June 5, 1934. O. C. DURYEA 1,961,130

CAR CONSTRUCTION

Filed Oct. 12, 1929 3 Sheets-Sheet 1

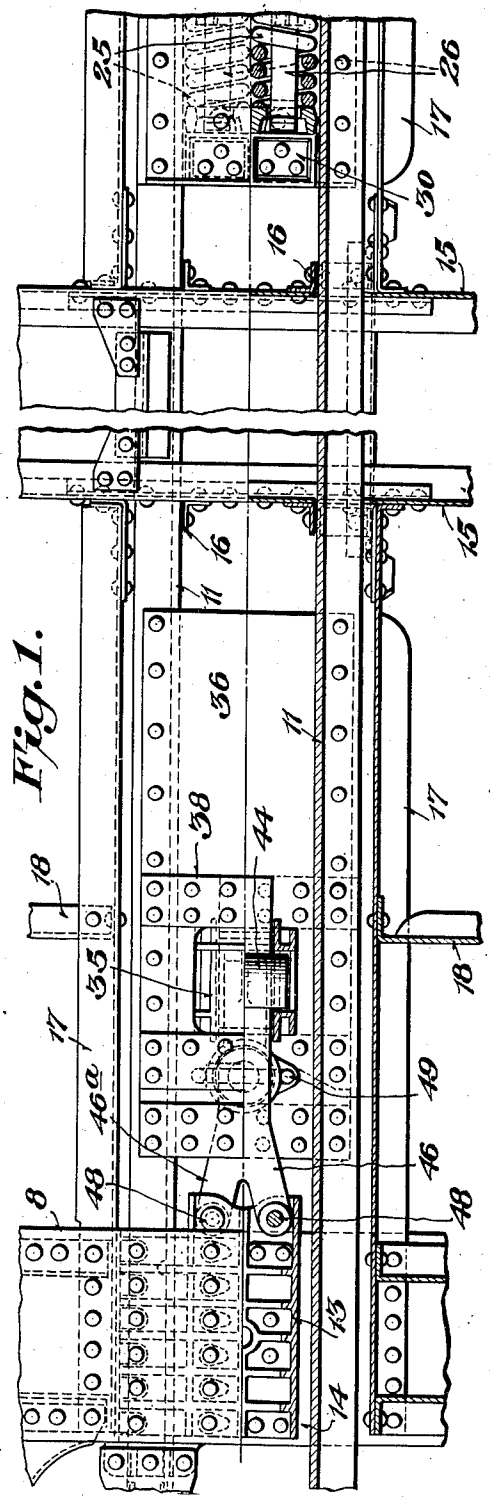


Fig. 1.

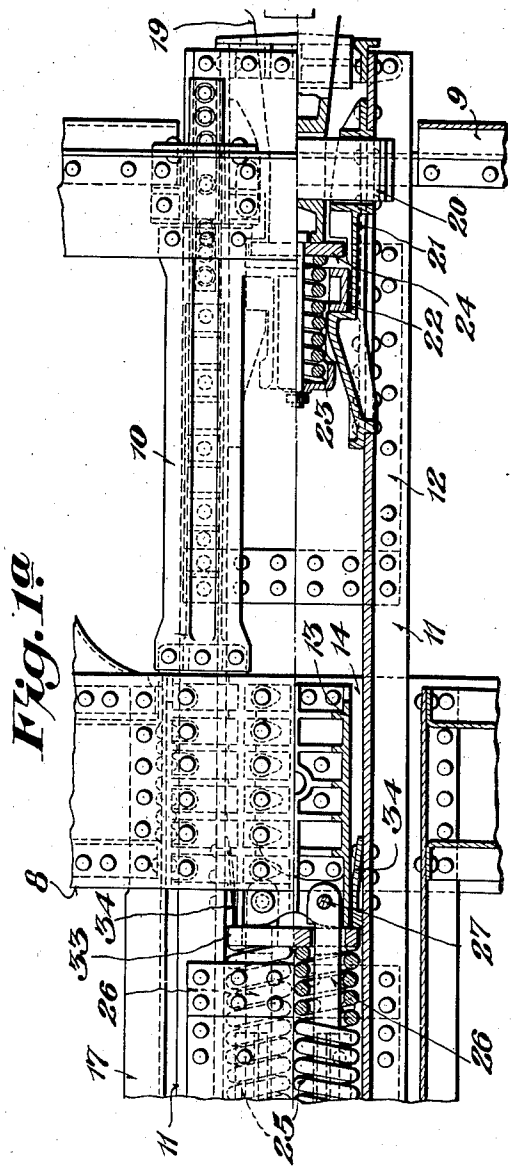


Fig. 1a.

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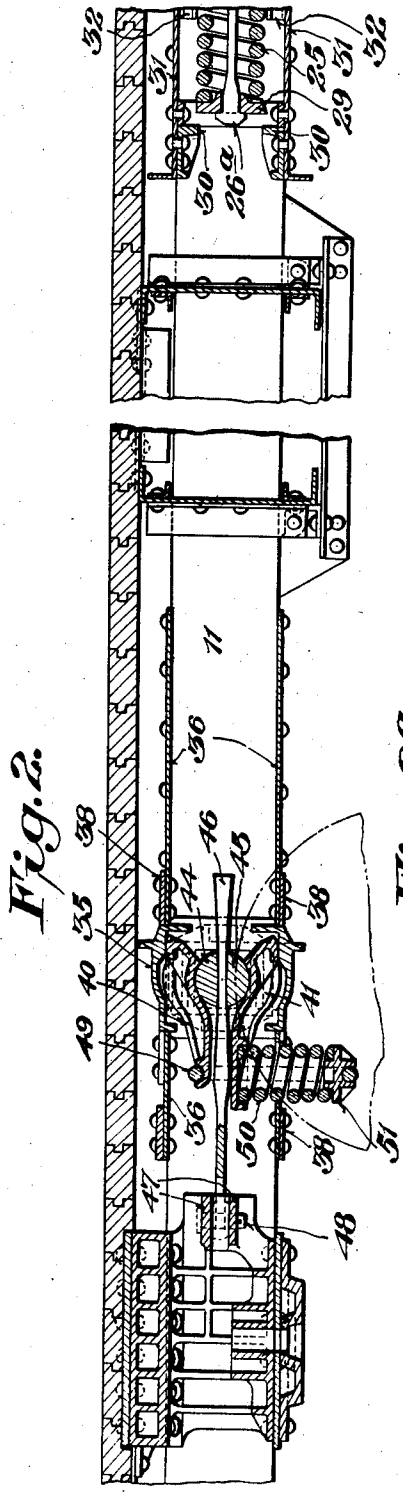


Fig. 2.

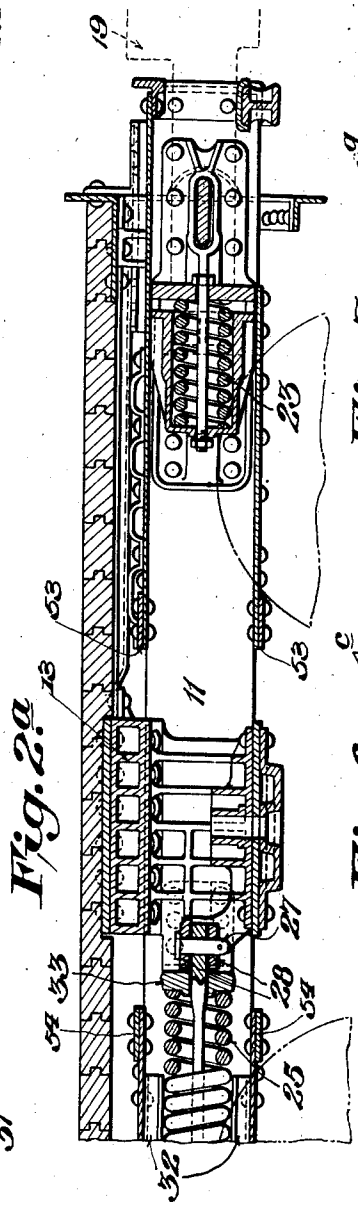


Fig. 2a.

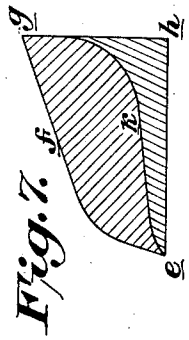


Fig. 7.

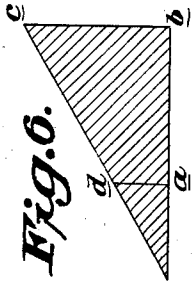


Fig. 6.

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CAR CONSTRUCTION

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Fig. 3.

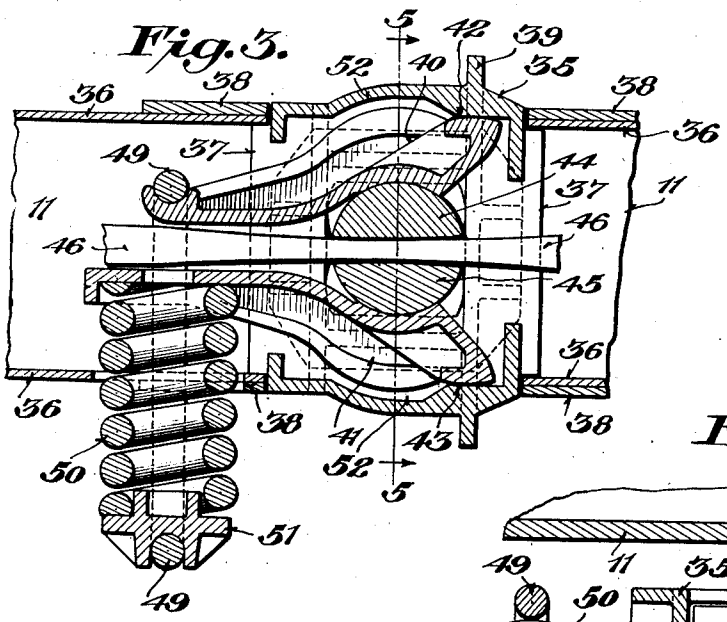


Fig. 4.

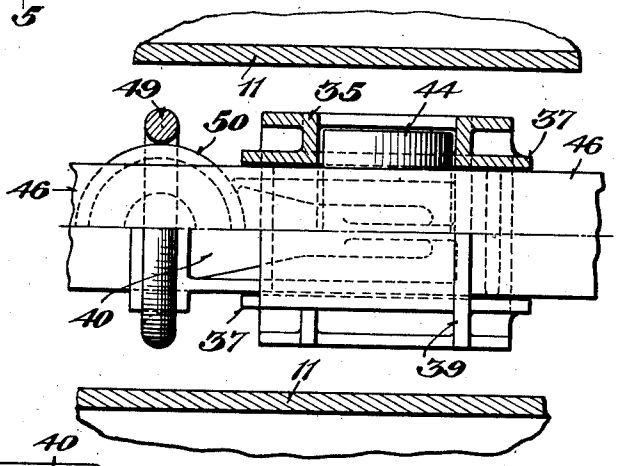
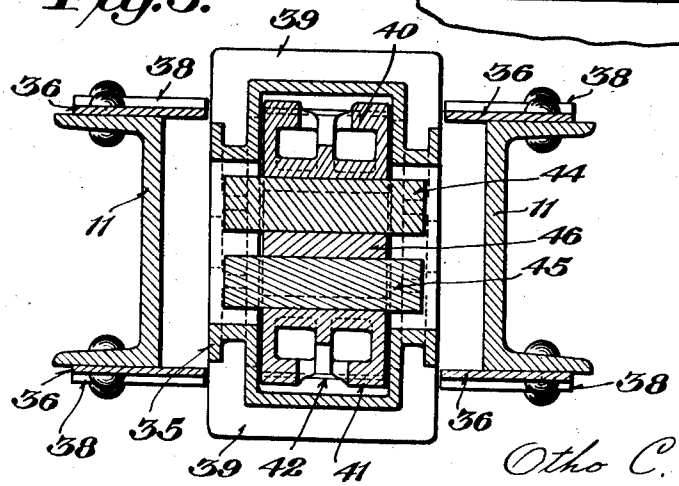


Fig. 5.



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Patented June 5, 1934 1,961,130

UNITED STATES PATENT OFFICE

1,961,130

CAR CONSTRUCTION

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Application October 12, 1929, Serial No. 399,311

13 Claims. (Cl. 213—8)

This invention relates to railway cars, and more particularly to a car embodying novel means for protecting the car and its lading against damage from draft and buffing forces imparted thereto.

One of the objects of the present invention is to provide a railway car, of the type having a rigid draft and buffing member extending substantially the length of the car body and mounted for movement relative to the body bolsters, with novel means of long travel for yieldingly resisting relative movement of the column whereby draft and buffing forces are gradually resisted, said car also being provided with couplers mounted for limited movement relative to the column and operatively connected to the opposite ends thereof.

In cars of the above type it is desirable to connect the means for resisting relative movement of the draft column or center member to the bolsters in order that draft and buffing forces may not be transmitted directly to the weaker parts of the structure. It is also desirable that forces imparted to the center member and tending to move said center member relative to the bolsters be resisted by like means adjacent each bolster in order that the forces may be equally distributed adjacent the opposite ends of the car. To this end it has heretofore been proposed to provide resilient and friction elements of similar size and character adjacent each bolster. It has also been proposed to provide resilient members adjacent each bolster, said resilient members being similar in form and strength to equally distribute the load, and to supplement the action of these resilient members by suitable friction means, such as stringers interposed between the center member and the flooring of the car, whereby excessive recoil is prevented.

Another object of this invention is to provide a car structure of the above type embodying resilient means operatively connected to the center member and one bolster in combination with friction means operatively connected to the center member and the opposite bolster, said friction and resilient means being adapted to resist movement of the center member relative to the bolsters whereby the car structure and its lading are protected against damage.

Another object is to provide resilient means adjacent one bolster in a "long travel, center member car" in combination with friction means adjacent the bolster at the opposite end of the car, each of said means being so constructed as to offer substantially equal amounts of resistance to relative movement of the center member whereby shocks or blows imparted to said member are equally distributed to the opposite ends of the car structure.

A further object is to provide a railway car embodying novel friction means for absorbing draft and buffing forces imparted to said car.

A still further object is to provide novel long travel friction means particularly adapted for use in a railway car of the "long travel, center member" type, said means being operable in both directions.

Another object is to provide a car of the type embodying a relatively movable center member with friction means adjacent one body bolster and resilient means adjacent the other bolster, each of said means being adapted to offer substantially the same amount of resistance to movement of the center member, relative to said bolsters, from a normal position, said resilient means being adapted to return the center member to normal position and the friction means being adapted to prevent excessive recoil.

The above and other objects will appear more fully hereafter in the detailed description which is to be read in connection with the accompanying drawings illustrating one embodiment of the present invention. It is to be expressly understood, however, that the drawings are for purposes of illustration only and are not designed as a definition of the limits of the invention.

In the drawings:

Figs. 1 and 1[a] constitute a top plan view, partly in section and with parts broken away, of a portion of a car structure formed in accordance with the present invention, the view extending from adjacent the left-hand body bolster to the coupler at the opposite end of the car with the intermediate portion being broken away to enable the use of a large scale drawing;

Figs. 2 and 2[a] constitute an axial view in section of the structure shown in Figs. 1 and 1[a];

Fig. 3 is an enlarged detail view in elevation of one form of friction means which may be employed in accordance with the present invention;

Fig. 4 is a top plan view, partly in section, illustrating the mechanism shown in Fig. 3;

Fig. 5 is a section taken on the line 5—5 of Fig. 3; and

Figs. 6 and 7 are pressure diagrams.

Referring to the drawings wherein like reference characters refer to like parts throughout the several views, the car construction of the present invention includes a pair of body bolsters 8 adapted to be mounted on truck bolsters and trucks (not shown) in any suitable manner well known

in the art. In order to employ large scale drawings, only one end portion of the car structure from bolster 8 to an end sill 9 has been shown, but it will be understood that the elements of the two opposite end portions are similar to those shown in Fig. 1ª, as will be readily understood by those skilled in the art. It will also be understood that the structure of the present invention is applicable to various types of cars, such as box cars, gondolas, hoppers, etc.

Each end sill 9 is rigidly connected to body bolster 8 by means of a pair of floor supports, one of which is shown at 10, each support lying in the vertical plane of a vertically disposed channel member 11, which extends substantially the length of the car structure to form a rigid and continuous draft and buffing column or center member, the channels being connected together at a suitable number of points by means of tie plates 12.

Each of the body bolsters is provided with a casting constituting a center brace 13 provided with a pair of openings 14 therein through which channels 11 extend. A suitable number of cross bearers 15 are provided intermediate the body bolsters 8. Openings 16 are provided in the cross bearers for channels 11, and the center member constituted by said channels is mounted for longitudinal movement in both directions relative to said bolsters and cross bearers. In the form shown flanged torque arms 17 extend inwardly from the body bolsters to the adjacent cross bearer 15 to strengthen the structure against twisting and bending movements. The arms 17 also constitute floor supports. A pair of flanged members 18 are secured at their inner ends to the arms 17 and extend transversely to the side sills (not shown), said flanged members constituting a cross tie.

Couplers, a portion of one of which is shown at 19, are secured to the opposite ends of the center member in such a manner as to provide for limited movement of the coupler relative to said member. As shown more clearly in Figs. 1ª and 2ª, a key 20 passes through the opening in the coupler shank and through suitable openings in draft lugs 21 that are attached, as by means of rivets, to channels 11. Draft lugs 21 carry housing 22 in which is mounted a coil spring 23 which abuts at its outer end against a follower 24 that is in engagement with the inner end of the coupler shank. In the illustrated embodiment of the invention the parts are so constructed that the coupler is adapted to move inwardly under a buffing force a very short distance relative to the center member, this movement being yieldingly resisted by spring 23. The latter normally holds the coupler in such a position that the same has no movement relative to the center member when a draft force is applied to the coupler. The movement of the coupler relative to the center member determines the train slack and, as stated, this is preferably more limited than that heretofore employed as standard, as pointed out in my Patent No. 1,693,194, dated November 27, 1928.

It will be apparent that coupler spring 23 is ineffective to absorb draft and buffing shocks imparted to the car structure in sufficient amount to protect said structure and its lading against damage. This protection is secured, however, in a highly efficient manner by long travel means adapted to yieldingly resist movement of the center member relative to the remainder of the car structure. The long travel means is constituted by suitable resilient means operatively connected to the center member and one of the bolsters and by friction mechanism operatively connected to the other bolster and the center member.

The long travel resilient means, in the form shown, is constituted by a pair of coil springs 25 which extend longitudinally between the channels 11, said springs being preferably positioned in the same horizontal plane. Extending through each spring is a rod 26 which is pivotally connected in any suitable manner as by means of a vertically disposed pin 27 to lugs 28 (Fig. 2ª) which extend inwardly from the inner face of center brace 13 toward the center of the car. The opposite end of each of the rods 26 is provided with a head 26ª (Fig. 2) to retain a follower plate 29 in operative engagement with the inner end of the spring. The follower plate normally abuts against follower stop lugs 30 which are suitably attached to upper and lower tie plates 31 secured to the upper and lower flanges respectively of the channels 11. Longitudinally disposed Z bars 32 are secured to the inner faces of the tie plates to prevent buckling of the springs in a vertical plane. Outward buckling of the springs is prevented by the webs of the channels 11. A follower 33 is interposed between lugs 28 and the adjacent ends of springs 25, and follower stops 34 (Fig. 1ª) are secured to the inner faces of the webs of channels 11 for engagement with follower 33.

When a force is imparted to one of the couplers 19 in a direction such as to move the center member to the left, as viewed in Figs. 1 and 1ª, relative to the bolster, follower stops 34 pick up follower 33 and compress springs 25, the opposite ends of the spring being held by follower 29 and heads 26ª of the rods 26. Since stops 30 are rigid with the center member, the same move out of engagement at this time with follower 29. If the force is such as to move the center member to the right relative to the bolsters, stops 30 engage follower 29 and compress springs 25, the outer ends of the springs being held against movement due to the engagement of follower 33 with the center brace. The force is thus yieldingly absorbed, and since the movement of the center member does not vary the train slack this movement is preferably made much greater than the movement of the coupler relative to the center member and also greater than the travel heretofore employed in draft gears, which has been limited by the permissible amount of train slack to approximately two and three-quarters inches. This travel, hereinafter referred to as long travel, of springs 25 may be as much as seven or eight inches or more and enables low pressures to be used, thereby protecting the car structure and its lading. The term "long travel" as used in the appended claims means travel longer than the standard draft gear travel in accordance with the above explanation.

Friction means are desirable to check the recoil resulting from the compression of springs 25. Moreover, it is desirable to distribute the forces imparted to the center member in equal amounts to the two bolsters. If combined resilient and friction means are employed adjacent each bolster to insure an even distribution of the forces and to prevent recoil, an expensive, heavy structure or yielding resisting unit must be provided, and each spring used should be of the long travel type. To overcome this difficulty I have heretofore employed friction means constituted by

stringers interposed between the car flooring and the channels constituting the center member, but the long travel springs were employed adjacent each bolster. In the present invention, however, a light and relatively inexpensive structure is disclosed wherein recoil is prevented and an even distribution of the forces is secured by employing the coil springs, referred to above, adjacent one bolster in combination with a friction unit operatively connected to the center member and the bolster at the opposite end of the car from that to which springs 25 are operatively connected.

As shown more clearly in Figs. 2 to 5 inclusive, the friction unit comprises a housing 35 which is mounted between channels 11 and retained in operative position by means of tie plates 36 which may be secured as by means of rivets to the upper and lower flanges of said channels. Preferably the housing is provided on its opposite ends with vertically disposed lugs 37 which are engaged at their upper and lower ends with the tie plates 36. If desired, strengthening tie plates 38 may be attached to the outer faces of tie plates 36 adjacent the housing 35. The latter is provided with an exterior reinforcing web 39 and suitable interior webs, and in the form shown is constituted by a casting. Positioned within the housing are two longitudinally extending arms 40 and 41 disposed one above the other, the upper arm 40 preferably being of less length than the lower arm 41. Arm 40 engages the inner surface of housing 35 closely adjacent its free end as at 42, while the lower arm engages the housing at 43, these points constituting fulcrums. The inner faces of the arms are rounded off for frictional engagement with substantially semi-cylindrical friction shoes 44 and 45, that extend transversely of the housing and bear against the opposite faces of a friction bar 46 that is secured at its outer end to the center brace of the adjacent body bolster. The outer ends of each shoe extend in recesses in the side walls of housing 35 whereby movement of the latter is imparted to said shoes.

As shown more clearly in Fig. 1, the outer end of bar 46 is provided with a pair of arms 46^a, which extend between lugs 47 on the center brace and are connected to said lugs by means of vertically disposed pins 48. The upper and lower faces of bar or plate 46 constitute friction surfaces for the shoes 44 and 45, and said bar tapers outwardly in opposite directions from the midportion of said surfaces, as shown more clearly in Figs. 2 and 3. When the parts are in normal position the friction shoes engage that portion of the bar having the least thickness, and preferably the tapered surfaces are curved or arcuate.

The outer end of arm 40 is provided with a recess to receive a link 49 which extends downwardly around bar 46 and a coil spring 50 which projects through an opening provided in tie plates 36 and 38. A follower 51 is interposed between the lower end of spring 50 and the lower bight of link 49, and the upper end of the spring bears against an enlarged portion of the lower arm 41. It will be understood that the dimensions of link 49 are such that when the parts are assembled the spring is under an initial compression. The spring thus acts through the link and fulcrums 42 and 43 to hold the arms in engagement with the arcuate surfaces of shoes 44 and 45 and to yieldingly hold the latter in frictional engagement with the tapered surfaces of bar 46. Unlike prior devices of this character, spring 50 is not effective to release the friction elements, but is used solely for setting up the friction.

If a force is imparted to the center member through the couplers in a direction such that the center member moves to the right relative to the bolsters, housing 35 is constrained by tie plates 36 and 38 to move to the right with the center member, and carries therewith the friction shoes 44. The latter are effective to move arms 40 and 41, and spring 50 in unison with said housing. Since the friction shoes move along diverging friction surfaces on bar 46, the friction generated gradually increases until the force imparted to the center member is absorbed, it being understood that springs 25 adjacent the opposite bolster coact with the friction elements to absorb the force. Bar 46 is held against movement by pins 48 when the friction shoes move in the manner described.

The center member is returned to normal position by the springs 25 adjacent the opposite bolster, and during the return movement friction shoes 44 move toward the narrow part of bar 46. It will be understood that the friction generated by the friction unit during recoil is sufficiently less than the energy stored in springs 25 that said springs are effective at all times to return the center member to a normal position, and rebound is effectively prevented by the friction unit. By varying the size or capacity of spring 50 and by changing the characteristics of bar 46 or shoes 44, it will be seen that the friction unit may be designed to offer any desired amount of resistance to relative movement of the center member, from normal position in either direction, whereby draft and buffing forces may be substantially equally distributed to the two body bolsters. The resilient means and the friction means are operable whether the center member moves to right or left relative to the body bolsters.

If a force of sufficient amount, as sometimes may occur under conditions which are not normal, is applied to the center member through the couplers, the center member 11, 11 may be given a relative movement so great as to overload springs 25. In order to avoid this, the structure embodies suitable stops for positively limiting movement of the center member relative to the car structure. As shown more clearly in Figs. 2 and 2^a, tie plates 53 are secured to the upper and lower flanges of the channels in such a position that the inner ends of said tie plates are adapted to engage the center brace 13 or bolster and positively limit relative movement of the center member to the left, as viewed in Fig. 2^a. Additional tie plates 54 are secured to channels 11 in a position to engage the center brace or bolster and limit movement of the center member to the right. Other tie plates similar to those shown in Fig. 2^a are provided for engagement with the bolster at the opposite end of the car, if desired.

Figs. 6 and 7 are diagrams illustrating the amounts of energy available for resisting relative movement of the center member and for returning the same to normal position. The line *a, b* represents the travel of the springs 25, while the line *b, c* represents the pressures set up in the springs. The line *a, d* indicates that springs 25 are preferably installed under an initial compression, and the area *a, b, c, d* represents the total energy of the springs available for resisting draft and buffing forces. The diagram of Fig. 7 represents the amount of friction available for resist-

ing relative movement of the center member. The area included between lines *e, f, g, h* of Fig. 7, which is equal to the area *a, b, c, d* of Fig. 6, represents the total energy absorbed in the friction unit for resisting relative movement of the center member. It will be understood that the sum of the two areas *a, b, c, d* and *e, f, g, h* is the total energy available for resisting relative movement of the center member. The area *e, k, g, h* of Fig. 7 represents the energy available in springs 25 to return the draft and buffing column to normal position, the remaining energy of the springs being absorbed by the friction unit.

There is thus provided a novel car structure embodying novel long travel yielding means for resisting draft and buffing forces. By providing resilient means adjacent one bolster and friction means adjacent the opposite bolster, the weight of the parts is reduced, the construction of the parts is made more simple, assembly is simplified, and the cost is accordingly reduced. The coil springs are relatively heavier and more expensive than the friction unit, and in the present structure a lesser number of springs is required than in structures heretofore provided. In cars of the type employing draft gears the draft and buffing forces are not distributed equally to the opposite ends of the structure as is done in the car of the present invention wherein each bolster is uniformly loaded. The novel friction unit does not include any resilient element for releasing the friction elements and is adapted to supply the same amount of friction at all times, regardless of the weight of the lading carried by the car.

While only one type of resilient means and one form of friction means have been illustrated and described, it is to be expressly understood that these means may embody various structural forms, and that those illustrated are merely one preferred embodiment of the invention. Reference will therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:—

1. In a railway car, a pair of body bolsters, a draft and buffing column mounted for movement relative to said bolsters, couplers movably secured to the opposite ends of said column, a housing carried by said column, a bar secured to one of said bolsters and extending into said housing, said bar being provided with friction surfaces, means including a pair of spring pressed arms in said housing having operative engagement with said bar, said means being movable with said housing relative to said bar, and resilient means operatively connected to said column and to the other bolster for maintaining said bar and means in normal relative position.

2. In a railway car, a pair of apertured body bolsters, a draft and buffing column mounted for movement relative to said bolsters and extending through the apertures in said bolsters, a housing carried by said column, a bar having friction surfaces secured to one of the bolsters and extending through said housing, friction shoes engaging said bar, means including a pair of arms having operative engagement with said bar and adapted for movement with said shoes and housing relative to the bar, and resilient means operatively connected to said column and the other bolster for maintaining said shoes and bar in normal relative position.

3. In a friction unit for resisting draft and buffing forces, a housing, a support therefor, a friction member extending through said housing, friction shoes engaging said member, said shoes having engagement with said housing, arms interposed between said housing and shoes, and yielding means engaging said arms for maintaining said shoes in engagement with said friction member, said yielding means being ineffective to release said shoes.

4. In a railway car, the combination with the car body and bolsters of a rigid draft and buffing column extending substantially the length of the car body and mounted for movement relative to the body bolsters, a long travel friction unit having relatively movable friction elements, one of said elements comprising a bar having tapered friction surfaces, another of said elements comprising a plurality of friction shoes having frictional engagement with said bar, one of said elements being connected to a body bolster at one end of the car and the other of said elements being connected to said column whereby relative movement between said column and the body bolster is frictionally resisted by said elements, and resilient means operatively connected to said column and to the bolster at the other end of the car whereby said elements are normally maintained in a predetermined relative position.

5. In a railway car, the combination with the car body and bolsters of a rigid draft and buffing column extending substantially the length of the car body and mounted for movement relative to the body bolsters, a long travel friction unit having relatively movable friction elements, one of said elements comprising a bar having tapered friction surfaces, another of said elements comprising a plurality of friction shoes having engagement with opposite sides of said bar and resilient means for urging said shoes together to set up frictional engagement with said bar, one of said elements being connected to a body bolster at one end of the car and the other of said elements being connected to said column, whereby relative movement between said column and the body bolster is resisted by said elements, and resilient means operatively connected to said column and the bolster at the other end of the car whereby said elements are normally maintained in a predetermined relative position.

6. In a railway car, the combination with the car body and bolsters of a rigid draft and buffing column extending substantially the length of the car body and mounted for movement relative to the body bolsters, resilient means operatively connected to said column and to one of the bolsters and normally maintaining said column and bolsters in a predetermined relative position and resisting relative movement therebetween, means for resisting relative movement between said column and body bolsters comprising cooperating friction elements one connected to said column and the other to the other bolster, one of said elements comprising a bar varying in cross section to form tapered friction surfaces, the other of said elements comprising a plurality of friction shoes engaging opposite sides of said bar, operating members for said shoes, and resilient means operatively connected to said members and tending to draw the same together, whereby said shoes are urged into frictional engagement with said bar, said bar and shoes being restored to normal relative position by said first named resilient means.

7. In a car structure, the combination with the car body of a draft and buffing column extending substantially the length of the car structure and mounted for movement relative to the car body, and means resisting such relative movement and

consisting of cooperating friction elements operatively connected to said column and the car body at one end of the car and resilient means operatively connected to said column and the car body at the other end of the car, said resilient means restoring said column and friction elements to normal position.

8. In a car structure, the combination with the car body and bolsters of a rigid center member extending substantially the length of said structure and mounted for longitudinal movement relative thereto, cooperating friction elements operatively connected to said center member and to the bolster at one end of the car for resisting relative movement of said center member away from normal position, and resilient means operatively connected to said center member and to the bolster at the other end of the car for resisting relative movement of said center member away from normal position, said resilient means constituting the sole means for restoring said center member and friction elements to normal position.

9. In a car structure, the combination with the car body of a rigid draft and buffing column extending substantially the length of the car structure and mounted for movement relative thereto, and cushioning means for resisting such relative movement and consisting of cooperating friction elements operatively connected to the column and car body at one end of the car, resilient means operatively connected to the car body and column at the other end of the car, said friction elements and column being restored to normal position by said resilient means, and means for maintaining said friction elements in frictional relation.

10. In a car structure, the combination with the car body and bolsters of a rigid center member extending substantially the length of the car structure and mounted for longitudinal movement relative thereto, and cushioning means for resisting such relative movement consisting of friction elements and a spring for restoring said friction elements, the friction elements being connected to the bolster and center member at one end of the car and the spring being connected to the bolster and center member at the other end of the car.

11. In a car structure, the combination with the car body of a center member extending substantially the length of the car structure and mounted for longitudinal movement relative to the car body, and long travel cushioning means for resisting such relative movement consisting of cooperating friction elements and resilient means for restoring said friction elements, said friction elements being connected to the car body and to the center member at one end of the car and said resilient means being connected to the car body and the center member at the other end of the car, and a short travel resilient means for maintaining said friction elements in frictional engagement.

12. In a car structure, friction means for resisting draft and buffing forces comprising a housing, a friction member extending through said housing, friction shoes each having a single plane surface engaging the opposite sides of said friction member, said friction member and shoes being adapted for movement relative to each other in either direction, a pair of operating members engaging said shoes, and means including a resilient member and engaging said operating members to maintain said shoes in frictional engagement with said friction member, said shoes being mounted for pivotal movement with respect to said housing, each plane friction surface frictionally engaging the corresponding surface on the side of said friction member on movement in either direction.

13. Apparatus for resisting draft and buffing forces in railway cars comprising a bar having tapered friction surfaces, a housing surrounding a portion of said bar, semi-cylindrical friction shoes in said housing and having frictional engagement between their flat faces and the tapered friction surfaces of said bar, said shoes being capable of rotation about their cylindrical axes and with respect to said housing whereby their flat faces cooperate with said tapered friction surfaces in either direction of relative movement between said shoes and said bar, arms in engagement with said shoes, one end of each arm being fulcrumed in said housing and the opposite ends of the arms projecting from the housing, and resilient means operatively connected to draw the projecting ends of said arms together for retaining the same in engagement with said shoes.

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