# United States Patent [19]

**Hawthorne**

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[54] **END OF CAR CUSHIONING DEVICE**


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[52] **U.S. Cl.** ..... **213/43,** 213/8, 213/62, 213/69

[51] **Int. Cl.** ..... **B61g 9/08,** B61g 9/16

[58] **Field of Search** ..... 213/8, 43, 62, 63, 67, 213/69



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,399,787 | 9/1968 | Zanow | 213/69 |
| 3,537,598 | 11/1970 | Moody | 213/8 |
| 3,598,249 | 8/1971 | Vickerman | 213/8 |
| 3,647,088 | 3/1972 | Seay | 213/67 R |
| 3,721,351 | 3/1973 | Chierci et al. | 213/8 |



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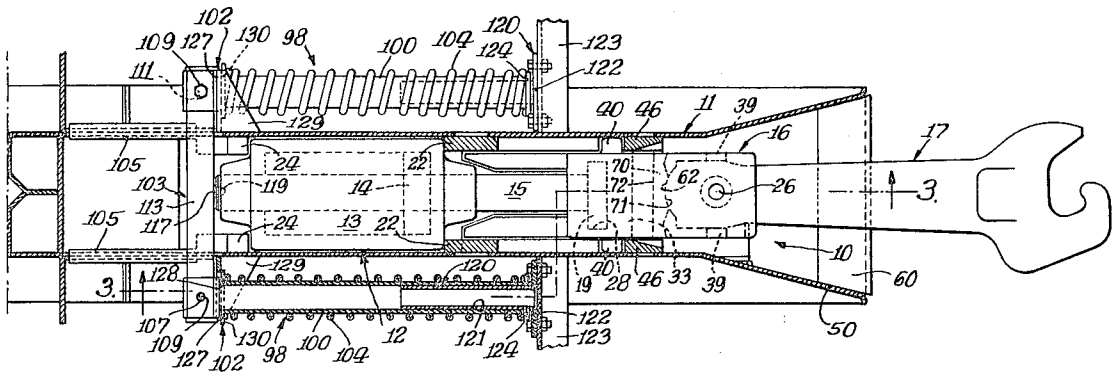
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[57] **ABSTRACT**

A compact end of car cushioning device, having a movable assembly, a fixed assembly and a return spring assembly, has a replaceable wear pad secured to the forward end of the movable assembly for abutment with a coupler during buff impacts. The rear end of the movable assembly is operably connected to the rear of the return spring assembly to return the movable assembly to a normal position after a buff impact.


**16 Claims, 4 Drawing Figures**



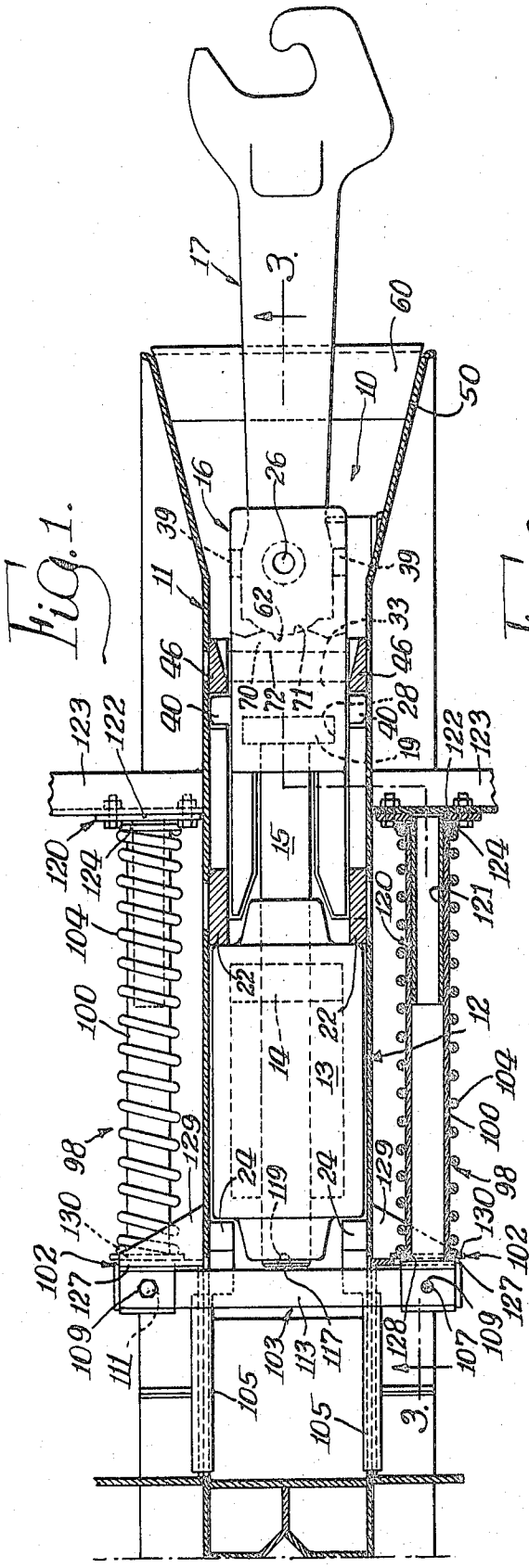


Fig. 1.

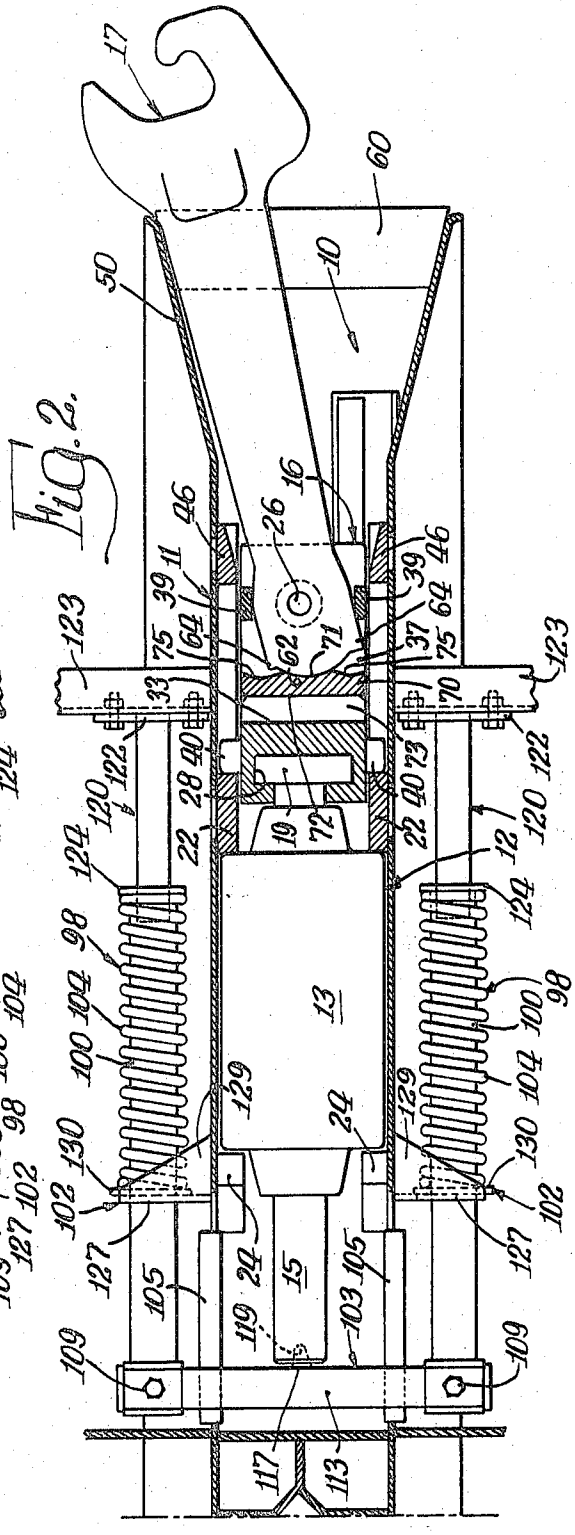


Fig. 2.

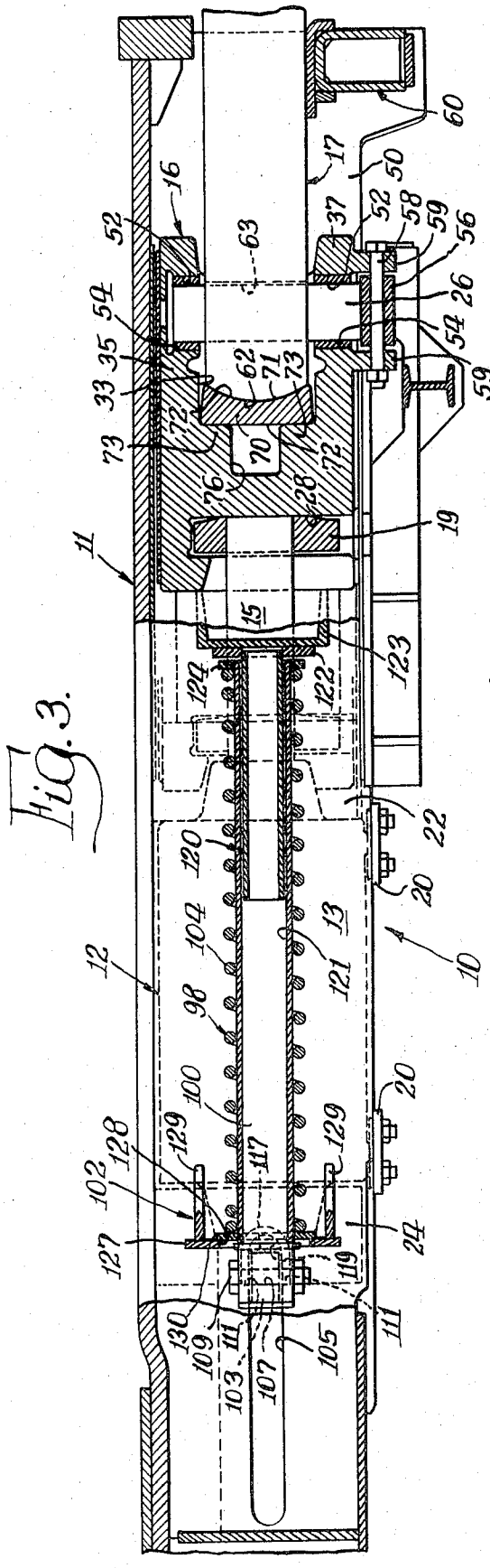


Fig. 3.

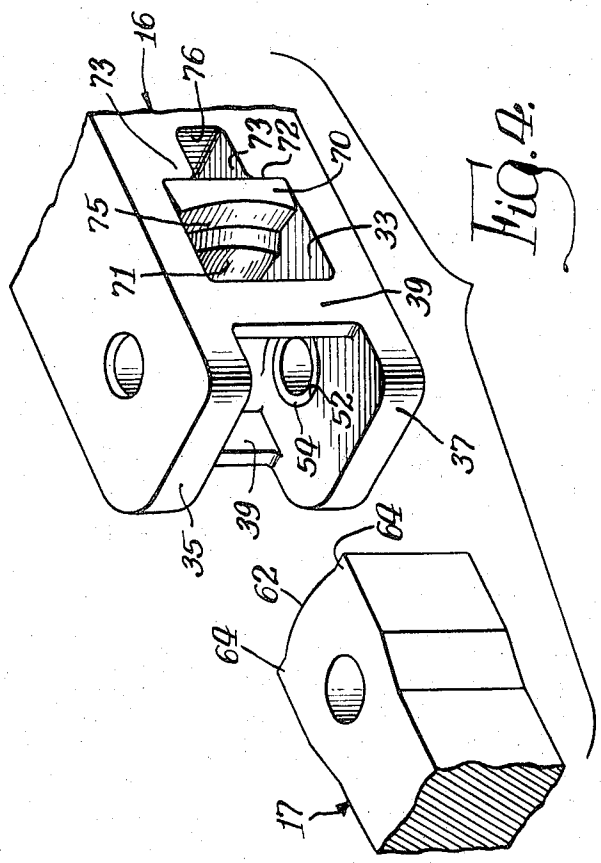


Fig. 4.

# END OF CAR CUSHIONING DEVICE

This invention relates to a railway cushioning device and more particularly to an end of car railway cushioning device.

The cushioning device of the present invention comprises a cylinder and piston, which may be conventional, forming fixed and movable assemblies and a return spring assembly co-operable between the fixed and movable assemblies to return the movable assembly to a normal position. The movable assembly at its forward end has a replaceable, removably secured wear pad which is adapted to engage a coupler, offering the advantage of simply replacing the wear pad should wear occur, instead of replacing a major component of the movable assembly. At its rear, the movable assembly is connected to the return spring assembly. The return spring assembly extends forwardly from the point of connection to the movable assembly and is generally parallel with the movable assembly to minimize the longitudinal dimension of the device.

A primary object of the present invention is to provide a compact end of car cushioning device having fixed and movable assemblies and a return spring assembly with a minimum longitudinal length for cushioning buff impacts.

Another object of the present invention is to provide a movable assembly having a replaceable surface contacted by the coupler during a buff impact.

Yet another object of the present invention is to provide a return spring assembly which is connected to the rear of the movable assembly and extends forwardly, parallel to the movable assembly.

These and other objects of the present invention will become apparent when taken in conjunction with the following description and accompanying figures of the drawings wherein:

FIG. 1 is a plan view with portions shown in crosssection of an end of car cushioning device embodying the present invention shown in a normal position;

FIG. 2 is a view similar to FIG. 1 but showing the device displaced by a buff impact;

FIG. 3 is an enlarged cross-sectional view taken along the line 3—3 of FIG. 1; and

FIG. 4 is an exploded view of a portion of the device shown in FIGS. 1-3. In FIG. 1 is shown an end of car type impact cushioning device 10 of the present invention installed in a railway car. The impact cushioning device 10 comprises a fixed assembly secured to the railway car, a movable assembly adapted to be connected to a coupler and return spring means operatively connected to the fixed and movable assemblies for returning the movable assembly to a normal position relative to the fixed assembly. Each of the fixed and movable assemblies includes portions of a hydraulic cushioning unit 12 which may be of a type similar to that described in my co-pending application, Ser. No. 52,265, filed July 6, 1970, which issued on Aug. 8, 1972 as U.S. Pat. No. 3,682,324. The hydraulic unit 12 has a reservoir-cylinder assembly 13 and a piston 14 (FIG. 1). The piston 14 has a piston rod 15 which extends from both the front and rear ends of the reservoir-cylinder assembly 13.

In this instance, the fixed assembly comprises a sill 11 of the railway car and the reservoir-cylinder assembly 13. The reservoir-cylinder assembly 13 of the hydraulic unit 12 is vertically positioned in the sill 11 by cross



members 20 (FIG. 3) which are bolted to the sill 11 and is longitudinally positioned in the sill 11 by abutting front stops 22 and rear stops 24 welded to the inner walls of the center sill 11.

The movable assembly comprises the piston 14, piston rod 15 and a yoke 16 which is slidable in the sill 11. A coupler 17 is pivotally mounted by a pin 26 to the front end of the yoke 16. At its front end, the piston rod 15 has an enlarged rod end 19 which fits in a pocket 28 formed in the rear of the yoke 16 to connect the yoke to the piston 14 of the hydraulic unit 12.

The yoke 16 is a steel casting having the rear pocket 28, heretofore described, for receiving the rod end 19 and a front opening or cavity 33 (FIG. 4), hereinafter more fully described, for receiving the coupler 17. The yoke 16 has front upper and lower portions 35 and 37 joined by side posts 39. The side posts 39 are located in the yoke 16 to be clear of the coupler 17 when it pivots. The yoke 16 is slidable in the sill 11 and has a pair of vertical ears 40 at its side for engaging the forward surface of the stops 22 which act as rear yoke stops to limit rearward movement of the yoke. The ears 40 of the yoke also abut front yoke stops 46 at the front of the sill 11 to limit forward movement of the yoke.

The coupler 17 is of the pivot or F type and is mounted on the vertical coupler pin 26, the pivotal swing of the coupler being limited by the bell-shaped forward end 50 of the sill 11. The coupler pin 26 is located in a pair of openings 52 provided in the upper and lower portions 35 and 37 of the yoke. Each of these openings 52 is fitted with a replaceable bushing 54 (FIG. 3), the bushings 54 being press fit into the openings 52. The use of the replaceable bushings 54 eliminates the need to replace an entire yoke 16 should the coupler pin 26 cause wear. The coupler pin 26 is vertically positioned in the bushings 54 by a coupler retainer key 56 which is held by a bolt 58 in lugs 59 formed on the yoke. The front of the coupler 16 is vertically supported by a coupler carrier assembly 60 provided at the outer end of the sill 11. The coupler 17 has a conventional rear configuration with a center spherical surface 62 of a radius generally equal to the distance from that surface to the center of the coupler pin. The coupler has a wing portion 64 on each side.

The yoke 16 is provided with a corresponding spherical surface, hereinafter described, for engagement with the spherical surface 62 of the coupler. Clearances are provided in the coupler pin opening, indicated generally at 63 (FIG. 3), so that the spherical surfaces engage during a buff impact to transmit the compression load from the coupler 17 to the yoke 16 and, in turn, to the hydraulic unit 12 and return spring means. Thus, the coupler pin 26 is not subjected to the severe buff impact forces, but is required only to carry the more moderate draft forces.

Both the yoke 16 and coupler 17 are subject to severe buff loading and, in prior constructions, during the life of a car were replaced several times. Heretofore, it may have been necessary to replace both the coupler and the entire yoke. The cushioning device 10 of the present invention provides a replaceable wear pad 70 in the yoke 16 so now only the coupler and the wear pad 70 need be replaced instead of the entire yoke. As is shown in FIGS. 3 and 4, the wear pad 70 is generally rectangular and fits within the cavity 33 in the yoke. The wear pad 70 may be made of a material especially suited for its task. For example, the wear pad 70 may

be forged from a steel with a hardness in the range of 35 Rockwell C to 45 Rockwell C which is harder than the cast yoke, the yoke having a hardness of 22 Rockwell C to 33 Rockwell C. The difference in hardness is particularly important since during buff impact pivotal movement of the coupler could occur, as shown in FIG. 2. The wear pad 70 has a front spherical surface 71 and a flat rear surface 72 to fit against a pair of shoulders 73 formed on the rear wall of the front cavity 33 of the yoke 16. The outer side edges 75 of the wear pad 70 are cut away to provide clearance for the wings 64 when the coupler 17 pivots on its pin 26.

The wear pad 70 is easily installed in the yoke 16 merely by sliding it into the cavity 33 from the side and welding it to the yoke before the yoke is installed in the sill 11. Likewise, removal of the wear pad 70 is easily accomplished by removing the yoke 16 from the sill 11 and then removing and replacing the wear pad. A small opening 76 is provided behind the wear pad 70 between the shoulders 73 and extends across the yoke 16. The opening 76 may be used to insert a tool (not shown), such as a bar, behind the wear pad to assist in removing the wear pad should that be necessary.

As the coupler 17 contacts the wear pad 70 during a buff impact, it forces the movable assembly rearward. After being displaced, the movable assembly is returned to its normal position by the return spring means. The return spring means in this instance comprises a pair of assemblies 98 connected to the sill 11 and operatively connected to the movable assembly. The pair of return spring assemblies 98 are arranged, one on each side of the sill 11, and extend forwardly from and parallel to the movable assembly to provide a compact cushioning device with a short longitudinal dimension. Each return spring assembly 98 comprises an elongated spring rod 100, a spring abutment 102 secured to the sill 11 and a spring 104 which cooperates with the abutment 102 and returns the spring rod 100 to its normal position after displacement.

The rear of the spring rod 100 is operatively connected to the rear of the movable assembly, in this instance to the piston rod 15. A cross-key 103 extends out openings or slots 105 in the sill 11 to operatively connect the piston rod 15 to the return spring assemblies 98. The cross key 103 has openings 107 at its ends receiving bolts 109 which engage in an opening 111 in weldments at the rear of each of the spring rods 100 to connect the cross key 103 to the springs rods 100. The center 113 of the cross key 103 is operatively connected to the rear of the piston rod 15 to force the piston rod 15 and yoke 16 to their normal positions. In this instance, the cross key 103, merely, bears against the end of the piston rod 15 and has a male plug portion 117 which projects into a female opening 119 provided in the rear of the piston rod 15. The cross key 103 also serves as a guide for the rear of the spring rods 100.

Each of the return spring assemblies 98 includes guide means for the front of the spring rod 100. The spring rod 100 is tubular, and a guide member 120 telescopes within a center opening 121 in the spring rod 100 to guide the spring rod. In this instance, guide member 120 is also tubular and is welded to a base 122 which, in turn, is bolted to a channel member 123 secured to the sill 11 of the railway car.

The spring rod 100 extends forwardly toward the coupler 17 and at its forward end has a spring stop 124 provided by a washer welded to the end of the rod. The spring 104 operates between the washer-like stop 124 secured to the forward end of the spring rod 100 and the abutment 102.

Abutment 102 is in the form of a bracket located at the other or rear end of the spring 104, intermediate the forward and rear ends of the spring rod 100. The bracket has a plate portion 127 having an opening 128 therein, and two web portions 129 to secure the bracket to the sill 11. The opening 128 in the plate portion 127 is larger than the spring rod 100 to permit the rod 100 to pass through, but is smaller than a washer 130 located between plate portion 127 and the rear end of the spring 104 to prevent the rear end of the spring from passing through the opening 128.

The spring 104 is of the coil type and is located on the spring rod 100. At its forward end, the spring 104 abuts the washer-like stop 124, and at its rearward end the spring 104 abuts the washer 130. The spring is guided by and is prevented from buckling when it is compressed by the spring rod 100. The spring is compressed by the washer-like stop 124 against the abutment 102.

During operation of the cushioning device 10, the coupler 17, yoke 16 and piston rod 15 are held in the normal position shown in FIG. 1 by the return spring assemblies 98. When the coupler 17 receives a buff impact, the coupler 17, the yoke 16, piston rod 15 and spring rods 100 move rearward to the position shown in FIG. 2. The coupler may or may not pivot (as shown in FIG. 2) depending upon whether the car is on a curved or straight track. In either case, the spherical surface 62 of the coupler 17 abuts against the spherical surface 71 of the wear pad 70 to force the yoke 16, piston rod 15 and spring rods 100 rearward. As the spring rods 100 move rearwardly, they compress the springs 104 between the washers 124 and plate portions 127 of the abutments 102. Expansion of the springs 104 forces the front ends of the spring rods 100 forward and causes the cross key 103, which is connected to the spring rods 100, to force or push the piston rod 15, the yoke 16 and coupler 17 back toward their normal positions.

From the foregoing, it is apparent that a novel and useful end of car railway car cushioning device having a fixed assembly, a movable assembly with a replaceable coupler abutting wear pads at its front end and a return spring assembly connected to the rear end of the movable assembly has been provided. It is further apparent that the use of the wear pad at the front of the movable assembly provides for more economical replacement of worn parts of the movable assembly. It is still further apparent that arrangement of the return spring assembly parallel with and connected to the rear portion of the movable assembly provides a cushioning device with a compact longitudinal dimension.

I claim:

1. An end of car hydraulic cushioning device for a railway car, including fixed and movable assemblies and a return spring assembly, said fixed assembly being adapted to be secured to said railway car, and said movable assembly being slidable relative to said fixed assembly and being adapted to have a coupler secured to the front end of said movable assembly, said return spring assembly cooperating with said assemblies to force said movable assembly toward a normal position relative to said fixed assembly, said return spring assembly comprising an elongated rod having its rear end

operatively connected to the rear end of said movable assembly and extending forwardly, said elongated rod having a spring stop adjacent its forward end, an abutment fixed relative to the fixed assembly and located intermediate the front and rear ends of said elongated rod, and a spring mounted on said rod between said spring stop and said abutment to be compressed therebetween in response to a buff impact on the coupler and thereafter to force said movable assembly forward toward its normal position relative to said fixed assembly.

**2.** An end of car device as in claim **1**, wherein said fixed assembly includes a cylinder and said movable assembly includes a piston, said piston having a piston rod extending through the front and rear ends of said cylinder, said elongated rod being operatively connected to the rear of said piston rod.

**3.** An end of car device as in claim **1**, wherein a pair of said return spring assemblies are mounted one on each side of said movable assembly.

**4.** An end of car device as in claim **3**, wherein said return spring assemblies further include a cross key connected at its ends respectively to the rear ends of said elongated rods of said return spring assemblies, said cross key being operatively connected at its center to said movable assembly.

**5.** An end of car device as in claim **4**, wherein said return spring assemblies further include guide means for guiding the forward ends of said elongated rods, the rear ends of said elongated rods being guided by said cross key.

**6.** An end of car device as in claim **5**, wherein each of said elongated rods is tubular shaped at its forward end, said guide means comprising a pair of rods extending telescopically into said tubular forward end of said elongated rods.

**7.** An end of car device as in claim **1**, wherein said return spring assembly further includes guide means for guiding the forward end of said elongated rod.

**8.** An end of car device as in claim **7**, wherein said elongated rod is tubular shaped at its forward end, said guide means comprising a rod extending telescopically into said tubular forward end of said elongated rod.

**9.** An end of car device as in claim **8**, wherein said fixed assembly includes a cylinder and said movable assembly includes a piston, said piston having a piston rod extending through the front and rear ends of said cylinder, said elongated rod being operatively connected to the rear of said piston rod.

**10.** An end of car device as in claim **1**, wherein said movable member includes a yoke portion adapted to have a pivotable coupler secured thereto, said yoke portion having a coupler pin opening in a coupler cavity, and a wear pad being located at the rear of said coupler cavity and being removably secured to said yoke, said wear pad having a spherical surface adapted to be abutted by said coupler, whereby said wear pad can be removed from said yoke portion and replaced should it wear.

**11.** An end of car hydraulic cushioning device for a railway car, comprising fixed and movable assemblies, said fixed assembly being adapted to be secured to said railway car and said movable assembly being slidable relative to said fixed assembly, and return means cooperating between said fixed assembly and said movable assembly for returning said movable assembly to a normal position, said movable assembly having a forward cavity for receiving a pivotable coupler, said forward cavity terminating in a rear wall, said rear wall having a pair of shoulders thereon extending across said movable assembly, said shoulders reducing the size of said forward cavity, said shoulders having an access opening therebetween extending across said movable assembly and being accessible from the side thereof, a wear pad contained in said forward cavity and immovably fixed by welding against said shoulders of said rear wall, the rear surface of said wear pad being adjacent said access opening between said shoulders, said wear pad having a forward spherical surface adapted to be abutted by a rear spherical surface of the pivotable coupler during buff impact for transmission to buff impact from said coupler to said wear pad to said shoulders of said movable assembly and to said return means, said access opening being adapted to receive a tool or lever for assisting in removing said wear pad from said movable assembly, whereby when desired removal of said wear pad can be assisted by placing the tool in said access opening and prying said wear pad out of said cavity of said movable assembly.

**12.** An end of car device as in claim **11**, wherein said movable assembly includes a piston having a piston rod and a yoke portion, said fixed assembly includes a cylinder, the rear of said yoke portion being connected to the forward end of said piston rod, said yoke portion having said forward cavity, said wear pad being welded in said yoke portion.

**13.** An end of car device as in claim **11**, wherein said wear pad is made of a harder material than that of said rear wall.

**14.** An end of car device as in claim **11**, wherein said wear pad has said vertical side edges shaped to provide clearance to permit said pivotable coupler to pivot.

**15.** An end of car hydraulic cushioning device for a railway car having a fixed assembly including a clinder, a movable assembly including a piston having a piston rod extending through the front and rear ends of said cylinder and a yoke receiving a pivotable coupler, and a return spring assembly cooperable with said movable assembly to return said movable assembly to its normal position, said yoke having a replaceable wear pad at its forward end, said wear pad having a spherical surface adapted to be abutted by a corresponding surface on the rear of the pivotable coupler, said yoke being connected at its rear to the forward end of said piston rod, said return spring assembly including an elongated rod having its rear end connected to the rear end of said piston rod, said elongated rod having a spring stop at its forward end, an abutment located intermediate the forward and rear ends of said elongated rod and secured to said fixed assembly, and a spring operating between said spring stop and said abutment to return said movable member to its normal position, whereby a buff impact may be transmitted from the coupler to said wear pad, to said yoke, to said piston rod, and to said return spring assembly, and upon expansion said return spring returns the coupler to a normal position.

**16.** An end of car device as in claim **15**, wherein a pair of said return spring assemblies are located one on each side of said movable assembly, and further comprising a cross key operatively connecting the rear of said piston rod to the rear ends of said elongated rods, said cross key guiding the rear ends of said elongated rods, and front guide rods for guiding the forward ends of said elongated rods, said guided rods being secured to said fixed assembly.

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