

[54] CUSHIONING ARRANGEMENT FOR RAILWAY CAR

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[58] Field of Search.....213/8, 43, 67, 69, 72, 22

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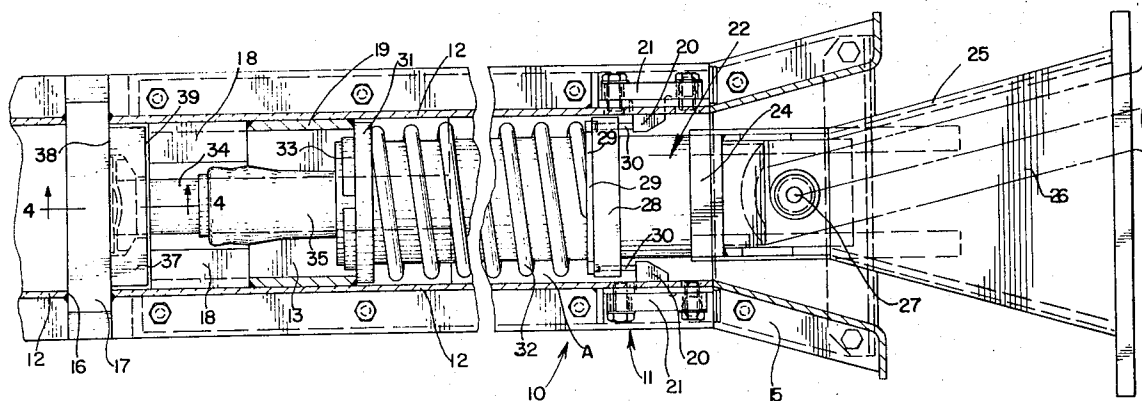
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ABSTRACT

A railway car underframe is provided with a center sill having at opposite ends thereof cushion pockets each containing a hydraulic cushioning unit. The cushioning unit includes a cylinder which is connected to the coupler, the cushioning device being of the double-acting type functioning to cushion both draft and buff impacts. Stops are provided on the center sill permitting a limited amount of movement of the hydraulic cylinder in a forward direction during draft impacts and the cylinder includes a piston and piston rod arrangement, the end of which is anchored to a stop provided on the center sill at one end of the cushion pocket. A base plate is connected to the end of the piston rod and includes a concavity having an inner concave surface. The end of the piston rod has connected thereto a securing plate having a convex surface adapted to complement the concave inner surface within the concavity. The concavity has an open end facing the stop and a thrust plate which engages the stop is disposed within the concavity. The thrust plate includes a convex central surface which complements the concave surface provided in a block rigidly secured to the end of the piston rod. The face plate is held against substantial longitudinal movement relative to the center sill structure and during eccentrically applied loads, occasioned by either draft or buff impacts, the arrangement is such that limited movement in universal direction is achieved thereby accommodating the eccentric loads without damage to the center sill structure or to the arrangement. End-of-car cushioning units of the type utilized with the present invention are disclosed in assignee's U.S. Pat. No. 3,568,856 patented Mar. 9, 1971.

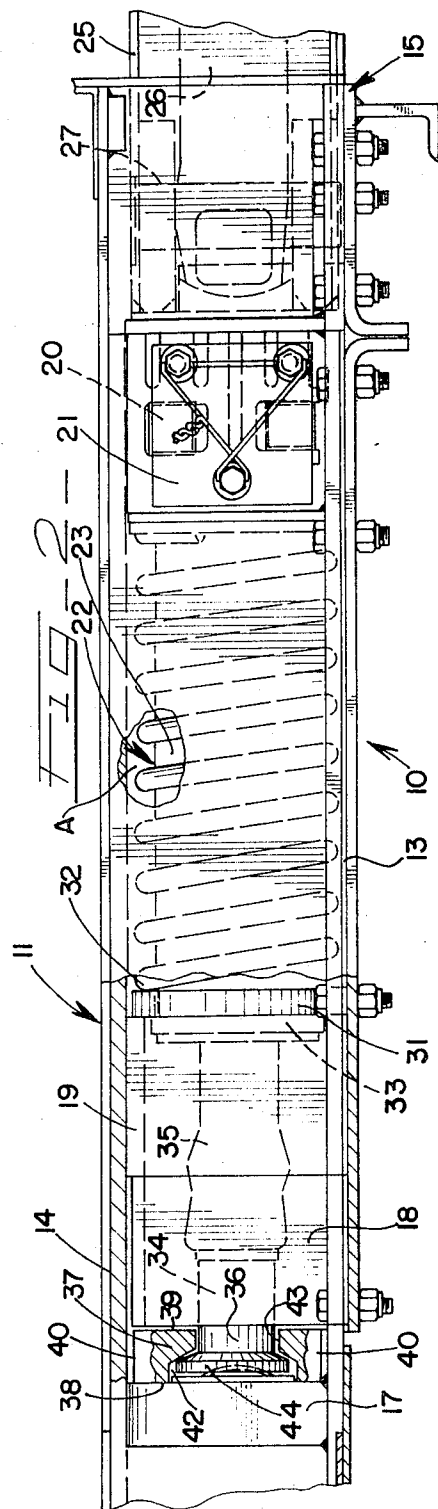
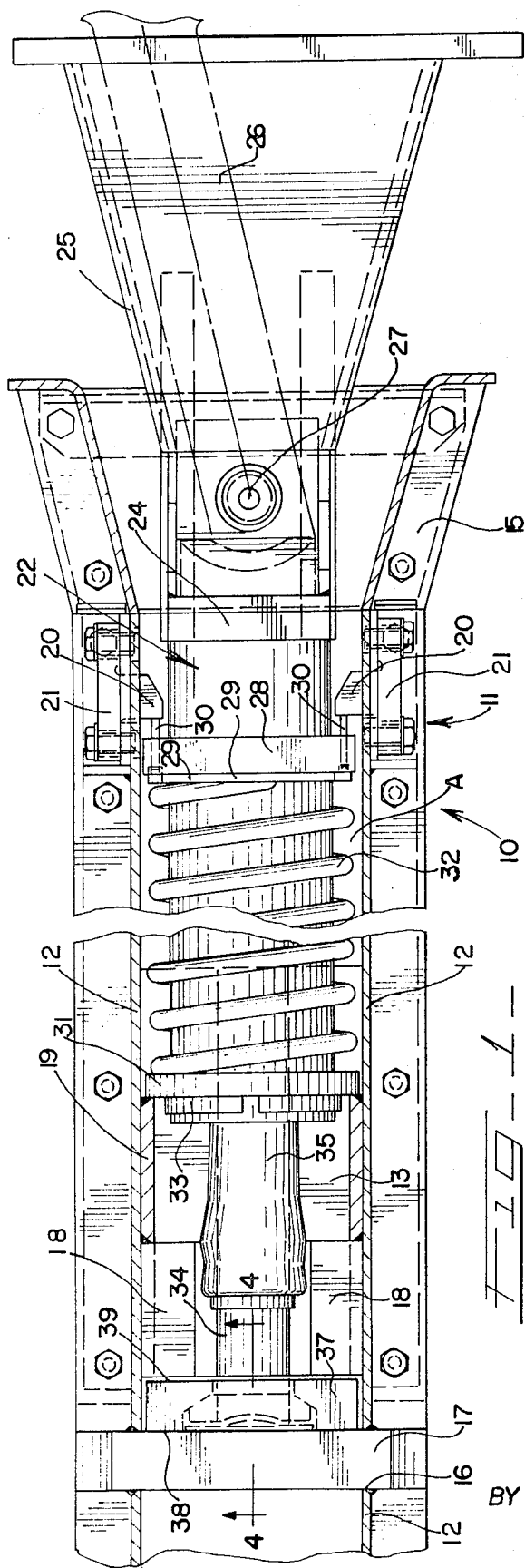
10 Claims, 4 Drawing Figures



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SHEET 1 OF 2



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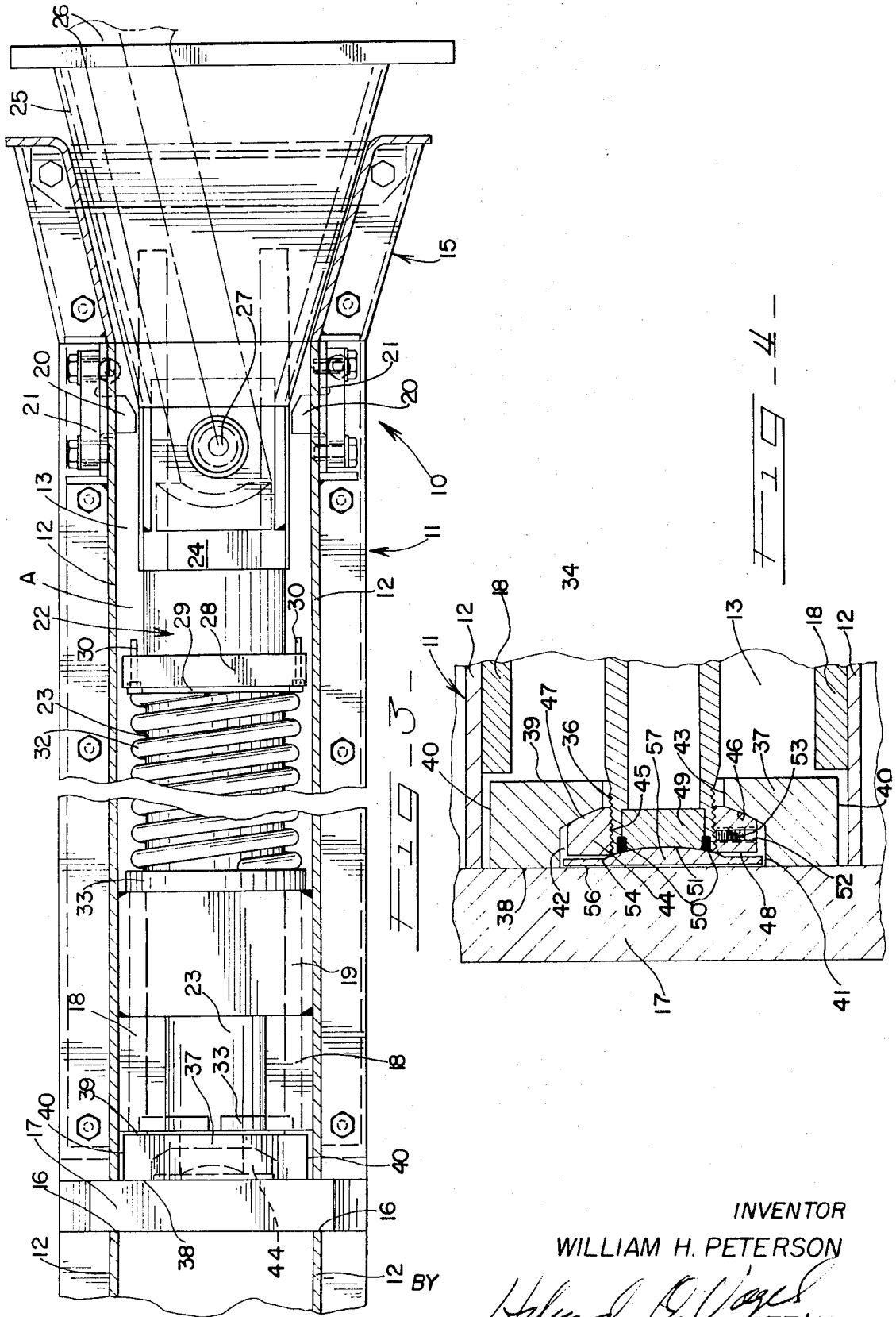
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SHEET 2 OF 2



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CUSHIONING ARRANGEMENT FOR RAILWAY CAR

SUMMARY

End-of-car cushioning units of the type disclosed in the aforementioned patent applications function to prevent damage to the car and lading carried therein both in draft and buff impacts on the couplers occurring during normal operating conditions. Cushioning units of the disclosed type as well as others utilized in the field have certain common characteristics in that a piston and piston rod arrangement is reciprocated within a hydraulic cylinder for providing a metered cushion force travel. Either the piston rod and piston assembly is anchored to the center sill of the underframe whereby the cylinder is directly connected for movement with the coupler or, the reverse occurs where the rod assembly is connected to the coupler and the cylinder remains stationary and is fixedly secured to the center sill. In either situation as a result of operating conditions eccentrically applied loads occur which in turn are transmitted to the center sill by a suitable rigid stop. Thus the cushioning unit must have a limited flexibility at its point of connection to the center sill so that the eccentrically applied loads will not cause structural damage but will readily be absorbed even though the cushioning unit assumes an eccentrically longitudinal position.

It is therefore a prime object of the present invention to provide an improved connecting arrangement for connecting a cushioning unit to the center sill which will permit the flexibility to accommodate angularity during eccentrically applied loads and yet prevent damage to the structure while effectively transmitting said loads to the underframe. This is achieved by the present invention relating to the connecting arrangement provided at one end of the cushion unit. This connecting arrangement includes a base plate which is held against longitudinal movement between stops provided on the center sill. The base plate is relatively loosely mounted between the stops and is permitted some lateral movement relative to the center sill structure. The base plate in turn is provided with a concavity having complemental engagement with a securing ring in turn rigidly secured to the end of a piston and piston rod assembly. The securing ring also includes convex surfaces which complement concave surfaces within the cavity and thus permit a certain angularity of the piston rod and cylinder during operation. Buff forces are transmitted to one of the stops through a thrust plate which also is provided with a convex surface engaging and complementing a concave surface provided in a member connected at the rearmost end of the piston rod assembly. While the present arrangement shows the base plate and related structure connected to a piston rod it is of course similarly applicable to connecting one end of a cylinder to the center sill in arrangements wherein the piston rod assembly is directly connected to the coupler.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view, partially in section, of a cushioning unit disposed in neutral position within one end of a center sill structure;

FIG. 2 is a side elevational view, partially in section, of the arrangement shown in FIG. 1;

FIG. 3 is a view similar to FIG. 1 showing a cushioning unit in substantially closed position during a buff impact; and

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 1.

DETAILED DESCRIPTION

Referring to the drawings, a railway car 10 comprises an underframe essentially consisting of a center sill structure 11 having vertical side walls 12 interconnected by a bottom wall 13 and a top wall 14, thereby providing a cushion pocket A. While only one end of a center sill structure has been disclosed the opposite end of the center sill structure also includes the identical arrangement. The center sill structure further includes a conventional flared end structure 15.

Referring particularly to FIGS. 1 and 3, the side walls 12 are suitably recessed as indicated at 16 and have rigidly connected thereto a stop member 17 extending across the center sill structure 11. Flanged stop plates 18 are suitably supported on the side walls 12 and a stop ring 19 is connected to said side walls 12 and to said stop plates 18. The forward end of the center sill structure 11 is provided with removable plate members 21. A cushioning unit is generally designated at 22 and includes a hydraulic cylinder 23 having an end plate 24 connected thereto. The end plate 24 is connected to a suitable bellmouth housing 25 in which a coupler 26 is mounted as indicated at 27 for pivotal movement. The coupler is of a conventional type and the cylinder 23, bellmouth housing 25 and coupler 26 move longitudinally as a unitary structure. A spring retainer stop 28 is connected to the cylinder 23 in longitudinally spaced relation from the end plate 24. A retainer ring 29 is positioned against the stop 28 and reciprocating pins 30 are supported on the retainer stop 28 in relative longitudinal movement, the said pins 30 engaging the retainer ring 29 on one side of the stop 28 and being in contact as shown in FIG. 1 with the stop lugs 20. A spring retainer ring 31 is slidably disposed about the cylinder 23 and a coil spring 32 is held captive between the ring 29 and said ring 31. A retainer stop 33 retaining said retainer ring 31 is rigidly secured to one end of the cylinder 23.

A tubular piston rod 34 includes a piston (not shown) disposed within the cylinder 23 with said rod 34 projecting longitudinally outwardly from one end thereof. The cushioning unit 22 is of the type utilizing a flexible accumulator boot 35 and the details of said unit are shown in the aforementioned patent. A threaded rod end 36 on the rod 34 is associated with a piston rod base plate 37 having a surface or wall 38 in engagement with the stop 17. The base plate 37 also includes a wall 39 which is adapted during draft impacts to engage stop plates 18 and is also provided with peripheral walls 40 disposed in substantially rectangular relation. The wall 38, as best shown in FIG. 4, is provided with an opening 41 at one end of a concavity 42 provided in the base plate 37. An opening 43 provided in the wall 39 also communicates with the concavity 42. As best shown in FIG. 4, the plate 37 includes a securing arrangement comprising a securing ring 44 having a threaded bore 45 which is rigidly connected through the threaded rod end 36. The securing ring 44 is provided with a convex surface 47 substantially complementing the concave surface 46. The securing ring 44 also includes circumferentially extending wall or face 48 and a block 49 is suitably connected within the threaded rod end 36 by means of welds 50. The block 49 is provided with a concave surface 51. A threaded bore 52 extends radially through the securing ring 44 and includes a suitable threaded stud 53 which rigidly locks the securing ring 44 against rotation relative to the rod end 36. A thrust plate 54 is disposed in the concavity 42 and includes a flat surface 56 disposed against the stop 17. The thrust plate 54 also includes a convex surface portion 57 which is disposed and substantially complements the concave surface 51 of the block 49.

THE OPERATION

Referring to FIG. 1 which discloses the neutral position of the cushioning unit, a draft impact on the coupler 26 provides for movement of the coupler end plate 24 and cylinder 23 in a direction to the right or forwardly with respect to the center sill structure 11. During such movement of the cylinder 23 the retainer stop 28 is disposed and held against the stops 20 and the pins 30 retain the retainer ring 29 against longitudinal movement. The spring retainer 31 which is held against the retainer stop 33 moves to the right and away from the stop ring 19 and the draft impact is cushioned by a metering arrangement within the cylinder 23 described in detail in the aforementioned patent.

In FIG. 3, a buff impact has been delivered to the coupler 26 and the cylinder 23 has moved longitudinally rearwardly or in

the direction toward the stop 17. The retainer stop 33 is in engagement with the stop ring 19 and the end of the cylinder and the retainer stop 33 has moved in a direction into the stop ring 19 toward the rear or stop member 17. FIG. 3 shows a substantially closed position which would occur during a maximum buff impact. Immediately after the buff and draft impacts the spring 32 is effective to return the unit to the neutral position shown in FIG. 1.

As indicated above, both draft and buff impacts may be such that eccentric loads are applied and these in turn are transmitted to the center sill structure 11. In order to permit free movement of the cylinder 23 a sufficient tolerance exists between the walls of the center sill structure 11 which permits a limited tilting or off-center movement which must be properly transmitted through the improved connecting arrangement shown in FIG. 4. Thrust forces from the piston rod 34 are through the block 49 against the convex surface 57 and plate 54 into the stop 17 which transmit the stresses and forces into the center sill structure 11. To accommodate the eccentrically applied loads the securing ring 44 provides a substantially universal tilting movement of the piston rod 34 by virtue of the arcuate and convex surfaces 46-47. Similarly, the thrust plate 54 is freely floating within the concavity 42 to facilitate such eccentric loading and tilting of the piston rod 34. Also a limited lateral movement is provided by the sides 40 of the base plate 37 which is slightly spaced from side walls 12. During draft impact, the base plate 37 is held against the stop plates 18 and the forces are transmitted from the securing member 44 through the base plate 37 and through the stop members 18 into the center sill structure 11. Thus, since the piston rod 34 and securing structure readily accommodate the eccentric loads which are applied, forces are properly transmitted and the sill structure and piston rod, cylinder, etc. and connecting arrangement are protected against damage and breakage.

Thus the objectives of the invention have been fully achieved by the improvement herein described.

What is claimed is:

1. A cushioning arrangement for a railway car having an underframe including a center sill structure, said center sill structure including vertical, top, and lower walls connected to form a cushion pocket, a cushioning unit including a fluid cylinder having one end associated with a car coupler, said cylinder being movable longitudinally during car impacts, a piston positioned within said cylinder, a piston rod connected to said piston and projecting outwardly from an opposite end of said cylinder, the improvement residing in a connecting assembly for connecting said piston rod to said center sill structure comprising:

a stop member supported on said center sill structure longitudinally spaced from an end of said piston rod,
a face plate having a surface facing and engaging said stop, said face plate having a concavity formed therein,
said concavity including a concave inner wall having a longitudinally extending opening,
said piston rod having an end portion projecting through said opening into said concavity,
a securing member rigidly connected to said end portion and positioned within said concavity,
said securing member having a convex surface engaging and substantially complementing said inner wall,
a thrust receiving member confined within said concavity, being relatively moveable therein and having a wall engaging said stop plate,
said thrust receiving member including a second wall facing

said end portion and including a substantially centrally disposed convex portion, and
means within said concavity associated with said end portion and including a concave surface engaging said convex portion in substantially complementary relation.

2. The invention in accordance with claim 1,

said securing member being releasably connected to said rod end portion.

3. The invention in accordance with claim 1,
said rod end being of tubular construction,

said means including said concave surface being supported within said tubular rod end.

4. The invention in accordance with claim 3,
including a second stop longitudinally spaced from said first stop on said center sill structure and said face plate being disposed therebetween and being retained thereby against substantial longitudinal movement.

5. The invention in accordance with claim 3,
said face plate cavity having an opening facing said first stop member, and
said thrust receiving member being disposed in said opening.

6. The invention in accordance with claim 5,
said thrust face first wall engaging said first stop member in relative sliding relation.

7. The invention in accordance with claim 6,
said thrust plate having a limited amount of lateral movement in said cavity.

8. The invention in accordance with claim 7,
said securing members and rod end having a limited lateral movement within said cavity relative to said base plate.

9. The invention in accordance with claim 8,
said base plate being positioned within said sill structure and between said stop member to provide for limited relative lateral and longitudinal movement.

10. A cushioning arrangement for a railway car having an underframe including a center sill structure, said center sill structure including vertical, top, and lower walls connected to form a cushion pocket, a cushioning unit including relative and reciprocating members, one of which is associated with a car coupler and being movable longitudinally during car impacts, the improvement residing in a connecting assembly for connecting the other of said members to said center sill structure comprising:

a stop member supported on said center sill structure longitudinally spaced from the other of said members,
a face plate having a surface facing and engaging said stop, said face plate having a concavity formed therein,
said concavity including a concave inner wall having a longitudinally extending opening,
said other of said members having an end portion projecting through said opening into said cavity,
a securing member rigidly connected to said end portion and positioned within said concavity,
said securing member having a convex surface engaging and substantially complementing said inner wall,
a thrust receiving member confined within said concavity, being relatively moveable therein and having a wall engaging said stop plate,
said thrust receiving member including a second wall facing said end portion and including a substantially centrally disposed convex portion, and
means within said concavity associated with said end portion and including a concave surface engaging said convex portion in substantially complementary relation.

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