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VEHICLE SHOCK ABSORBER.

APPLICATION FILED FEB. 3, 1910.

994,546. Patented June 6, 1911.

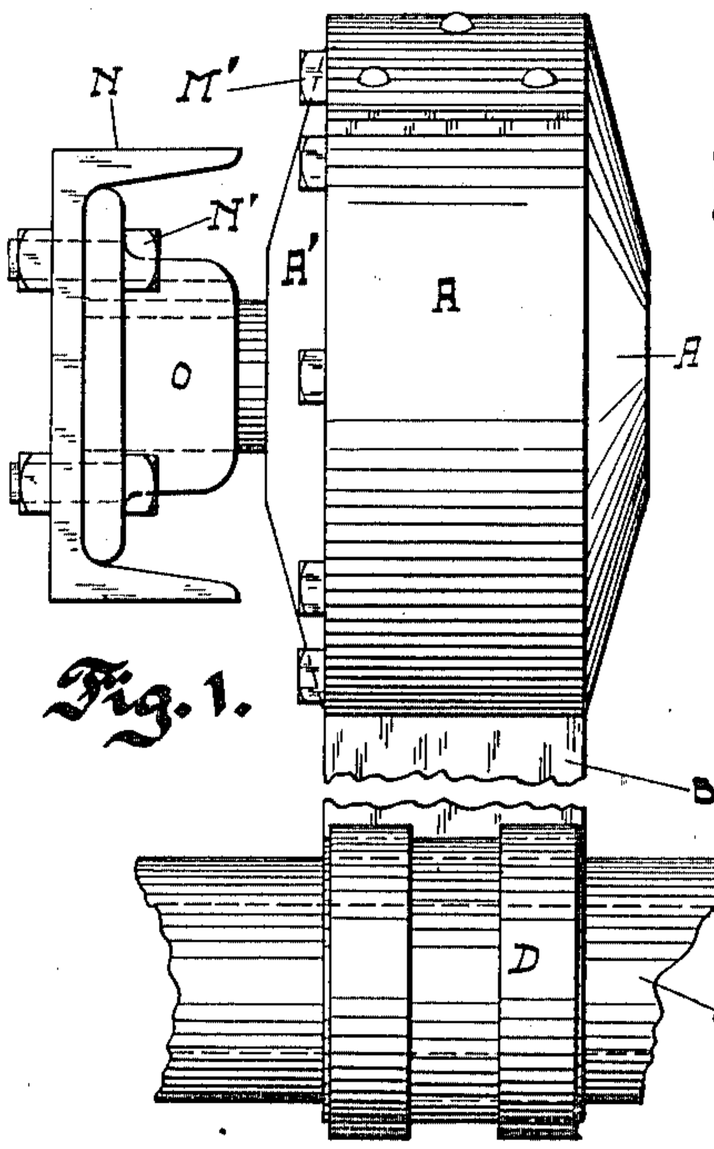

Fig. 1.

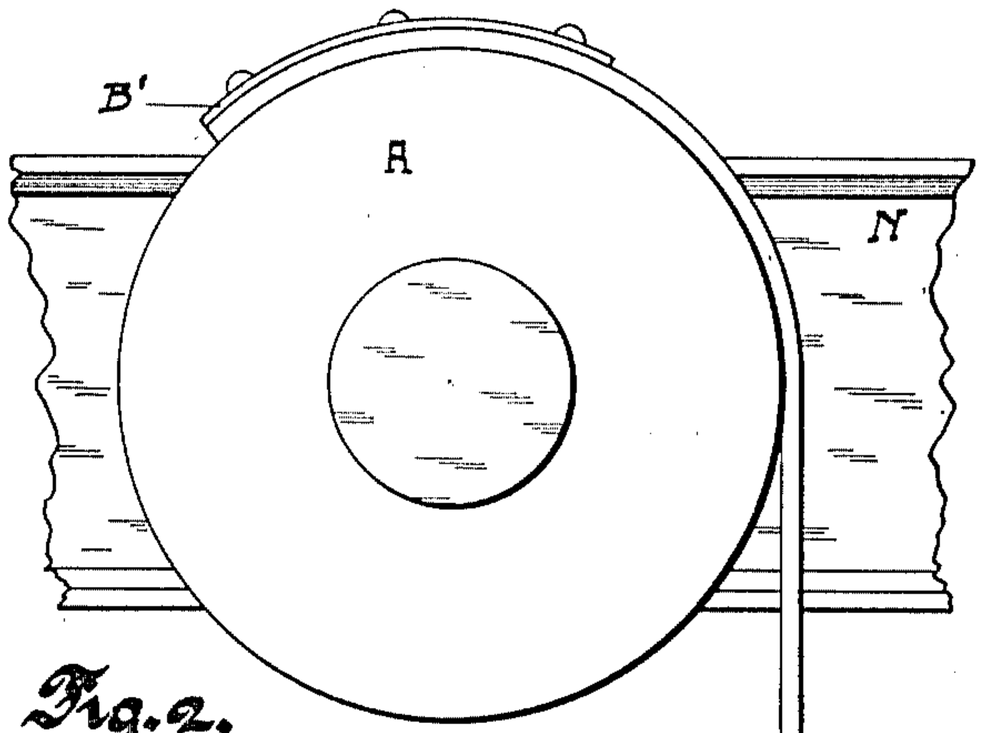

Fig. 2.

Fig. 3.

Fig. 4.

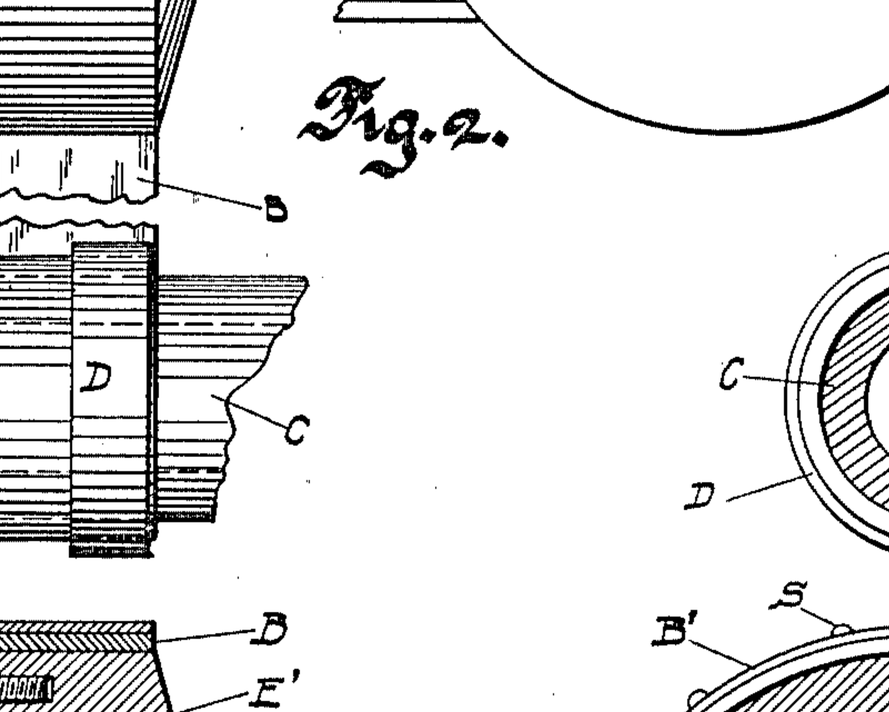

Fig. 5.

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VEHICLE SHOCK-ABSORBER.

994,546. Specification of Letters Patent. Patented June 6, 1911.

Application filed February 3, 1910. Serial No. 541,947.

To all whom it may concern:

Be it known that I, HARVEY TERHORST, of Milwaukee, Wisconsin, have invented a Vehicle Shock-Absorber, of which the following is a specification.

This invention relates to cushioning-devices for vehicles, to wit, that class of devices which is employed to reduce the rebound of the vehicle-body upon a sudden compression of the body-springs due to the wheels riding over a rough place in the road.

More particularly my invention relates to rotary dash-pots or shock-absorbers of that type wherein the body is connected with the vehicle-axle by a strap fixedly attached to one of said members and a drum about which the strap is wound, said drum being mounted in an oscillating manner on the other member and having means for preventing its rotating suddenly in the unwinding direction and for causing it to be turned automatically in the opposite direction in order to take up any slack in the strap. In my invention I provide such a drum mounted on a central shaft and having an internal chamber adapted to contain liquid, a rotary piston on the shaft, and an abutment mounted on the drum and coöperating with the piston. I further provide a double cover with an auxiliary chamber between, to receive any leakage through the inner cover and having means for returning the same to the non-compression side of the piston.

The nature of my invention will best be understood by a consideration of the following detailed description taken in connection with the accompanying drawings illustrative thereof.

In these drawings, Figure 1 is a side elevation of the complete device with the parts of the vehicle with which it is connected; Fig. 2 is a front elevation of the same; Fig. 3 is an axial section through the drum, the central shaft being shown partly in elevation, as also the piston and abutment; Fig. 4 is a transverse section through the drum on the central plane of the main chamber; and Fig. 5 is an elevation of the drum from the left as shown in Figs. 1 and 2, with the outer cover removed and the shaft shown in section.

In these drawings every reference letter and numeral refers to the same part in each figure.

Upon the body-frame N of the vehicle is mounted a base-block O, which carries projecting therefrom horizontally a stub-shaft E fixed against rotation by means of a key T. Upon this stub-shaft is mounted the shock-absorbing drum A, which is hollowed out internally to form a cylindrical chamber, as shown in Figs. 3 and 4; which chamber is provided with an inner cover V and an outer cover A′, both secured in place by the cap-screws M′, and between which is a secondary chamber (see Figs. 3 and 5). To the outer circumference of the drum is attached a strap B by means of a plate B′ and screws S, in position to be wrapped thereon; the other end of said strap being attached in any suitable manner, as by means of clamp-collars D and bolts D′, to the axle C of the vehicle or other appropriate element of the running-gear.

Upon the stub-shaft E within the main chamber of the drum, is a piston E′ which completely fills the bore of the cylinder from the center to circumference on one side; and on the opposite side when the drum is in its normal position, is an abutment G, fixed to the drum A and cover V by means of screw-dowels F, F′, and also filling the entire bore of the cylinder from center to circumference. In each of these members E′, G, is a passage valve, K and K′, hinged at one edge and drawn yieldingly into closed position by means of a spring, H and H′. These valves, as will be seen by Figs. 3 and 4, are located so as to open on the same side of the piston and abutment, to wit, into the left hand one of the two subchambers in Fig. 4 into which they divide the main chamber; so that when both chambers are filled with liquid, the drum is free to move in a counterclockwise direction, in which the strap B is wound upon it, by the opening of the valves K, K′, produced by any excess of pressure in the right hand chamber; while any tendency of the drum A to turn in the opposite direction will immediately produce a closure of said valves and will, therefore, be checked by a lack of exit of the liquid from the left into the right hand chamber. To provide for the gradual yielding of the drum in such case, a passage 1 is bored in the abutment C, the effective cross-section of which passage, and therefore the rate of yielding of the drum, may be regulated by means of a screw J, the end of which enters the end of the passage I and which can be turned from the outside. A further exit-

passage for the liquid is provided in the form of a groove P in the circumferential surface of the main chamber, which groove tapers from a maximum sectional area at the extreme wound-up position of the drum to nothing at the extreme unwound position; whereby as the drum turns more and more into the unwound position, the liquid escapes at a slower and slower rate through said groove P and so gradually slackens the unwinding movement of the drum.

In order to cause the automatic winding of the slack of the strap B upon the drum, I provide a pair of spiral springs L, the inner ends of which are secured to the shaft E and the outer ends to suitably placed pins L′ on the inner cover V. These springs are confined within the auxiliary chamber of the drum, which thereby serves a double purpose, first, of inclosing the spring and keeping it lubricated and free from dirt, and secondly of catching leakage of oil which escapes past the inner cover, caused by the compression within the left-hand or compression-half of the main chamber (as seen in Fig. 4). It should be understood that the auxiliary chamber is not intended to serve as a reservoir or air-chamber, but to retain the oil-leakage and return it to the right-hand or noncompression-half of the main chamber, which is done by means of an aperture X opening into that half. Leakage around the shaft is prevented by a gland Q, screwed into a threaded recess at the center of the cover A′ and inclosing a liquid-tight packing.

As will be clear from the foregoing description to those skilled in the art, the mode of operation is briefly as follows: When the vehicle-body approaches the axle due to any sudden bump or elevation in the road or the like, the springs L cause the drum A to turn so as to wind the slack of the strap B thereon, the valves K K′ opening in such case automatically to equalize the pressure on the two sides of the main chamber. A compression of the body-springs of the vehicle is produced but the subsequent rebound which would otherwise result is checked because of the strap-connection B, the sudden pull upon which causes an unwinding-stress upon the drum; but the valves K K′ now close and the liquid is therefore compressed within the left-hand half of the cylinder, finding a gradual exit through the passages I and P, and thus checking any undue movement in that direction.

Various changes and modifications in the constructions as herein shown may be made without departing from the spirit of my invention, and I wish it understood therefore that the latter is not otherwise limited than by the proper scope of my claims. It will be understood of course that either the drum or shaft may be made stationary and the other rotatable upon it, and that the first member may be connected to the axle and the strap to the vehicle body instead of vice versa as shown.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination of a shaft, a drum rotatably mounted thereon and having an internal cylindrical chamber, a radial abutment mounted on said drum within said chamber, a radial piston mounted on said shaft within said chamber, an inner cover-plate covering one side of said cylindrical chamber, an outer cover-plate secured over said inner cover-plate leaving between them a secondary chamber, there being a passageway from said secondary chamber to the low pressure side of the piston and a spring within said secondary chamber.

2. The combination of a shaft, a drum rotatably mounted thereon and having an internal cylindrical chamber, a radial abutment mounted on said drum within said chamber, a radial piston mounted on said shaft within said chamber, an inner cover-plate covering one side of said cylindrical chamber, an outer cover-plate secured over said inner cover-plate leaving between them a secondary chamber, there being a passageway from said secondary chamber to the low pressure side of the piston and a spiral spring in said secondary chamber having one end secured to said shaft and the other to an element turning with said drum.

3. The combination of a shaft, a drum rotatably mounted thereon and having an internal cylindrical chamber, a radial abutment mounted on said drum within said chamber, a radial piston mounted on said shaft within said chamber, an inner cover-plate covering one side of said cylindrical chamber, an outer cover secured over said inner cover-plate leaving between them a secondary chamber, and a liquid-tight packing between said outer cover and said shaft; there being a passageway from said secondary chamber to the low-pressure side of the piston.

4. The combination of a shaft adapted to be mounted on one part of a vehicle, an element rotatably mounted thereon and having an internal cylindrical chamber, a connection connected at one end to said element and adapted to be connected at the other end to another part of the vehicle which is movable toward and from the first part, a radial abutment mounted on said element within said chamber and filling the area of the chamber on one side of said shaft, a radial piston mounted on said shaft within said chamber and filling the area of the latter on one side of said shaft there being a passage between the two subcham-

bers into which the main chamber is thus divided, a valve closing said passage and maintained normally closed and opening in one direction only; a closure-plate closing said chamber on one side, a coiled spring having one end secured to said shaft and the other to said closure-plate, and a secondary plate mounted over said first-named closure-plate and inclosing said spring; said first-named closure-plate having an aperture therein adapted to return to the noncompression subchamber oil leaking from the compression sub-chamber.

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