HYDRAULIC DRAFT GEAR ARRANGEMENT

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ABSTRACT OF THE DISCLOSURE

A hydraulic cushioning device for a draft gear arrangement which includes a cylinder having a piston and piston rod mounted therein for reciprocation, the cylinder being provided with metering grooves to provide substantially constant force travel during buff impacts. A second cylinder encircles the first cylinder and provides therewith an annular chamber acting as a reservoir for receiving hydraulic fluid displaced from the first cylinder. The reservoir is of a variable size type defined by a movable floating piston element which provides for enlargement of the reservoir resulting from hydraulic pressure compressing a spring disposed within an adjacent biasing chamber.

BACKGROUND OF THE INVENTION

Field of the invention

The invention pertains to draft gear arrangements for railroad cars wherein an end-of-car cushion is utilized in conjunction with the conventional short travel resilient cushioning element.

Description of the prior art

The prior art includes devices of the type shown in the Peterson Patent 3,275,164 wherein a double-acting end-of-car cushioning arrangement is disclosed. In this particular construction a metering arrangement within the main cylinder is provided which permits the flow of fluid to an outer chamber in turn directing the said fluid to a low pressure side of the piston wherein the fluid is retained in a flexible boot-like reservoir. The present arrangement provides for the elimination of any boot-like low pressure reservoir and includes instead a variable chamber reservoir surrounding the main hydraulic cylinder which expands during the entrance of fluid under pressure thereinto and contracts as the piston returns to its original position whereby fluid from the reservoir chamber is quickly emptied into the main cylinder for a subsequent operation.

The present invention comprises a cushioning unit of the end-of-car type which is combined with a draft gear arrangement, said cushion being of a compact size in length including a variable chamber which during the buff stroke expands to permit the inflow of hydraulic fluid under pressure, said expansion being effective by means of a floating piston which is movable into a compressed position against a biasing element. After the buff stroke and upon return of the piston to its normal position the floating piston is biased to reduce the size of the variable reservoir thereby providing for the quick emptying of the fluid from the reservoir into the cylinder for anticipation of the succeeding buff impact.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view, showing certain portions in elevation, of a draft gear arrangement including an end-of-car hydraulic cushioning unit;

FIG. 2 is a cross-sectional view similar to FIG. 1 showing the arrangement in a normal position;

FIG. 3 is an enlarged cross-sectional fragmentary view showing one end section of a cushion in a normal position;

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

FIG. 5 is a cross-sectional view taken substantially along the line 5—5 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A draft gear assembly is generally designated by the reference character 10. A draft gear assembly 10 of this type is adapted to be mounted at each end of a railway car in a conventional draft slit (not shown). The assembly 10 comprises a yoke 11 including a pair of spaced arms 12 which support a pivot or coupler pin 13. The shank 14 of a standard coupler is pivotally supported on the coupler pin 13. The bight 15 of the yoke 11 includes a recess or pocket 16 in which a resilient cushion is provided as generally indicated at 17. The cushion 17 may be of conventional construction including a plurality of rubber pads 18 suitably bonded to separator disks 19. A follower plate 20 is in a normal position disposed against a forward wall 21 of the pocket 16. A rear wall 22 of the bight 15 is provided with a longitudinally extending opening 23.

A hydraulic cushioning device for the draft gear assembly 10 is generally designated by the reference character 24 and includes a piston and piston rod assembly 25 comprising a piston rod 26 extending through the opening 23 and being suitably connected by a connector element 27 to the follower plate 20. The assembly 25 comprises a piston 28 which is reciprocally positioned within a cylinder designated at 29. The cylinder 29 includes a bore 30, having as best shown in FIGS. 1 and 3, a plurality of metering passages 31 extending longitudinally and during the travel of the piston 28 providing what is known in the art as "constant force travel."

One end of the cylinder 29 is closed by means of an end closure member 32 and the other opposed end of the cylinder 29 is closed by means of an end closure assembly designated at 33. The end closure assembly 33 comprises a plurality of sealing elements 36 for the end of the cylinder yet permitting sliding movement of the piston 28 through a longitudinally extending opening generally designated at 35. The assembly 33 is maintained in position by means of a snap ring 34 disposed in a reduced shoulder portion 34' of the cylinder 29. A seal 36 is positioned in the assembly 33 to effectively seal the bore 30 against the escape of fluid during sliding movement of the piston rod 26. The detailed structure of the assembly 33 is not described since any effective sealing combination may be utilized. The reduced shoulder portion 34' of the cylinder 29 is further closed at its ends.
by means of a wiper assembly 37 supporting an annular wiper element 38 engaging the piston rod 26 during relative sliding movement of the same to remove and prevent residues which may collect under the pistons 28 from entering the working parts of the draft gear assembly 10. As best shown in FIG. 3, the piston 28 is provided with a face 39 which is also designated as the high pressure side of the piston 28. The opposite side or rear face 40 is designated as the low pressure side of the piston 28. The face 39 is provided with a centrally opening 41 in which a position ring 42 securely in position a valve plate 43 having a central orifice 44. The orifice 44 is regulated and closed by means of a valve element 45 which is slingly disposed in a bore 46 in the piston rod 26. A spring 47 disposed in the bore 46 normally urges the valve element 45 into its closed position as indicated in FIG. 3. Discharge passages 48 communicate with the bore 46 and in the movement of the piston 28 from the position shown in FIG. 3, communicate with the bore 30 on the low pressure side 40 of the piston 28. The outer peripheral surface of the piston 28 is provided with a piston ring 49 adapted to slidingly and sealingly engage the bore 30 of the cylinder 29. The cylinder 29 also supports an outer cylinder 50 having a bore 51. Closure means for the bore 51 are provided by an annular projection 52 of the end closure member 53. The opposite end of the bore 51 is closed by an annular ring 53 suitably welded to the outer circumferential surface of the cylinder 29.

As best shown in FIG. 3, an annular floating piston element or ring 55 includes a ring shaped seal 56 engaging the bore 51 in sliding relation and an annular seal 57 slidingly engaging the outer surface of the cylinder 29. The floating piston element 55 divides the bore 51 into an expansible reservoir 58 and into a biasing chamber 59. A coil spring 60 is disposed in the biasing chamber 59 normally biasing the floating piston element 55 into the position shown in FIG. 3 during the normal position of the piston 28 as indicated.

A coil spring 61 is disposed between the annular ring 53 and held captive against a face 62 of the rear wall 22. Passages 63 in the cylinder 29 are adapted to provide for communication of the bore 30 with the expansible reservoir 58.

**OPERATION**

The draft gear assembly 10 is suitably disposed within a draft all of a railway car with the closure member 32 disposed against a suitable stop. Upon a certain speed being developed, the coupling, which is transmitted to the shank 14, the yoke 11 moves to the left as shown in FIG. 1. The resilient cushion 17 is compressed and thus some of the forces of impact are absorbed thereby. Upon its travel of the piston 28 to the left, energy is absorbed by the resistance of the hydraulic fluid on the high pressure side 39 of the piston 28 whereupon a metered amount of fluid flows through the metering passages 51 around the piston 28 until the fluid is virtually exhausted from the high pressure side 39 when the piston reaches the position shown in FIG. 2. During this travel of the piston 28 hydraulic fluid is also discharged through the passages 63 into the expansible reservoir or chamber 58 thereby moving the floating piston element 55 also to the left increasing the capacity of the chamber 58 and compressing the spring 60 to the position shown in FIG. 2. The quantity of fluid which formerly was disposed on the high pressure side 39 of the piston 28 now is disposed within the area on the low pressure side 40 of the piston 28 and the excess of fluid is contained within the reservoir 58 which is now expanded to its maximum position. Upon the cessation of the buff impact the spring 61 causes movement of the cylinder 29 to effectuate relative sliding movement of the piston 28 to its return or normal position shown in FIGS. 1 and 3. Upon this movement fluid within the low pressure side 40 of the bore 30 passes through the metering passages 61 to the high pressure side 39 and the spring 60 forces fluid from the reservoir 58 upon return of the floating piston 55 to the position shown in FIG. 1. Thus the spring 60 is effective to rapidly move the fluid to its position on the high pressure side 39 whereupon the cushioning device 24 is ready for the next buff impact.

The valve 45 provides a safety in the event of excessive pressure being generated within the bore 30 on the high pressure side 39 of the piston 28. This can be occasioned by greatly over-speed impacts which would necessarily cause damage to the unit. Thus upon the occurrence of a predetermined higher pressure within the cylinder 29 the valve 45 is moved against the spring 47 permitting fluid to pass from the high pressure side 39 through the discharge passages 48 to the low pressure side 40 of the piston 28 in the cylinder 29.

A draft impact is absorbed in the resilient cushion 17 in a manner similar to that represented by the standard type draft gear.

The foregoing description and the drawings are merely given to explain and illustrate my invention and the invention is not to be limited thereto, since those skilled in the art who have my disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

What is claimed is:

1. A railway car cushioning device comprising, a hydraulic fluid-containing cylinder having at opposite ends first and second end closure members, said cylinder having a first bore including a plurality of metering passages provided within said first bore, a piston and piston rod assembly positioned within said bore for relative sliding movement, said piston having a low pressure side facing said first closure member and a high pressure side facing said second end closure member, said piston rod extending outwardly from said first end closure member in relative sliding relation and being adapted to be connected to the yoke of a draft gear assembly, a second cylinder carried by said first cylinder and being concentric therewith, said second cylinder having a second bore extending circumferentially about said first cylinder, closure means disposed radially outwardly from said first cylinder for closing the ends of said second bore, a floating piston element disposed in said second bore for relative longitudinal sliding movement, said piston element having an inner circumferential surface including an inner seal slidingly engaging an outer peripheral surface of said first cylinder, and an outer seal slidingly engaging said second bore, said piston element dividing said second bore into a biasing chamber, and a reservoir chamber, biasing means in said biasing chamber, fluid passage means on said first cylinder providing communication between said first bore and said reservoir chamber whereby during a buff impact said piston is moved toward said second closure member from an extended position to a closed position whereby fluid under pressure is directed from the first bore on said high pressure side, through said metered passages and fluid passage means, into said reservoir whereby said floating piston is slidingly moved against said biasing means to contract said biasing chamber, and means for returning said piston to said extended position wherein fluid from said reservoir chamber is returned by said biasing means and floating piston to said high pressure side of said piston.

2. A railway car cushioning device in accordance with claim 1, said floating piston element comprising a ring encircling said first cylinder.
3,493,124

3. A railway car cushioning device in accordance with claim 2, said biasing means comprising a coiled spring.

4. A railway car cushioning device in accordance with claim 3, said piston and piston rod assembly including a pressure release valve, and passage means communicating with said valve and providing for the release of hydraulic fluid from said high pressure side through said valve during a predetermined pressure therein to said low pressure side during buff impact.

5. A railway car cushioning device in accordance with claim 4, said means for returning said piston to said extended position comprising a spring encircling said piston rod and extending between said cylinders and said draft yoke of a draft gear assembly.

References Cited

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