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BUMPER, ESPECIALLY APPLICABLE TO RAILWAY VEHICLES

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Fig. 2.

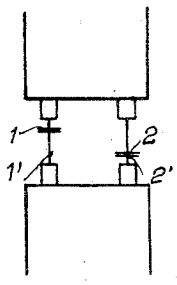


Fig. 1

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BUMPER ESPECIALLY APPLICABLE TO RAILWAY VEHICLES

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7 Claims. (Cl. 213—223)

The present invention concerns bumpers especially applicable to railway vehicles.

Its object is to provide a device of this kind which is better adapted to meet the requirements of practice than similar devices made up to the present time.

According to the essential feature of the present invention two or more buffers, disposed on either side of the longitudinal axis of the vehicle are rigidly connected with two or more pistons, respectively, movable in corresponding cylinders which communicate and contain a fluid, which may be compressible or not, and yielding means are provided for elastically opposing displacements of both buffers simultaneously in the same direction, produced by shocks thereon.

According to another feature of the present invention, these last mentioned means include a third cylinder communicating with the two first mentioned cylinders and in which there is movably fitted a piston subjected, on the one hand to the pressure of the fluid above mentioned, and on the other hand to the resistance of elastic means, such as a spring or a cushion of compressed air.

Other features and advantages of the present invention will result from the following detailed description of specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawing, given merely by way of example, and in which:

Fig. 1 is a horizontal sectional view of a first embodiment of the device according to the present invention;

Fig. 2 is a diagrammatic explanatory view illustrating the working of the system according to the invention.

In the embodiment of Fig. 1, buffers 1 and 2 are rigid with two pistons 3 and 4 movable in two cylinders 5 and 6 secured to the railway car on either side of the median longitudinal axis of said car. These two cylinders 5 and 6 communicate through a conduit 7 and contain a fluid, for instance an incompressible liquid, in chambers 8 located on the sides of the pistons opposed to respectively buffers 1 and 2. These two cylinders 5 and 6 also communicate, through conduit 9, with a third cylinder 10, fixed on the car and in which a piston 11 is movable. This last mentioned piston is subjected, on the one hand, to the pressure transmitted by the liquid, and, on the other hand, to the pressure of an elastic element, such as a spring 12 or a cushion of compressed air present in cylinder 10. A valve 13, provided with a small passage 14, may be arranged in conduit 9, in such manner as to permit liquid to flow freely from conduit 7 into conduit 9 toward cylinder 10, by lifting valve 13, and to brake the flow of liquid from cylinder 10 toward conduit 7, by compelling it to pass through the small orifice 14. The elastic element 12 which acts on piston 13 pushes the incompressible liquid and both pistons 3 and 4 in such manner that, in the position of rest, these pistons 3 and 4 are substantially in the respective middle parts of cylinders 5 and 6.

When a train passes over a curved part of the track, the buffers of adjacent cars located on the inner side of the curve, such as buffer 2 for instance, drive out, through the action of piston 4, the incompressible liquid into the cylinders located on the outer side of the curve, such as cylinder 5, so that the corresponding buffers 1 are pushed toward the outside of their cylinders, and remain in contact. The elastic element 12 is sufficiently powerful for resisting the relatively slight stresses developed during these displacements.

On the contrary, if, due to sudden braking of the car, or to the fact that an obstacle is met with, buffers 1 and 2 simultaneously undergo a violent shock, the liquid, driven out from cylinders 5 and 6 by both pistons 3 and 4, lifts valve 13 and pushes back piston 11, against the action of element 12, which will thus absorb the shock. The shock having been thus absorbed, elastic element 12 slowly drives out the liquid from cylinder 10 through passage 14 and brings back pistons 3 and 4 into their normal positions.

It will be noted that, in the embodiment of Fig. 1, the coupling of the vehicles may be rather difficult, due to the resistance against movement of the vehicles toward each other exerted by the shock absorbing fluid. It is therefore advisable to introduce this fluid into the apparatus only after the cars have been coupled together. For this purpose, I provide, on conduit 7, a small inlet tube 19 for connection with a high pressure pump which serves to introduce the liquid into the device. Eventually, the discharge of the liquid may take place through this tube 19.

On the other hand, it will be noted that, due to the perfect balancing of the efforts of the pistons in all positions, it may happen that, in operation, for instance at the end of a curve, the pistons 1 and 2 of a given vehicle are not in the same transverse plane (as shown by Fig. 2), the pistons 1' and 2' of the next vehicle being also in corresponding positions.

This phenomenon has no unfavorable influence upon the working of the device.

On the rod 20 of each buffer 1 or 2 and on the portion thereof which is located outside cylinder 6, there are provided two bearings 21 and 22, forming stops, between which can slide, along the rod, two rings 23 and 24. There is interposed between these two rings a spring 25 which tends to move them away from each other, by keeping them in contact with stops 21 and 22.

The displacement of these rings 23 and 24 is also limited by stops 26 and 27, rigid with cylinder body 6, while nothing opposes the longitudinal displacements of stops 21 and 22. The strength of spring 25 is chosen in such manner as to be negligible with respect to the efforts undergone by the buffers, as well when the car is running along a curve as under the effect of the shocks due, for instance, to sudden braking. It follows that the operation above described is not modified in any way.

On the contrary, when at the end of a curve the two buffers are in different transverse planes, as shown by Fig. 2, but the efforts on both of their pistons are again balanced, spring 25 can act freely so as to bring them back into the normal position. This is due to the fact that, when buffer 1, for instance, is moved inwardly, ring 23 is moved toward ring 24, compressing spring 25, so that, as soon as any antagonistic action has ceased, this spring 25 can expand so as to come back into its normal position.

Conversely, this spring 25 does not interfere in any way with the outward displacement of the other buffer, since the rod 20 of this last mentioned buffer can slide freely with respect to rings 23 and 24 that correspond thereto. On the contrary, when buffer 1, previously driven in into the corresponding cylinder, comes back into its position of equilibrium, buffer 2, which is permitted to move outwardly with respect to this position of equilibrium, can come back freely into its normal position, due to the balancing of the fluid pressures in respective chambers 8 according to the principle above set forth.

In a general way, while I have, in the above description, disclosed what I deem to be a practical and efficient embodiment of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What I claim is:

1. A bumper device of the type described, for use in connection with a vehicle and especially a railway vehicle, which comprises, in combination, two mechanically independent buffers carried by said vehicle on either side of the longitudinal axis thereof, said buffers being movable with respect to said vehicle parallelly to said axis in either direction from their respective normal positions, in which they are both in a common transverse plane, two cylinders rigidly carried by said vehicle parallel to said axis, pistons movable in said cylinders respectively, with a fluidtight fit, and rigid with said buffers respectively, a passage interconnecting the respective chambers of said cylinders that are located on the same respective sides of said pistons, an incompressible liquid filling the whole of said chambers and said passage, for interconnecting said pistons so that a movement of one buffer in one direction produces an equal movement of the other in the opposite direction, a third cylinder connected at one end to said passage, a piston movable with a fluidtight fit in said third mentioned cylinder, the same liquid filling the portion of said third cylinder extending between the piston thereof and said passage, means for elastically opposing displacements of said third mentioned piston in response to pressure rises in said passage and said chambers produced by shocks on said bumpers exerted simultaneously in the same direction, and means for freely admitting liquid from said passage to said third cylinder and braking the flow of said liquid from said third mentioned cylinder to said passage.

2. A bumper device according to claim 1 in which the last mentioned means include a check valve interposed between said passage and said third mentioned cylinder, adapted to open in the direction that corresponds to the flow of said liquid from said passage into said third mentioned cylinder, said check valve being provided with an escape channel of restricted section for the slow outflow of said liquid from said third mentioned cylinder into said passage.

3. A bumper device according to claim 1 further including an inlet conduit communicating with said passage for feeding fluid thereto.

4. In apparatus of the class described, in combination two mechanically independent car end buffers, one arranged on either side of the center longitudinal line of the car, a substantially incompressible fluid filling a conduit directly connecting said buffers in virtue of which movement of one buffer in one direction will impart a similar movement to the other buffer in the opposite direction, and an elastic shock absorbing means connected to said conduit and operable through said substantially incompressible fluid upon movement of both buffers together in a direction tending to compress said substantially incompressible fluid.

5. In apparatus of the class described, in combination two mechanically independent car end buffers, one arranged on either side of the center longitudinal line of the car, a substantially incompressible fluid filling a conduit directly connecting said buffers in virtue of which movement of one buffer in one direction will impart a similar movement to the other buffer in the opposite direction, and a single elastic shock absorbing means connected to said conduit and operable through said substantially incompressible fluid upon movement of both buffers together in a direction tending to compress said substantially incompressible fluid.

6. In apparatus of the class described, in combination two mechanically independent car end buffers, one arranged on either side of the center longitudinal line of the car, a substantially incompressible fluid filling a conduit directly connecting said buffers in virtue of which movement of one buffer in one direction will impart a similar movement to the other buffer in the opposite direction, and an elastic shock absorbing means connected to said conduit and operable through said substantially incompressible fluid upon movement of both buffers together in a direction tending to compress said substantially incompressible fluid, said elastic shock absorbing means including a cylinder and a spring-pressed piston in the cylinder against which piston said substantially incompressible fluid acts.

7. A bumper device according to claim 4 further including elastic means, of a strength low enough for avoiding interference with the normal working of the device, for urging said pistons back into their intermediate relative positions in their respective cylinders when no action is being exerted thereon.

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