END OF CAR CUSHIONING DEVICE FOR A RAILWAY CAR

Inventor: Vaughn T. Hawthorne, Mechanicsburg, Pa.


Filed: Mar. 1, 1972

Appl. No.: 230,786

U.S. Cl. 213/8, 213/43, 267/65
Int. Cl. B61G 9/12
Field of Search 213/8, 43, 223; 267/64 R, 267/65 R; 188/312, 315

References Cited

UNITED STATES PATENTS
3,483,952 12/1969 Cardwell ......................... 213/43
3,490,607 1/1970 Shafer .......................... 213/43
3,217,897 11/1965 Peterson ....................... 213/43
3,568,855 3/1971 Scay .......................... 213/43
3,152,699 10/1964 Vickerman ....................... 213/43
3,220,561 11/1965 Blake ......................... 213/43

Primary Examiner—Drayton E. Hoffman
Attorney, Agent, or Firm—Hibben, Noyes & Bicknell

ABSTRACT

An end of car hydraulic cushioning device has been provided for a type of railway car usually situated at the rear of a train. The device comprises a cylinder, a piston slidable in the cylinder, a yoke adapted to carry a coupler, and a return spring assembly for returning the piston to a neutral position in the cylinder. To cushion the forces acting on such a car, the device has a travel in a draft direction at least equal to its travel in the buff direction. The device also has draft and buff orifices in the cylinder for providing fluid flow therefrom and also has neutral orifices in the cylinder for returning fluid to the cylinder. The area of the draft, buff and neutral orifices are proportioned to cushion impact forces acting on such a car. The return spring assembly includes a coil spring which cooperates with a pair of brackets on the railway car and a pair of abutments movable with the piston to return the piston to its neutral position where it covers the neutral orifices.

28 Claims, 9 Drawing Figures
This invention relates to a railway car coupler cushioning device and more particularly to an end of car hydraulic cushioning device.

Men riding in a business car or a caboose at the rear of a train have suffered through the experience of a long freight train getting under way. Usually, the engine, which may be a mile or more away, has been under way for a considerable period of time before the rear car is "jerked" into motion. Also, as the train runs along the track, there are wave-like motions, due to changes of track conditions and train operation, which travel up and down the train. These wave-like motions are ultimately transmitted to the rear car of the train and result in movements, sometimes violent, which could cause injury to a man riding in the rear car who is caught off guard. The rear car is also subject to some of the draft and buff impacts caused by train acceleration, braking and coupling, but the design criteria for these impacts are somewhat different for the rear car of the train than for a freight car which could be situated anywhere along the train.

The end of car impact device of the present invention has improved the quality of ride in the rear car of the train by providing increased draft impact cushioning to control the jerk and wave-like motions while maintaining adequate buff impact cushioning for braking and coupling impacts. To accomplish this result, the device of the present invention has a travel in the draft direction at least equal to its travel in the buff direction. The device comprises a hydraulic unit with piston and cylinder members, a yoke, and a return spring assembly. One of said members is mounted on the car and the other of said members is secured to the yoke which is slidable in the car and is adapted to have a coupler secured thereto. The piston member is movable relative to the cylinder member and separates it into buff and draft ends. The other of said members is forced toward a neutral position relative to and near the center of the one member by the return spring assembly. Both the other of said members and the return spring assembly are capable of travel in either direction from the neutral position. A housing encloses the cylinder and provides passage means for fluid flow between the ends of the cylinder.

To achieve the desired draft and buff cushioning, not only is the draft travel of the device equal to or greater than its buff travel but a special orifice arrangement is provided. Orifices are provided in the cylinder member to connect that member with the passage means, draft and buff orifices being provided in the respective ends of the cylinder. Additional neutral orifices for returning fluid flow are provided in the cylinder and are located adjacent the piston member, when in its neutral position with respect to the cylinder member. The neutral orifices provide return passages for fluid flowing from the passage means into the one end of the cylinder member as the piston member moves from the relative neutral position toward the opposite end of the cylinder member. The draft orifices are at least equal in total area to the buff orifices, and the total area of the neutral orifices is at least as great as one-third the total area of the buff orifices.

The hydraulic unit of the device is held in its neutral position by the return spring assembly which is displaceable in either direction from a neutral position and returns the other of said members of the device back to its neutral position. The return spring assembly comprises a spring and a pair of spaced abutment means for engaging the spring means, the abutment means being secured to a tube connected to the other of said members. The spring is slidably mounted and guided on the tube and is located between the abutment means. Bracket means for reacting with the spring are located at either end thereof and are secured to the railway car. The spring may be compressed in either direction by one of the abutment means against one of the bracket means as the other of said members of said device moves from its neutral position, and, upon its return, the spring forces the other of said members back to its neutral position.

Accordingly, it is a primary object of the present invention to provide a cushioning device with a draft travel at least equal to its buff travel.

Still another object is to provide a return spring assembly which is movable in either direction from a neutral position and returns the device to a neutral position.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying figures of the drawings wherein:

FIG. 1 is an elevational view of an end of car cushioning device embodying the present invention, portions of the railway car having been broken away and shown in cross section;

FIG. 2 is an enlarged cross-sectional view of the device shown in FIG. 1;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1, with portions of the device being shown in full lines;

FIG. 4 is a development view of a cylinder of the device of FIG. 1;

FIG. 5 is a development view of a cylinder of a second form of device embodying the invention;

FIG. 6 is a schematic drawing showing a hydraulic unit and a part of a return spring assembly of the device of FIG. 1 in a neutral position;

FIG. 7 is a view similar to that of FIG. 6 but showing the return spring assembly displaced by a draft impact;

FIG. 8 is a view similar to FIG. 7 but showing the return spring assembly displaced by a buff impact; and FIG. 9 is a cross-sectional view taken along the line 9—9 of FIG. 3.

An end of car cushioning device embodying the present invention installed in a car assembly 10, which forms part of the center sill 11 of a railway car, is shown in FIG. 1. The carrier assembly 10 is positioned beneath and secured to the center sill 11. The cushioning device comprises a hydraulic unit 12, a yoke 13 slidably mounted in the carrier 10, and a return spring assembly 14.

The hydraulic unit 12 is generally similar to the units shown in my co-pending U.S. patent applications, Ser. No. 52,265, filed July 6, 1970, which issued on Aug. 8, 1972 as U.S. Pat. No. 3,682,324 and Ser. No. 195,236, filed Nov. 3, 1971. As is shown in FIG. 2, the hydraulic unit 12 comprises a cylinder member 16 and a piston
member 18, the piston member 18 being relatively slid-able in the cylinder member 16. The cylinder member 16 is closed at its ends by cylinder heads 22 and 24, and a housing 20 cooperates with reservoir heads 26 and 28 to enclose the cylinder member 16 and the cylinder heads 22 and 24. The cylinder head 22 and reservoir head 26 form a head assembly at the butt end of the unit and the cylinder head 24 and the reservoir head 28 form a head assembly at the draft end of the unit.

While the piston member may be held fixed in the car, and the cylinder member adapted to be attached to the yoke carrying the coupler, in this instance, the cylinder member 16 is held fixed to the carrier 10 of the car sill 11, and the piston member 18 is secured to the yoke 13. The cylinder member 16 is held in fixed position in the carrier 10 by front and rear stops 29 which are secured to the carrier 10 and abut the reservoir heads 26 and 28.

The piston member 18 has an enlarged portion 30 to separate the ends of the cylinder and has a piston ring 31 for forming a seal with the interior wall of the cylinder member 16. The piston member 18 further includes a piston rod 32 which, as shown in FIG. 1, extends out both ends of the unit through openings in the reservoir heads 26 and 28. Seals 34 are located in the reservoir heads 26 and 28 to seal the openings for the piston rod 32 in the reservoir heads 26 and 28.

The front end of the piston rod 32 is adapted to be secured to the yoke 13. At the front, the piston rod 32 is provided with a rod end, enlarged abutment 44, which fits in a corresponding opening 45 formed in the yoke 13. The abutment 44 is downwardly slidable in the opening 45 so that the unit 12 may be disengaged from the yoke 13. The rear or butt end of the piston rod 32, in this instance, is connected to the return spring assembly 14, hereinafter described.

The yoke 13 is slidable in the carrier 10 and supports the rear end of the coupler 27 which is pivotally mounted on a coupler pin 40 received in openings 42 provided in the yoke 13.

As is shown in FIG. 2, the cylinder member 16 and the housing 20 define a reservoir space or passage means 46 for communicating hydraulic fluid flowing between the draft and butt ends of the cylinder 16. As the piston member 18 moves toward one of the draft or butt ends of the cylinder member 16, hydraulic fluid in the one end of the cylinder member 16 is forced out of orifices in that end, hereinafter described, into the passage means 46, through orifices on the other end, hereinafter described, and into the other end of the cylinder. Should the pressure in the end of the cylinder member 16 toward which the piston member 18 is moving become too great, a pressure relief valve 52 or 53 opens and permits additional fluid flow from the cylinder forming the passage means 46. In addition, fluid from the passage means 46 may return to the other end of the cylinder by check valves 54 or 55 located at each end of the cylinder, in this instance four check valves 54 or 55 are provided in each end.

To provide the cushioning desired for the rear car of a train, particularly a business car which may carry railway executives or a caboose which may carry train operating personnel, the devices have been provided with a unique relative piston travel arrangement, the travel in the draft direction being at least as great as the travel in the buff direction. For the business car application shown in FIG. 2, the piston member has a neutral position in the cylinder and can travel 6 inches in a draft direction and 4 inches in a buff direction from the neutral position.

The device of the present invention also has a unique orifice arrangement. The orifices comprise three separate groups. The first group, called draft orifice means, is located in the draft end of the cylinder, and for the business car application comprises six 0.358 inch diameter openings, generally indicated in FIG. 4 as 71-76. The draft orifice means 71-76 permits flow of fluid from the draft end of the cylinder member 16 to the passage means 46 as the enlarged portion 30 of the piston member 18 moves toward the draft end, and the draft orifice means 71-76 also permits flow of fluid from the passage means 46 into the draft end of the cylinder member 18 as the enlarged portion 30 moves toward the buff end. The second group, called buff ori-fice means, for the business car comprises six 0.302 inch diameter openings, generally indicated in FIG. 4 as 81-86. The buff orifice means functions in a manner generally opposite that of the draft orifice means. In the business car application, the total area of the draft orifice means is larger than the total area of the buff orifice means.

The third group, called neutral orifice means, is located generally adjacent the neutral position, indicated by the dashed line 90, of the enlarged portion 30 in the cylinder member 16. The neutral orifice means may vary in size or shape, and may be provided by a single opening. For the business car the neutral orifice means comprises two 0.302 inch diameter openings having their centers located in one plane which is perpendicular to the axis of the cylinder. Thus, the total area of the neutral orifice means is at least as great as one-third of the total area of the buff orifice means.

The neutral orifice means assists the check valves 54 or 55 in the ends of the cylinder 16 and permits flow of fluid from passage means 46 into the cylinder 16 as the enlarged portion 30 of the piston member 18 moves from its neutral position toward one or the other ends of the cylinder. The use of the neutral orifices 91 and 92 permits the number of check valves provided in the buff and draft ends of the cylinder to be reduced, in this instance, only four such valves having been provided at each end. Preferably, the longitudinal dimensions of the neutral orifices 91 and 92, in this instance their diameters, are less than the width of the piston ring 31 on the enlarged portion 30, so that the piston ring 31 when in a neutral position, covers or closes off the neutral orifices and no flow through these orifices can occur.

FIG. 5 shows a cylinder 100 for use in a device (not shown), particularly adapted for use in a caboose. The hydraulic unit for the caboose device is identical to that for the business car except that the cylinder, housing and piston rod are somewhat longer, and the orifice arrangement and the travel of the piston are somewhat different. In the second embodiment, the neutral position of the piston is located at the center of the cylinder, and the travel of the piston in the buff direction and in the draft direction is equal, the travel in each direction being 7½ inches. As is shown in FIG. 5, the draft orifice means for the caboose comprises orifices 101-109, and the buff orifice means comprises orifices 111-119. At the neutral position, indicated by the dashed line 120, are located four neutral orifices 121-124. The draft orifices 101-109 and buff orifices 111-119 are formed by 35/64 inch diameter holes in
the cylinder 100, while the neutral orifices 121–124 are formed by 1 inch diameter holes.

As is shown in FIG. 3, the return spring assembly 14 for the first embodiment of the device is arranged at the rear and sides of the hydraulic unit 12. The return spring assembly 14 comprises a pair of sub-assemblies 125. Each sub-assembly 125 has an elongated member or tube 130. The rear of each tube 130 is connected to an outer end of a draft key 132 which, in turn, is connected at its center to the rear of the piston rod 32. As is shown in FIG. 9, the draft key 132 extends across the rear of the unit 12. The center of the draft key 132 has openings 133 to receive bolts 134 which also extend through openings 135 in a pair of flats 129 welded to the rear of the piston rod 32. At its outer ends, the draft key 132 has end openings 136 which receive pins or bolts 137. The bolts 137, in turn, pass through openings 138 in box-like weldments 139 secured to the rear of the tubes 130. Thus, the tubes 130 will move with the piston rod 32.

The rear end of each tube 130 is supported by the draft key 132, as was heretofore described. The front end of each tube 130 is supported by tubular guide bracket 131 which is secured to the carrier 10, the tube passing through and being slidable in an opening in the guide bracket.

On each tube 130 is located a pair of washers 146 and 147 for engaging a spring 150, hereinafter described. The washers 146 and 147, in this instance, serve as abutment means and are secured, as by welding, in a spaced relation to the tube 130. The spring 150, preferably, is a single-coil spring which is slidable on the tube 130 and extends between the washers 146 and 147. The spring 150 is of such length so as to be in a compressed state when located between the washers 146 and 147 and has a preload of approximately 3,000 pounds. Each tube 130 is movable through a pair of brackets 153 and 154 for engaging the ends of the spring 150. In this instance, the brackets 153 and 154 have a flat portion 156 with an opening 158 (FIG. 9) therein to receive the tube 130 and a brace portion 160 secured to the carrier 10 of the sill 11. The openings 158 are preferably U-shaped and open to the outside to permit removal of the sub-assemblies 125. The brackets 153 and 154 are spaced apart a distance generally equal to that of the washers 146 and 147.

Located between each end of the spring 150 and both the adjacent washer 146 or 147 and bracket 153 or 154 is an enlarged follower 164 or 165. The enlarged follower 164 or 165 is formed from a washer having a center opening 167 for the tube 130 and is larger than the opening 158 in the bracket 153 or 154 to engage the flat portion 156 of the bracket 153 or 154. Thus, the follower 164 or 165 can move in the direction only toward the distant bracket 153 or 154. The followers 164 and 165 have cut-off edges to provide clearance between the followers and various parts.

FIGS. 6, 7 and 8 are schematic drawings of a unit with a portion of its associated spring assembly showing relative positions of parts during three operative conditions. FIG. 6 is a schematic drawing of one of the return spring subassemblies 125 and the hydraulic unit 12 in the neutral position. As can be seen, the spring 150 presses both of the enlarged followers 164 and 165 against their adjacent brackets 153 and 154, forcing the washers 146 and 147 on the tube 130 into the same plane as the brackets to hold the tube and piston rod 32 in their neutral position. In this position the enlarged portion 30 of the piston covers the neutral orifices 91 and 92.

In FIG. 7 a draft impact is shown acting on the unit 12 as is represented by the arrow 170. Under such condition, the piston rod 32 moves toward the front (right) and causes the tube 130 to move with it. As this happens, hydraulic fluid in the draft end of the cylinder flows out draft orifices 71–76 through the reservoir space 46 and into the buff end of the cylinder through the buff orifices 81–86, check valves 54 and neutral orifices 91–92 to cushion the impact.

During draft impact the return spring assembly 14 operates as follows: the rear washer 146 passes through the opening 158 in the rear bracket 154 and engages the enlarged follower 164 at the rear end of the spring 150, thus further compressing the spring against the front bracket 153. The front end of the spring 150 is held by the front bracket 154 since the front enlarged follower 165 cannot pass through the opening 158 in the front bracket. The rear washer 147 on the tube 130, however, is free to move through the opening 158 in the front bracket 154. The compressed spring 150 will then force the piston member 16 and tube 130 to return to their neutral position.

After the draft impact is cushioned the unit and spring assembly return to their neutral position. Hydraulic fluid flows from the buff end of the cylinder through all orifices to the left of the enlarged portion 30 of the piston, into the reservoir space 46 and into the draft end of the cylinder through all orifices to the right of the enlarged portion 30 of the piston and check valves 55. The enlarged portion 30 of the piston stops at the neutral position and again covers the neutral orifices 91–92.

In FIG. 8, a buff impact is shown, as indicated by the arrow 171, acting on the unit 12 and a portion of the return spring assembly 14. Under a buff impact, the piston rod 32 moves toward the rear or buff end and causes the tube 130 to move with it. The hydraulic fluid in the buff end of the cylinder flows through the buff orifices 81–86 and through the reservoir space 46 into the other end of the cylinder through the draft orifices 71–76, check valves 55 and the neutral orifices 91–92 to cushion the impact.

The operation of the return spring assemblies 14 for a buff impact is generally just the reverse of that described for a draft impact. The washer 147 passes through the bracket 154 and engages the enlarged follower 165 to compress the spring 150 against the rear bracket 153. The follower 164 engages the bracket 153, while the rear washer 146 moves through the opening 158 in the rear bracket 153. The compressed spring 150 will then force the return spring assembly 125 and unit 12 to again assume their neutral position as shown in FIG. 6.

On the return to the neutral position, fluid flows from the draft end of the cylinder through all orifices to the right of the enlarged portion 30 of the piston, into the reservoir space 46 and into the buff end of the cylinder through all orifices to the left of the enlarged portion 30 of the piston and check valves 54. The enlarged portion 30 of the piston stops at the neutral position and again covers the neutral orifices 91–92.

The return spring assembly, using the same basic parts, the tube 130, washers 146 and 147, spring 150, and brackets 153 and 154 has the advantages of being...
assembled so that it can be used with hydraulic units having different neutral positions. The return spring assembly can be assembled to have a greater travel in either the buff or draft direction or equal travel in both directions. To assemble the return spring for a desired neutral position, the piston 18 is placed in the relative neutral position, wherever desired, with respect to the cylinder 16, and the spring 150 in a precompressed state is located on the tube 130. The washers 146 and 147 are secured to the tube 130 adjacent the ends of the spring 150, and the brackets 153 and 154 are aligned with their adjacent washers and are secured to the car sill 11. Thus installed, the spring 150 will return the unit 12 to the selected neutral position.

The spring 150 can also be located at various positions along the tube 130 to facilitate installation. The spring 150 in a precompressed state, is installed on the rod in the position desired. The washers 146 and 147 are then secured to the tube 130, and the brackets 153 and 154 are secured to the car sill 11.

The initial preload of the spring 150 can also be easily varied. The preload of the spring 150 can be changed simply by moving installed positions of the washers 146 and 147 and brackets 153 and 154, thereby varying the precompressed length of the spring, relatively toward each other to increase the preload or relatively away from each other to decrease the spring load.

As will be seen from the foregoing description, the present invention provides a novel and improved end of car cushioning device having a hydraulic unit and return spring assembly for a railway car, particularly suitable for a car of the type normally located at the rear of a train and carrying passengers or railway personnel. The device has a travel in the draft direction at least equal to the travel in the buff direction so as to be able to cushion forces which act on such type car. Also, the device has a piston slidably in a cylinder and novel orifice means including buff and draft orifices in each end of the cylinder and neutral orifices located adjacent the neutral position of the piston in the cylinder. Furthermore, the orifices have been proportioned to provide the desired cushioning for such type car. Still further, the device has a novel spring arrangement for returning the piston to its neutral position where it closes off the neutral orifices.

I claim:

1. In an end of railway car hydraulic cushioning device including a hydraulic unit having piston and cylinder members, said piston member being relatively slidably in said cylinder member and dividing said cylinder member into buff and draft ends, said piston member having a relative neutral position in said cylinder member, one of said members being mounted on said railway car and the other of said members being adapted to have a coupler of said car attached thereto, said other member being movable in both buff and draft directions from said neutral position, the relative travel of said other member in the draft direction being approximately one and one-half times the relative travel of said other member in the buff direction, a housing enclosing said cylinder member and providing passage means for interconnecting said buff and draft ends of said cylinder member, and orifice means in said cylinder member to provide communication between said passage means and said buff and draft ends of said cylinder member, said orifice means including draft orifices in said draft end of said cylinder member, buff orifices in said buff end of said cylinder member, said draft orifices having at least as great a total area as said buff orifices, and neutral orifice means for return flow located in said cylinder member at approximately said neutral position, said neutral orifice means permitting flow from said passage means into said cylinder member as said piston member moves relatively from said neutral position toward either of said buff and draft ends of said cylinder member, whereby said unit provides cushioning of draft impact forces and buff impact forces imposed on said coupler.

2. In an end of railway car hydraulic cushioning device including a hydraulic unit having orifice and cylinder members, said piston member being relatively slidably in said cylinder member and dividing said cylinder member into buff and draft ends, said piston member having a relative neutral position in said cylinder member, one of said members being mounted on said railway car and the other of said members being adapted to have a coupler of said car attached thereto, said other member being movable in both buff and draft directions from said neutral position, a housing enclosing said cylinder member and providing passage means for interconnecting said buff and draft ends of said cylinder member, and orifices in said cylinder member to provide communication between said passage means and said buff and draft ends of said cylinder member, said orifice means including draft orifices in said draft end of said cylinder member, buff orifices in said buff end of said cylinder member, said draft orifices having at least as great a total area as said buff orifices, and neutral orifice means for return flow located in said cylinder member at approximately said neutral position, said area of said neutral orifice means being at least equal to one-third the area of said buff orifice, said neutral orifice means being of a longitudinal dimension so that said piston member covers said neutral orifice means when in its relative neutral position, said neutral orifice means permitting flow from said passage means into said cylinder member as said piston member moves relatively from said neutral position toward either of said buff and draft ends of said cylinder member, whereby said unit provides cushioning of draft impact forces and buff impact forces imposed on said coupler.

3. In a cushioning device as in claim 2, wherein said other member has a relative travel in a draft direction at least equal to its relative travel in a buff direction.

4. In a cushioning device as in claim 2, further comprising a check valve adjacent each end of said cylinder for providing additional flow of fluid from said passage means to said ends of said cylinder.

5. In a cushioning device as in claim 2, further comprising a pressure relief valve adjacent each end of said cylinder for providing fluid flow from said ends of said cylinder into said passage means when the pressure in said ends exceeds a predetermined level.

6. In a cushioning device as in claim 1, further comprising a return spring assembly having a neutral position and being capable of returning said other member to said relative neutral position after having been displaced in either a buff or draft direction.
7. In a cushioning device as in claim 2, wherein the relative travel of said other member in the draft direction is greater than the relative travel of said other member in the buff direction.

8. In an end of railway car hydraulic cushioning device including a hydraulic unit having piston and cylinder members, said piston member being relatively slidably in said cylinder member and dividing said cylinder member into buff and draft ends, said piston member having a relative neutral position in said cylinder member, one of said members being mounted on said railway car and the other of said members being adapted to have a coupler of said car attached thereto, said other member being movable in both buff and draft directions from said neutral position, a housing enclosing said cylinder member and providing passage means for interconnecting said buff and draft ends of said cylinder member, orifice means in said cylinder member to provide communication between said passage means and said buff and draft ends of said cylinder member, said orifice means including draft orifices in said draft end of said cylinder member, buff orifices in said buff end of said cylinder member, said draft orifices having at least as great a total area as said buff orifices, and neutral orifice means for return flow located in said cylinder member at approximately said neutral position, said neutral orifice means being of a longitudinal dimension so that said piston member covers said neutral orifice means when in its relative neutral position, said neutral orifice means permitting flow from said passage means into said cylinder member as said piston member moves relatively from said neutral position toward either of said buff and draft ends of said cylinder member, and a return spring assembly having a neutral position and being capable of returning said other member to said relative neutral position after having been displaced in either a buff or draft direction, said return spring assembly comprising an elongated element secured to and movable with said other member, spring means for returning said other member to a neutral position, said spring means being slidable on said elongated element, said elongated element having spaced abutment means for engaging the ends of said spring means, one of said abutment means being at each end of said spring means, and bracket means for engaging said ends of said spring means, said bracket means being secured to said car and receiving said elongated element; when said elongated element and said other member move in one direction from the neutral position said abutment means at one end engaging and compressing said spring means against said bracket means at the opposite end; when said elongated element and said other member move in the other direction from the neutral position said abutment means at the other end engaging and compressing said spring means against said bracket means at the opposite end; whereby said spring means forces said elongated element and said other member into their neutral position and said unit provides cushioning of draft impact forces and buff impact forces imposed on said coupler.

9. In an end of car device as in claim 8, wherein said cylinder member is mounted on said car and said piston member has a piston rod which extends out at least one end of said unit, said elongated element being connected to said piston rod.

10. In an end of car device as in claim 8, wherein a pair of said return spring assemblies are located one on each side of said hydraulic unit.

11. In an end of car device as in claim 10, further comprising a draft key for connecting said assemblies, said draft key extending transversely across said unit and being connected at its center to said piston rod, one of said return spring assemblies being connected at each end of said draft key.

12. In an end of car device as in claim 11, further comprising followers disposed between said abutment means on said elongated element and said spring means and adjacent said bracket means, said abutment means being slidable through said bracket means in either direction of travel, each of said follower means being movable away from its adjacent bracket means in one direction of travel and abutting its adjacent bracket means in the opposite direction of travel.

13. In an end of railway car hydraulic cushioning device including a hydraulic unit having piston and cylinder members, said piston member being relatively slidably in said cylinder member, one of said members being mounted on said car, the other of said members having a neutral position with respect to said one member and being movable in either direction from said neutral position, the improvement comprising a return spring assembly for returning said other member from either direction to its neutral position, said return spring assembly including a pair of abutments secured to and movable with said other member, a pair of brackets secured to said car, and a spring disposed between both said pair of abutments and said pair of brackets for engaging said abutments and brackets to return said other member from either direction to its neutral position, each of said abutments and brackets being spaced apart for engaging said spring at its ends; when said other member moves in one direction from said neutral position one of said abutments at one end engaging and compressing said spring against one of said brackets at the opposite end; when said other member moves in the other direction from the neutral position the other of said abutments at the other end engaging and compressing said spring against the other of said brackets at the opposite end; whereby said spring forces said other member from either direction into its neutral position.

14. In an end of car device as in claim 13, wherein said spring comprises a single coil spring.

15. In an end of car device as in claim 13, wherein said cylinder member is mounted on said car and said piston member has a piston rod which extends out at least one end of said cylinder member, and further comprising an elongated element connected to said piston rod, said abutments being carried on said elongated element, said spring being slidable carried on said elongated element.

16. In an end of car device as in claim 15, wherein said piston rod extends through both ends of said cylinder member, and said elongated element is connected to the rear of said piston rod.

17. In an end of car device as in claim 15, wherein a pair of said return spring assemblies are located one on each side of the said unit, and further comprising a draft key extending transversely across said unit and being connected at its center to said piston rod and at its outer ends to said spring assemblies.
11. In an end of car device as in claim 15, further comprising a guide located at the opposite end from said draft key, said draft key supporting one end of said elongated element, said guide supporting the other end of said elongated element.

12. In a cushioning device as in claim 24, wherein the total area of said neutral orifice means is at least as great as one-third the total area of said buff orifice means.

13. In an end of car device as in claim 13, wherein a pair of said spring assemblies are located on opposite sides of the hydraulic unit, said brackets also being located at the sides of the hydraulic unit, and further comprising a draft key extending transversely of said unit and being connected at its center to said other member, one of said spring assemblies being connected at each end of said draft key.

14. In an end of car device as in claim 13, further comprising a pair of followers disposed between said abutments and said spring and adjacent said brackets, said abutments being movable past said brackets in both directions of travel, each of said followers being movable from its adjacent bracket in only one direction of travel and aborting its adjacent bracket in the opposite direction of travel.

15. In an end of car device as in claim 20, wherein said brackets have openings therein, each of said followers being larger than said openings, said abutments being smaller than said openings.

16. In a cushioning device as in claim 24, wherein the total area of said neutral orifice means is at least as great as the total area of said buff orifice means.

17. In a cushioning device as in claim 22, wherein said return spring assembly comprises a coil spring, a pair of abutment means for engaging the ends of said spring and secured to said other member, a pair of bracket means for engaging the ends of said spring and secured to said one member, when said other member moves in one direction said spring is compressed between said abutment means at one end and said bracket means at the opposite end, when said other member moves in the opposite direction said spring is compressed between said abutment means at the opposite end and said bracket means at one end.

18. In an end of railway car hydraulic cushioning device including a hydraulic unit having piston and cylinder members, said piston member being relatively slidably in said cylinder member and dividing said cylinder member into two sections, one of said members being mounted on said railway car and the other of said members being adapted to have a cooper of said car attached thereto, said return spring assembly and said other member being movable in both buff and draft directions of travel from said neutral position, said travel of said other member and said return spring assembly in said draft direction being at least as great as said travel in the buff direction, and a housing enclosing said cylinder member and providing passage means for interconnecting said buff and draft ends of said cylinder member, orifice means in said cylinder member to provide communication between said passage means and said buff and draft ends of said cylinder member, said orifice means including draft orifice means in said draft end of said cylinder member and buff orifice means in said buff end of said cylinder member, whereby said unit provides cushioning of draft and buff impact forces imposed on the coupler.

19. In a cushioning device as in claim 22, wherein said travel in said draft direction is one and one-half times said travel in the buff direction.

20. In a cushioning device as in claim 22, further comprising neutral orifice means located in said cylinder member adjacent said neutral position of said piston member, said piston member covering said neutral orifice means when in its neutral position.

21. In an end of car device as in claim 15, further comprising a guide located at the opposite end from said draft key, said draft key supporting one end of said elongated element, said guide supporting the other end of said elongated element.

22. In an end of railway car hydraulic cushioning device including a return spring assembly and a hydraulic unit having a piston and cylinder members, said piston member being relatively slidably in said cylinder member and dividing said cylinder member into two sections, one of said members being mounted on said railway car and the other of said members being adapted to have a cooper of said car attached thereto, said return spring assembly and said other member being movable in both buff and draft directions of travel from said neutral position, said travel of said other member and said return spring assembly in said draft direction being at least as great as said travel in the buff direction, and a housing enclosing said cylinder member and providing passage means for interconnecting said buff and draft ends of said cylinder member, orifice means in said cylinder member to provide communication between said passage means and said buff and draft ends of said cylinder member, said orifice means including draft orifice means in said draft end of said cylinder member and buff orifice means in said buff end of said cylinder member, whereby said unit provides cushioning of draft and buff impact forces imposed on the coupler.

23. In a cushioning device as in claim 22, wherein said travel in said draft direction is one and one-half times said travel in the buff direction.

24. In a cushioning device as in claim 22, further comprising neutral orifice means located in said cylinder member adjacent said neutral position of said piston member, said piston member covering said neutral orifice means when in its neutral position.
CERTIFICATE OF CORRECTION

Patent No. 3,800,961 Dated April 2, 1974

Inventor(s) VAUGHN T. HAWTHORNE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 21, "leat" should read --least--;
Col. 8, line 17, "orifice" should read --piston--.

Signed and sealed this 10th day of September 1974.

(SEAL)
Attest:

McCoy M. Gibson, Jr.
Attesting Officer

C. Marshall Dann
Commissioner of Patents