FIGURE 8, load support 10 is shown as moved to the left a distance D2 of around ten (10) inches, for example, under an impact load from the left as viewed in FIGURES 1 and 6. Forces acting through legs 18, 20 of hitch 16 urge upper frame 26 to the left and lugs 66 engage follower blocks 62 to move housings 54 to the left. Housings 54 are connected to housings 56 through upper connecting members 74 but housings 56 are restrained by abutments 48. Thus, rubber pads 68 and 68A deflect in shear a distance of five (5) inches each for a total travel of ten (10) inches in hitch 16. Friction wedge members 64A provide a frictional resistance to the movement of adjacent sides 28 and dissipate a substantial portion of the impact forces. Friction wedge members 64 adjacent end 30 do not dissipate any appreciable forces when support frame 26 is moved to the left as viewed in FIGURE 8, as housings 54 move with frame 26 thereby eliminating any appreciable relative movement between wedge members 64 and adjacent sides 28.

Thus, a cushioned load support 10 has been provided in which a minimum of elastomeric material is employed. This is accomplished by the employment of elastomeric shear pads 68, 68A in series with the total travel of the load support being twice the shear deflection of any single shear pad. In addition, friction members 64, 64A have been provided to assist in the dissipation of the impact forces to decrease the total impact force required for dissipation by the elastomeric shear pads 68, 68A. The preloading of the elastomeric shear pads 68, 68A effects a relatively rapid and accurate recentering of load support 10 after its cushioned travel.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results obtained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A support structure mounted on the deck of a railway flat car comprising, a support adapted to support a load thereon, at least a pair of elastomeric shear pads spaced longitudinally of the deck and mounted in series between the deck and said support to permit a cushioned movement of the support in opposite directions longitudinally of the deck upon impact forces exerted against the railway flat car, each of said shear pads being connected along one of their faces to the support, one of said shear pads moving substantially simultaneously with the support upon movement thereof in one direction longitudinally of the deck and the other shear pad moving substantially simultaneously with the support upon movement thereof in the opposite direction longitudinally of the deck, means restraining the other pad against any appreciable movement relative to the deck upon movement of the support in said one direction and restraining said one pad against any appreciable movement relative to the deck upon movement of the support in said opposite direction, said pads being unsecured to said deck to permit said respective movements with the support, and a rigid connection between the opposite faces of said shear pads for transmitting forces therebetween upon movement of the support longitudinally of the car, the cushioned movement of the support longitudinally of the deck being substantially twice the shear movement of either shear pad.

2. A support structure as set forth in claim 1 wherein said shear pads are connected to said support along their lower faces, and said rigid connection is between the upper faces of the shear pads for transmitting forces therebetween.

3. A support structure as set forth in claim 1 wherein each shear pad has a total shear travel of at least around

six inches and said support has a total cushioned travel in each direction of at least around twelve inches.

4. A support structure mounted on the deck of a railway flat car comprising, a support adapted to support a load thereon, at least a pair of elastomeric members spaced longitudinally of the deck and mounted in series between the deck and said support to permit a cushioned movement of the support in opposite directions longitudinally of the deck upon impact forces being exerted against the railway flat car, each elastomeric member being separately connected along one of its faces to the support, means connecting the elastomeric members in series for deflection in shear an equal amount in opposite directions so that the cumulative total deflection of the elastomeric members in shear is substantially the same as the total cushioned travel of the support, one of the elastomeric members moving substantially simultaneously with the support upon movement thereof in one direction longitudinally of the deck and the other elastomeric member moving substantially simultaneously with the support upon movement thereof in the opposite direction longitudinally of the deck, said elastomeric members being unsecured to the deck to permit said respective movements with the support, a rigid connection between the opposite faces of said elastomeric members for transmitting forces therebetween upon movement of the support longitudinally of the car, separate friction members positioned between the support and deck to assist the elastomeric members in dissipating the impact stresses, and means mounting said elastomeric members to urge at least some of said friction members into frictional contact with said support during cushioned travel of the support with a force proportional to the shear stresses of said elastomeric members and increasing with an increase in shear stress of the elastomeric members, at least some of said elastomeric members being prestressed when in neutral position and aiding in returning the support to neutral position after the impact forces have been dissipated.

5. A support structure mounted on the deck of a railway flat car comprising, a support adapted to support a load thereon, at least a pair of elastomeric members horizontally spaced longitudinally of the deck and mounted in series between the deck and said support to permit a cushioned movement of the support in opposite directions longitudinally of the deck upon impact forces being exerted against the railway flat car, one of said elastomeric members being preloaded in shear in one direction and the other of said elastomeric members being preloaded in shear in an opposite direction, and means connecting said elastomeric members in series for deflection in shear an equal amount in opposite directions so that the cumulative total deflection of the elastomeric members in shear is substantially the same as the total cushioned travel of the support, said preloaded elastomeric members returning the support to its neutral position after the impact forces have been dissipated thereby to recenter the support.

6. A support structure mounted on the deck of a railway flat car comprising, a support adapted to support a load thereon, at least a pair of elastomeric members spaced longitudinally of the deck and connected between the deck and said support to cushion the movement of the support in opposite directions longitudinally of the deck upon impact forces being exerted against the railway flat car, one of said elastomeric members being preloaded in shear in one direction and the other of said elastomeric members being preloaded in shear in an opposite direction, means connecting the elastomeric members in series for deflection in shear an equal amount in opposite directions so that the cumulative total deflection of the elastomeric members in shear is the same as the cushioned travel of the support, and friction members positioned between the support and deck to assist the elastomeric members in dissipating the impact forces, said

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friction members exerting frictional forces against the support in both directions of travel of the support, said preloaded elastomeric members returning the support to its neutral position after the impact forces have been dissipated thereby to recenter the support.

7. A support structure mounted on the deck of a railway flat car comprising, a support adapted to support a load thereon, at least a pair of elastomeric members horizontally spaced longitudinally of the deck and mounted in series between the deck and said support to permit a cushioned movement of the support in opposite directions longitudinally of the deck upon impact forces being exerted against the railway flat car, means connecting the elastomeric members in series for deflection in shear an equal amount in opposite directions so that the cumulative total deflection of the elastomeric members in shear is the same as the cushioned travel of the support, and separate wedge-like friction members positioned adjacent each end of the support between the support and deck to assist the elastomeric members in dissipating the impact forces, the wedge-like members adjacent one end of the support being urged into frictional contact with said support in one direction of travel and the wedge-like members adjacent the other end of the support being urged into frictional contact with said support in the

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opposite direction of travel with a force proportional to the shear stresses of said elastomeric members and increasing with an increase in shear stress of the elastomeric members.

8. A support structure as set forth in claim 7 wherein said elastomeric members are connected to said support along their lower faces and are unsecured to the deck, and a rigid connection extends between the upper faces of said elastomeric members for transmitting forces therebetween upon movement of the support longitudinally of the car.

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DRAYTON E. HOFFMAN, Primary Examiner

U.S. Cl. X.R.

105—366, 392.5, 454; 248—119