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CUSHIONING DEVICE FOR RAILROAD CAR COUPLERS

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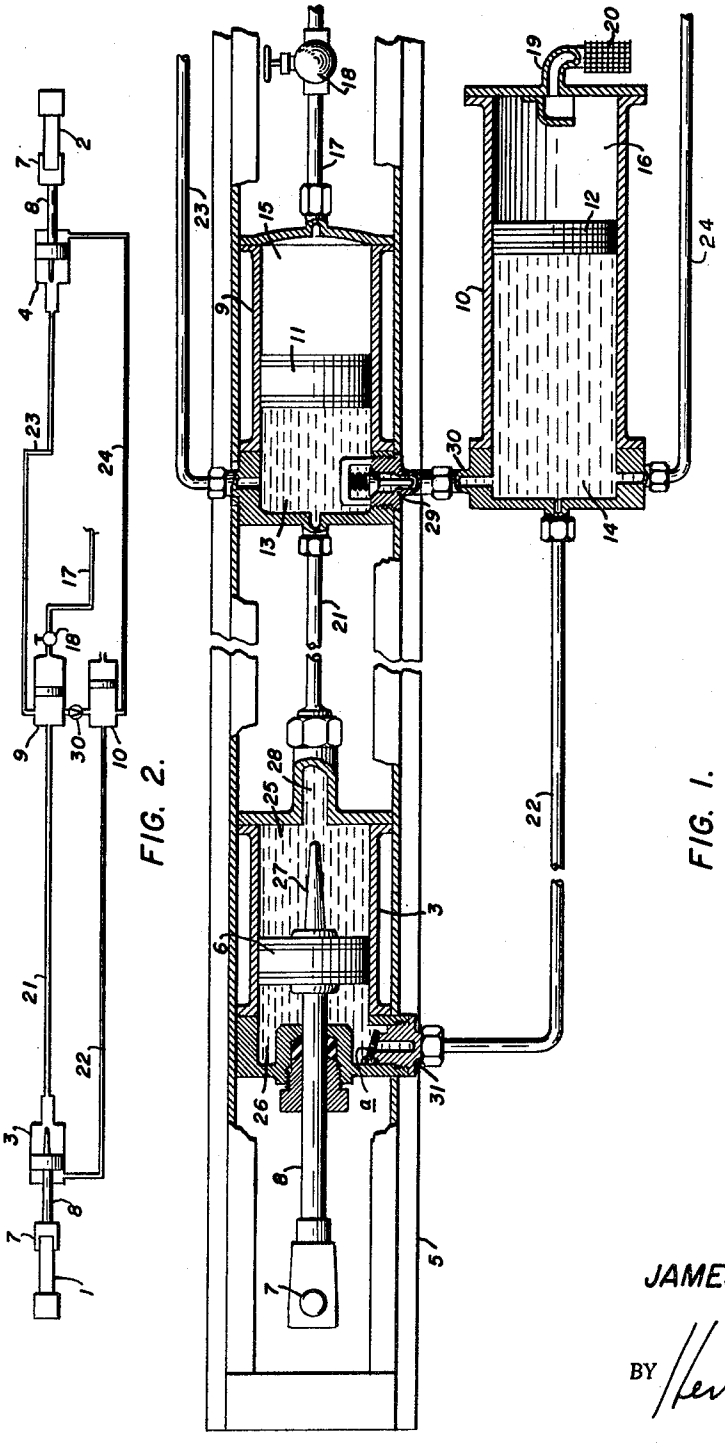


FIG. 2.

FIG. 1.

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CUSHIONING DEVICE FOR RAILROAD CAR COUPLERS

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This invention relates to cushioning devices for railroad car couplers and it concerns more particularly a combination hydraulic and pneumatic shock absorbing system for cushioning railroad cars against shock as applied to the couplers, either upon starting the train, when the couplers are pulled in opposite directions, or upon sudden stopping or impact when the cars are bumped together.

The invention is an improvement over related apparatus described and claimed in my prior Patents Nos. 2,909,291 and 3,009,584.

The invention contemplates a shock absorbing system as described which is common to the couplers on opposite ends of a railroad car whereby buff or impact forces applied to one of the couplers is transmitted to the other coupler while at the same time both couplers are effectively cushioned.

The invention further contemplates a shock absorbing system as described which is characterized by its flexibility and in which a pair of hydraulic cylinders, each having a piston therein, are supported on the frame of the car immediately adjacent the couplers on opposite ends thereof, respectively, each of said pistons being operatively connected to one of the couplers, and in which two other hydraulic-pneumatic cylinders, which comprise the remainder of the apparatus as hereinafter described, may be positioned at any convenient location under the car.

A distinguishing feature of this invention, whereby it is believed to be readily dstinguishable from the inventions described in my two earlier patents, is the arrangement of the two hydraulic-pneumatic cylinders above mentioned, each of which has a free floating piston therein and has a liquid space and an air space in opposite ends thereof, on opposite sides of the piston, the air space of one of said hydraulic-pneumatic cylinders being filled with compressed air and the air space of the other of said hydraulic-pneumatic cylinders being filled with air at atmospheric pressure.

The liquid spaces of the hydraulic-pneumatic cylinders are in fluid communication, respectively, through connecting lines, with liquid spaces in opposite ends of the first mentioned hydraulic cylinders, on opposite sides of the pistons thereof, so that upon longitudinal movement of the couplers in one direction, in which they are advanced relative to each other, as on their impact strokes, liquid is caused to flow from the liquid space in one end of the respective first mentioned hydraulic cylinders to the liquid space of said one of the hydraulic-pneumatic cylinders, while at the same time liquid is caused to flow from the liquid space of said other of the hydraulic-pneumatic cylinders to the liquid space in the opposite end of the respective first mentioned hydraulic cylinders. Similarly, upon longitudinal movement of the couplers in the opposite direction the direction of flow is reversed.

The pistons in the first mentioned hydraulic cylinders are double acting, as above described, and the arrangement is such that liquid is discharged therefrom upon movement of the pistons in one direction, as on the impact strokes of the couplers, against the resistance of compressed air in the air space of one of the second mentioned hydraulic-pneumatic cylinders, while liquid is discharged therefrom upon movement of the pistons in the opposite direction, as on the draft strokes of the couplers, against the resistance of atmospheric air pressure only.

An advantageous feature of the invention is that the compressed air in said one of the hydraulic-pneumatic cylinders assists in returning the couplers to their original positions after havng been bumped.

The presence of liquid in opposite ends of the first mentioned hydraulic cylinders, rather than in one end thereof only, as shown in my two earlier patents, provides a liquid seal whereby liquid is positively prevented from flowing by the pistons thereof and escaping on the impact strokes of the couplers.

The liquid space of said other of the hydraulic-pneumatic cylinders provides a reservoir of hydraulic liquid which is available as needed.

The liquid space of said other of the hydraulic-pneumatic cylinders communicates through a check valve and connecting line with the liquid space of said one of the hydraulic-pneumatic cylinders whereby the maintenance of a supply of liquid in the liquid space of said one of the hydraulic-pneumatic cylinders is positively assured.

The lines whereby the liquid space of said other of the hydraulic-pneumatic cylinders is connected to the first mentioned hydraulic cylinders have flapper type check valves communicating therewith whereby liquid may flow freely in the direction of the first mentioned hydraulic cylinders, and the flappers of the check valves have small orifices therein whereby the flow of liquid in the opposite direction is restricted.

The invention will be readily understood by referring to the following description and the accompanying drawing, in which:

FIGURE 1 is a longitudinal view, partly in section taken on a median line, of apparatus embodying the invention.

FIGURE 2 is a diagrammatic view illustrating the manner in which the invention is applied to a pair of couplers on opposite ends of a railroad car.

Referring to FIGURE 2 of the drawing, the numerals 1, 2 designate generally a pair of couplers which are positioned on opposite ends of a railroad car (not shown).

A pair of hydraulic cylinders, indicated generally by the numerals 3, 4, one of which is shown in FIGURE 1, are supported in a sill 5 immediately adjacent the couplers 1, 2 on opposite ends of the car.

The hydraulic cylinders 3, 4 each have a piston 6 therein, and the shanks of the couplers 1, 2 are each pivotally connected, as at 7, to one end of a piston rod 8 whereby the pistons 6 are movable reciprocally in the hydraulic cylinders 3, 4 in response to reciprocal movement of the respective couplers 1, 2.

Two other cylinders 9, 10, hereinafter referred to as hydraulic-pneumatic cylinders, which may be positioned at any convenient location under the car, have free floating pistons 11, 12 therein and have liquid spaces 13, 14 and air spaces 15, 16 in opposite ends thereof, on opposite sides of the pistons 11, 12 respectively.

The air space 15 of one of the hydraulic-pneumatic cylinders 9 is filled with compressed air, and the air space 16 of the other of the hydraulic-pneumatic cylinders 10 is filled with atmospheric air. A line 17, which communicates with a source of compressed air and has a cut off valve 18 therein, is connected to said one of the hydraulic-pneumatic cylinders 9, in fluid communication with the air space 15 thereof. Said other of the hydraulic-pneumatic cylinders 10 has a short fluid conduit 19 communicating with the air space 16 thereof which is open to the atmosphere and is provided with a strainer 20.

The liquid spaces 13, 14 of the hydraulic-pneumatic cylinders 9, 10 are in fluid communication, through connecting lines 21, 22 and 23, 24, respectively, with liquid spaces 25, 26 in opposite ends of the hydraulic cylinders 3, 4, on opposite sides of the pistons 6 thereof.

Upon longitudinal movement of the couplers 1, 2 in

one direction, in which they are advanced relative to each other, as in buff, liquid is caused to flow from the liquid space 25 in one end of the respective hydraulic cylinders 3, to the liquid space 13 of the hydraulic-pneumatic cylinder 9, while at the same time liquid is caused to flow from the liquid space 14 of the hydraulic-pneumatic cylinder 10 to the liquid space 26 in the opposite end of the respective hydraulic cylinders 3, 4. Similarly, in draft the direction of flow is reversed.

The pistons 6 have axial tapered valve elements 27 on the sides thereof opposite the piston rods 8 for coaction with restricted openings 28 in the adjacent ends of the hydraulic cylinders 3, 4 communicating with the lines 21, 23, respectively, whereby the restricted openings 28 are adapted to be gradually closed in response to longitudinal movement of the couplers 1, 2 to limit such longitudinal movement thereof in one direction, in which the couplers 1, 2 are advanced relative to each other.

The pistons 6 in the hydraulic cylinders 3, 4 are double acting, as above described, and the arrangement is such that liquid is discharged therefrom upon movement of the pistons 6 in one direction, as on the impact or buff strokes of the couplers 1, 2 against the resistance of compressed air in the air space 15 of the hydraulic-pneumatic cylinder 9, while liquid is discharged therefrom upon movement of the pistons 6 in the opposite direction, as on the draft strokes of the couplers 1, 2, against the resistance of atmospheric air pressure only in the air space 16 of the hydraulic-pneumatic cylinder 10.

The compressed air in the air space 15 of the hydraulic-pneumatic cylinder 9 returns the couplers 1, 2 to their original positions after having been bumped.

The pressure in the liquid spaces 25, 26 of the hydraulic cylinders 3, 4 is equalized through the liquid spaces 13, 14 of the hydraulic-pneumatic cylinders 9, 10 and the connecting lines 21, 22 and 23, 24 whereby the couplers 1, 2 are movable longitudinally substantially in unison.

The presence of liquid in the liquid spaces 25, 26 of the hydraulic cylinders 3, 4 eliminates the possibility of air by-passing the piston 6 as might be possible in the referred to patents after long use which would cause some wear of the piston. The liquid space 14 of the hydraulic-pneumatic cylinder 10 provides a reservoir of hydraulic liquid which is available as needed.

The liquid space 14 of the hydraulic-pneumatic cylinder 10 communicates through a check valve 29 and connecting line 30 with the liquid space 13 of the hydraulic-pneumatic cylinder 9 whereby the maintenance of an adequate supply of liquid in liquid space 13 of the hydraulic-pneumatic cylinder 9 is positively assured by action of the draft forces.

The lines 22, 24 whereby the liquid space 14 of the hydraulic-pneumatic cylinder 10 is connected to the hydraulic cylinders 3, 4 have flapper type check valves 31 communicating therewith whereby liquid may flow freely in the direction of the hydraulic cylinders 3, 4, and the flappers of the check valves 31 have small orifices *a* therein whereby the flow of liquid in the opposite direction is restricted.

The invention is not limited to the exemplary construction herein shown and described, but may be made in various ways within the scope of the appended claims.

What is claimed is:

1. A cushioning device for railroad car couplers comprising, in combination with a railroad car having a pair of couplers on opposite ends thereof, the combination of a pair of hydraulic cylinders, each having a piston therein, supported on the car adjacent the couplers, each of said pistons being operatively connected to one of the couplers, and two other hydraulic-pneumatic cylinders each having a free floating piston therein and having a liquid space and an air space in opposite ends thereof on opposite sides of the piston, the air space of one of said hydraulic-pneumatic cylinders being filled with compressed air and the air space of the other of said hydraulic-pneumatic cylinders being filled with atmospheric air, the liquid spaces of the hydraulic-pneumatic cylinders being in fluid communication, respectively, through connecting lines, with liquid spaces in opposite ends of the first mentioned hydraulic cylinders on opposite sides of the pistons thereof.

2. The structure of claim 1, the arrangement being such that upon longitudinal movement of the couplers in one direction, in which they are advanced relative to each other, liquid is caused to flow from the liquid space in one end of the respective first mentioned hydraulic cylinders to the liquid space of said one of the hydraulic-pneumatic cylinders, while at the same time liquid is caused to flow from the liquid space of said other of the hydraulic-pneumatic cylinders to the liquid space in the opposite end of the respective first mentioned hydraulic cylinders, and upon longitudinal movement of the couplers in the opposite direction the direction of flow is reversed.

3. The structure of claim 2, the pistons in the first mentioned hydraulic cylinders being double acting and the arrangement being such that liquid is discharged therefrom upon movement of the pistons in one direction, as on the impact strokes of the couplers, against the resistance of compressed air in the air space of said one of the hydraulic-pneumatic cylinders, while liquid is discharged therefrom upon movement of the pistons in the opposite direction, as on the draft strokes of the couplers, against the resistance of atmospheric air pressure only in the air space of said other of the hydraulic-pneumatic cylinders.

4. The structure of claim 1, the liquid space of said other of the hydraulic-pneumatic cylinders communicating through a check valve and connecting line with the liquid space of said one of the hydraulic-pneumatic cylinders whereby the maintenance of a supply of liquid in the liquid space of said one of the hydraulic-pneumatic cylinders is positively assured.

5. The structure of claim 1, the lines whereby the liquid space of said other of the hydraulic-pneumatic cylinders is connected to the first mentioned hydraulic cylinders having flapper type check valves communicating therewith whereby liquid may flow freely in the direction of the first mentioned hydraulic cylinders, and the flappers of said check valves having small orifices therein whereby the flow of liquid in the opposite direction is restricted.

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