Aug. 20, 1968 R. L. CARLSON 3,397,798

COUPLER DEVICE

Filed Feb. 23, 1966

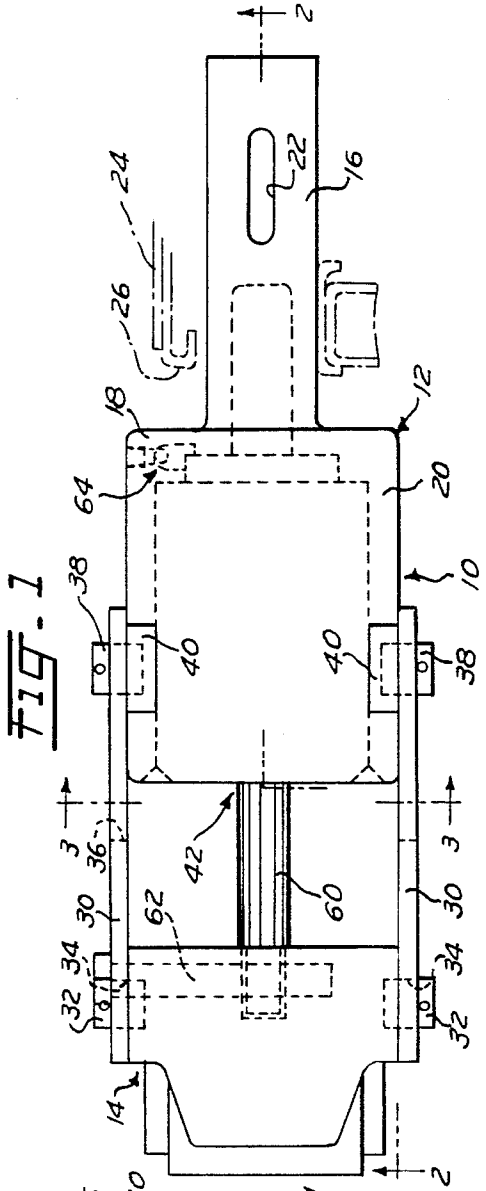


FIG. 1

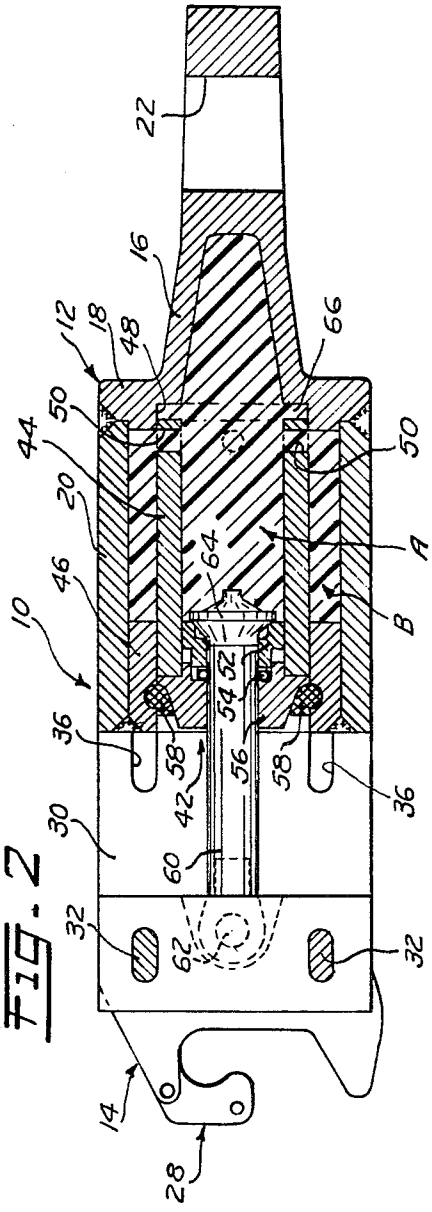


FIG. 2

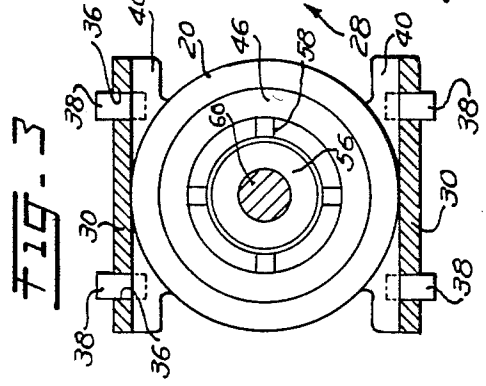


FIG. 3

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COUPLER DEVICE

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ABSTRACT OF THE DISCLOSURE

A two-part railway car coupler for dissipating a portion of the buff force applied thereto with the two parts being normally biased apart by a damped spring in the form of a piston and cylinder unit wherein the cylinder is filled with a compressible solid material and with connecting means between the two parts permitting relative longitudinal movement therebetween while preventing relative rotation therebetween.

My present invention relates generally to a coupler device for use in a railway car, and the principal object thereof is the provision of a coupler device incorporating damped spring means.

The coupler device of my present invention comprises a rear coupler section adapted to be connected to a railway car, a forward coupler section movable relative to the rear coupler section, and damped spring means acting between the two coupler sections for dissipating at least a portion of the energy of buff forces imposed on the front coupler section. More specifically, the rear coupler section has provided therein a cylindrical chamber, and a piston rod extends outwardly of the chamber. The forward end of the piston rod is connected to the forward coupler section, while the rear end of the piston rod is provided with a piston. The periphery of the piston is spaced from the interior of the chamber to define axial orifice means, and the chamber is filled with a compressible solid. As the piston rod moves into the chamber in response to buff forces imposed on the front coupler section, the reduction in volume of the compressible solid, and the throttling effect produced by the compressible solid being forced through the orifice means, impose a damping and spring force on the piston rod and the piston. Thus, the coupler device of my present invention serves as a composite cushion and coupler.

It is another object of my present invention to provide a coupler device, as described, wherein guide means are provided for limiting axial movement, and preventing rotary movement, of the forward coupler section relative to the rear coupler section.

It is a further object of my present invention to provide a coupler device, as described, wherein the cylindrical chamber that receives the piston communicates with an auxiliary concentric annular chamber whereby desirable damping and spring characteristics are afforded in a compact construction.

It is a still further object of my present invention to provide a coupler device, as described, which is so constructed that it may be substituted for a conventional coupler member without requiring modification of the railway car.

Now in order to acquaint those skilled in the art with the manner of constructing and using coupler devices in accordance with the principles of my present invention, I

shall describe in connection with the accompanying drawing a preferred embodiment of my invention.

In the drawing:

FIGURE 1 is a side elevational view of a coupler device incorporating the principles of my present invention, with a fragmentary portion of the sill of a railway car being shown in phantom;

FIGURE 2 is a view, partly in elevation and partly in section, taken substantially along the line 2—2 in FIGURE 1, looking in the direction indicated by the arrows; and

FIGURE 3 is a view, partly in elevation and partly in section, taken substantially along the line 3—3 in FIGURE 1, looking in the direction indicated by the arrows.

Referring now to the drawing, there is indicated generally by the reference numeral **10** a coupler device incorporating the principles of my present invention. The coupler device **10** includes a rear coupler section **12** and a forward coupler section or head **14**. The rear coupler section **12** is comprised of a shank **16** having a radial flange portion **18** at the forward end thereof, and a forwardly extending outer cylinder or casing **20** suitably secured, as by welding, to the flange **18**. The shank **16** is formed with a transverse slot **22** which is adapted to receive a draft key (not shown). When assembled in a railway car, the shank **16** projects into the draft gear pocket of the car sill **24**, and a draft key serves to interconnect the shank **16**, and thereby the coupler device **10** as a unit, to the conventional yoke and draft gear (not shown) mounted in the draft gear pocket. The car sill **24** also presents the usual striker face **26** that is engageable by the flange **18** of the rear coupler section **12**.

The coupler head **14**, which is provided at its forward end with conventional coupler means **28**, is slidably interconnected with the rear coupler section **12** by guide means comprising a pair of lengthwise plate members **30**. The forward ends of the plate members **30** are secured to the couplerhead **14** by key members **32** anchored in the coupler head and extending through apertures **34** in the plate members. Each plate member **30**, adjacent the rear half thereof, is formed with a pair of parallel lengthwise extending guide slots **36**. Extending through the guide slots **36** of each plate member **30** are key members **38** that are anchored in transverse flange portions **40** of the cylinder **20**. The outer faces of the flange portions **40** provide sliding bearing surfaces for the plate members **30**. Engagement of the key members **38** with the rear ends of the guide slots **36** serves to limit outward axial movement of the coupler head **14** relative to the rear coupler section **12**. The plate members **30** may be retained on the key members **32** and **38** by cotter pins.

Mounted within the cylinder **20**, and having operative connection with the coupler head **14**, is damped spring means indicated generally by the reference numeral **42**. The damped spring means **42** comprises an inner cylinder **44** which at its forward end is received in a sleeve member **46** suitably secured, as by welding, in the forward end of the outer cylinder **20**. The rear end of the inner cylinder **44** is supported in the counterbore **48** of the shank flange **18**. The inner cylinder **44** is also provided, adjacent its rear end, with a plurality of circumferentially spaced radial ports **50**. Disposed in the forward end of the inner cylinder **44** is an annular adapter sleeve **52**, a seal ring **54**, and an annular gland **56**. The latter three components, which serve as guide and seal means, and the inner cylin-

der 44 are retained in proper axial position by means of four ring segments 58 engaged in an annular groove in the sleeve mmeber 46. The described arrangement of parts serves to define an inner cylindrical chamber A and an outer auxiliary annular concentric chamber B, which chambers are maintained in communication by the ports 50.

Extending through the gland 56, the seal ring 54 and the adapter sleeve 52, and projecting into the chamber A is a piston rod 60. The outer end of the piston rod 60 is connected to the coupler head 14 by a pin member 62, while the inner end of the piston rod is provided with a piston 64. The periphery of the piston 64 is spaced from the interior cylindrical surface of the chamber A to define axial orifice means in the form of an annular orifice. Additionally, the chambers A and B are filled with a compressible solid or elastomer 66 such as silicone rubber. To permit the admission of compressible solid into the chambers A and B, and yet prevent the escape of compressible solid therefrom, a charging port and ball check valve, indicated generally at 64, is provided in the shank flange 18.

In the operation of the coupler device 10, buff forces imposed on the coupler head 14 cause the piston rod 60 and the piston 64 to move inwardly of the chamber A. During such movement, the volume of chamber A is reduced to the extent of displacemesnt by the piston rod, thus increasing the pressure of the compressible solid 66 in both chambers A and B. Concurrently, the compressible solid 66 is forced through the annular orifice surrounding the piston 64 thereby producing a throttling effect. The described volume-pressure change of the compressible solid, and the attendant throttling effect, impose a damping and spring force on the piston and the piston rod, and thereby serve to dissipate at least a portion of the energy of the buff forces imposed on the coupler head 14.

When the buff forces are removed from the coupler head 14 and piston rod 60, or are otherwise fully dissipated, the pressure of the compressible solid 66, acting on the unbalanced area of the piston rod 60, causes the piston 64 and piston rod 60 to return to the position shown in the drawing. During the return stroke of the piston rod 60, the compressible solid flows back through the annular orifice surrounding the piston 64 to fill the space being vacated by the latter. Correspondingly, the pressure of the compressible solid 66 returns to the normal preload pressure. In this connection, the compressible solid 66 is initially charged through the port and ball check valve 64 to a desired preload pressure in order to assure positive return of the piston rod and piston to a rest position. By reason of the concentric arrangement of the chambers A and B, desirable damping and spring characteristics are afforded in a compact construction.

The coupler device 10 of my present invention is adapted to be substituted for the conventional coupler extending from the standard draft gear pocket of a railway car sill without any modification being required in the latter. To accommodate draft gear pockets of different depths, the length of the shank 16 may be changed as required. In buff, the coupler device 10 operates in series with the conventional draft gear and the yoke assembly. In draft, the coupler device 10 is inactive, but the standard draft gear and yoke assembly are fully operative in the normal manner. In this connection, the keys 38 are engageable with the rear ends of the guide slots 36 in full draft thus preventing the piston 64 from bottoming against the adapter sleeve 52. Additionally, the plate members 30 prevent the coupler head 14 from rotating relative to the rear coupler section 12, and also act as a safety catch in the event of failure of the piston rod 60, the pin member 62, or any other component of the damped spring means 42.

While I have shown and described what I believe to be a preferred embodiment of my present invention, it will be understood by those skilled in the art that various rearrangements and modifications may be made therein without departing from the spirit and scope of my invention.

I claim:

1. A coupler device comprising a rear coupler section adapted to be connected to a railway car, a forward coupler section movable relative to said rear coupler section, a cylindrical chamber in one of said coupler sections, a piston rod extending outwardly of said chamber and connected to the other of said coupler sections, a piston at the end of said piston rod within said chamber and providing axial orifice means, a compressible solid filling said chamber for providing a damping and spring force on said piston rod and said piston as said piston rod moves into said chamber and reduces the volume of said compressible solid while the latter is forced through said orifice means whereby to dissipate a portion of the energy of buff forces imposed on said forward coupler section, and means interconnecting said forward and rear coupler sections in a manner permitting relative longitudinal movement therebetween while preventing relative rotational movement therebetween.

2. The coupler device of claim 1 wherein an auxiliary annular chamber is provided in said one coupler section concentric of said cylindrical chamber and in communication with the latter whereby to permit the use of a greater volume of said compressible solid and thus increase the maximum travel of said piston and rod.

3. The coupler device of claim 1 wherein said interconnecting means comprises lengthwise plate members secured at their forward ends to said forward coupler section and having lengthwise guide slots therein, key members anchored in said rear coupler section and projecting through said guide slots, said plate members serving to prevent rotary movement of said forward coupler section relative to said rear coupler section, and said key members being engageable with the rear ends of said guide slots for limiting axial outward movement of said forward coupler section relative to said rear coupler section.

4. A coupler device comprising a rear coupler section including a shank portion adapted to be connected to a railway car and a radial flange portion and a forwardly extending outer cylinder, a sleeve member secured in the forward end of said cylinder, an inner cylinder supported at its rear end in said radial flange portion and at its forward end in said sleeve member, said inner cylinder defining a cylindrical chamber, said inner and outer cylinders defining an auxiliary annular chamber concentric of said cylindrical chamber, said inner cylinder having radial ports therein through which said cylindrical chamber and said annular chamber communicate, annular guide and seal means at the forward end of said inner cylinder, a piston rod extending outwardly of said cylindrical chamber through said guide and seal means, a piston at the end of said piston rod within said cylindrical chamber, the periphery of said piston being spaced from the interior of said cylindrical chamber to define an orifice therebetween, a compressible solid filling said chambers for providing a damping and spring force on said piston rod and said piston as said piston rod moves into said cylindrical chamber and reduces the volume of said compressible solid while the latter is forced through said orifice, and a forward coupler section movable longitudinally but not rotationally relative to said rear coupler section and having connection with the outer end of said piston rod.

5. The coupler device of claim 4 including lengthwise plate members secured at their forward ends to said forward coupler section and having lengthwise guide slots therein, key members anchored in said rear coupler section and projecting through said guide slots, said plate members serving to prevent rotary movement of said forward coupler section relative to said rear coupler section, and said key members being engageable with the rear ends of said guide slots for limiting axial outward movement

of said forward coupler section relative to said rear coupler section.

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