No. 850,181. PATENTED APR. 16, 1907.

V. H. PODSTATA.

PNEUMATIC CUSHION.

APPLICATION FILED APR. 21, 1906.

Fig. 1

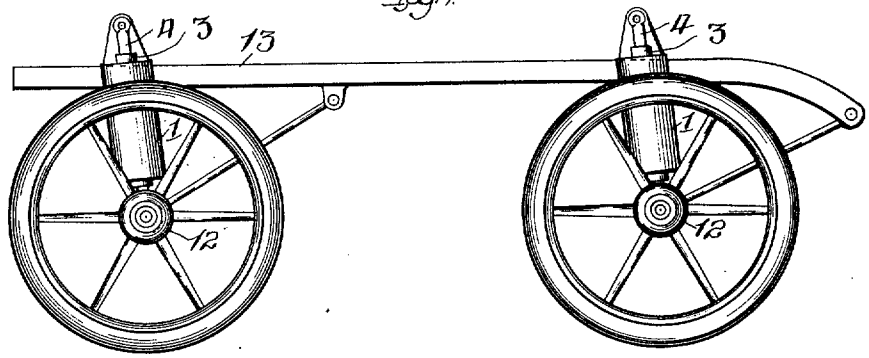


Fig. 2

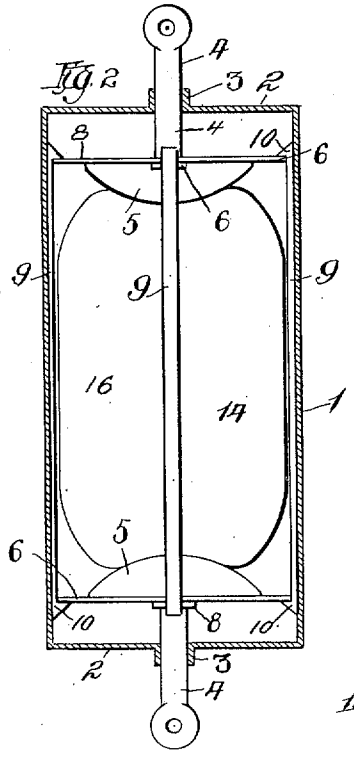


Fig. 4

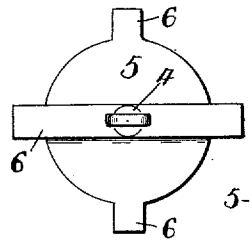


Fig. 3.

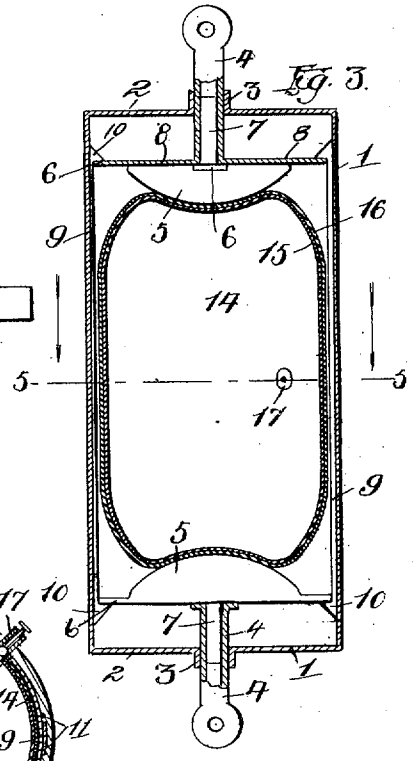
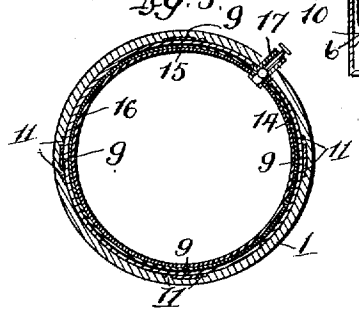


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC CUSHION.

No. 850,181. Specification of Letters Patent. Patented April 16, 1907.

Application filed April 21, 1906. Serial No. 313,033.

To all whom it may concern:

Be it known that I, VACLAV H. PODSTATA, a citizen of the United States, residing at Dunning, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Cushions, of which the following is a specification.

This invention is intended primarily for use with automobiles, although the device may be applied to carriages or other vehicles in which it is desirable to make use of a cushion located between the running-gear and the frame for the purpose of minimizing the effect of jars or jolts on the running-gear.

The object of the invention is to so construct the cushion that it may be regulated to exert a greater or less degree of resiliency by inflating the inner pneumatic receptacle to a greater or less extent.

A further object, which more especially forms the subject-matter of the present invention, is to provide against a rebound after the cushion has been depressed by a jolt or jar against the wheels and to provide means for quickly bringing the vehicle-body to a state of rest, thereby greatly increasing the efficiency of the cushioning mechanism and promoting the comfort and welfare of the occupants of the vehicle.

In the drawings, Figure 1 is a side elevation of an automobile-frame employing the pneumatic cushion of the present invention. Fig. 2 is a view showing in section the outer shell or cylinder and in elevation the pneumatic cushion. Fig. 3 is a longitudinal sectional elevation of the device; Fig. 4, a top or plan view of the plunger and inner bracket, and Fig. 5 is a cross-sectional view taken on line 5 5 of Fig. 3.

Referring more especially to Fig. 2, the cushion consists of a metallic or other rigid casing 1, preferably of cylindrical form, having ends 2, each provided with a flanged opening 3 for the projection of the tubular stem 4 of a plunger 5. The plungers are of convex or rounded formation, and each is provided with a pair of oppositely-disposed outwardly-extending fingers 6, the fingers on the upper plunger being located at right angles to the fingers on the lower plunger, as will appear from an inspection of Fig. 2. Each of the plungers is formed in two sections, the rounded body portion and the stem, which stem is of tubular formation, as shown in Fig. 3, and has entered thereinto a stud 7, rigidly connected to the body of the plunger, which stem is slidable within the tubular stem of the plunger. The tubular stem terminates at its inner end in a pair of oppositely-disposed transversely-extending arms 8, which arms are turned at right angles to the fingers 6 of the plunger-body with which the stem coöperates. It is therefore apparent that at one end of the cushion is a plunger having two arms connected with a tubular stem and two fingers at right angles to the arms and connected with the plunger-body and that at the opposite end of the cushion the parts are arranged in reverse relation. Around the walls of the cylinder or casing are arranged four slidable bars 9, equally spaced with respect to one another, and each of the bars is provided at opposite ends with inwardly-extending hooks 10. One pair of these bars connects the outwardly-extending arms of the upper plunger-stem with the outwardly-extending fingers of the lower plunger-body, and the other pair of arms is arranged to connect the outwardly-extending arms of the lower plunger-stem with the outwardly-extending fingers of the upper plunger-body. The length of the cylinder is sufficient to permit of considerable play or reciprocation of the rods, and the rods are preferably held in place by means of longitudinally-extending lugs or ribs 11 on the inner wall of the cylindrical shell or casing which are suitably space to provide guideways for the reciprocation of the rods.

As shown in Fig. 1, the cushion is fitted for use by attaching one of the plunger-stems to the running-gear 12 of a vehicle and the other plunger-stem to the body-frame 13 of a vehicle, although it will be understood that the vehicle-body of Fig. 1 serves merely for the purpose of illustration and that the method of attachment therein shown can be varied in any manner desirable.

Within the cylinder is located a pneumatic receptacle 14, preferably formed of two thicknesses of material, an inner elastic bag 15 and an outer non-elastic sheath or casing 16. Air is admitted through a valve 17, which may be of any suitable description. The pneumatic receptacle is preferably of oval formation and of diameter substantially equal to the diameter of the outer cylinder, and Figs. 2 and 3 represent the shape of the receptacle under normal conditions when the vehicle is at rest, the ends of the bag being inwardly compressed by the weight of the vehicle. When the vehicle is in mo-

tion, the plungers will work in opposite directions, and any jolt or jar will inwardly project the tubular stems toward one another and with the stems the plunger-bodies will be driven in against the pneumatic tension of the receptacle or cushion, the plungers acting in opposite directions and causing the compression to be centered at the points of greatest efficiency. This makes the device very sensitive; but at the same time the arrangement would result in an objectionable rebound were it not for the provision of the connecting side bars, which operate to prevent the rebound after the compression of the pneumatic receptacle. As the vehicle-body tends to fly back after being depressed, the upper plunger-stem will be upwardly carried with the vehicle-body, and this movement of the upper plunger-stem imparts a corresponding movement to the lower plunger-head through the medium of the side bars which connect the arms 8 of the upper plunger-stem with the fingers 6 of the lower plunger-head. It will thus be seen that the rebound is prevented by the abutment of the lower plunger-head against the lower end of the flexible pneumatic cushion, so that the rebound is pneumatically prevented and the vehicle will come to rest in a very short space of time without jolts or jars and without any continued bounding or rocking, which would be the case if no means were provided for preventing the rebound. The action is the same with respect to a jolt or jar which would tend to draw back the lower plunger-stem, and the motion of such stem would be imparted to the upper plunger-head in the manner heretofore described. It will be observed that the arrangement is one which tends to compress the elastic pneumatic cushion in whatever way the force is applied, and this arrangement holds the vehicle-body poised in a state of equilibrium with respect to the running-gear and at the same time prevents all jars or shocks which would be the case if a less sensitive cushioning medium were employed. By making the plunger-heads and plunger-stems separate and distinct from one another a constant tension or compression is exerted on each end of the pneumatic receptacle or cushion regardless of the movement of the stems which are connected with the vehicle-body and running-gear. This prevents any jolting or jarring, since the several elements or devices composing the complete structure will adjust themselves automatically and without jar or friction to the changed conditions incident to the use of the device.

What I regard as new, and desire to secure by Letters Patent, is—

1. A cushion consisting of a rigid outer casing, a pneumatic receptacle inside the casing, two oppositely-disposed plunger-bodies slidably mounted in the casing, and a connection between each section of the structure to be cushioned and the adjacent plunger-body adapted to actuate such plunger-body by an inward thrust due to the bound, and a connection between each section of the structure to be cushioned and the opposite plunger-body for actuating such plunger-body on the rebound, substantially as described.

2. A cushion consisting of a rigid outer casing, a pneumatic receptacle within the casing, two oppositely-disposed plunger-bodies slidably mounted within the casing, each of the plunger-bodies provided with a connection with the adjacent portion of the structure to be cushioned for receiving the inward thrust due to the bound, and oppositely-disposed side bars connecting the sections of the structure to be cushioned with the non-adjacent plunger-body for actuating such plunger-body by the rebound after the initial compression of the pneumatic receptacle, substantially as described.

3. A cushion consisting of a rigid outer casing, a pneumatic receptacle inside the casing, oppositely-disposed plungers slidably mounted in the casing, each of the plungers consisting of a plunger-head and a stem slidably mounted with respect to one another, and bars connecting the plunger-head of one plunger with the plunger-stem of the companion plunger and other bars connecting the plunger-stem of the first-mentioned plunger with the plunger-head of the second-mentioned plunger for minimizing the rebound, substantially as described.

4. In a cushion, the combination of a rigid elongated cylindrical casing, a pneumatic receptacle within the casing, oppositely-disposed plungers slidably mounted within the casing and adapted to bear against the opposite ends of the pneumatic receptacle, each of the plungers consisting of a tubular plunger-stem having outwardly-extending arms and a plunger-head having a stud slidably mounted within the stem and having outwardly-extending fingers arranged at right angles to the arms, and slidably-mounted bars connecting the arms of one stem with the fingers of the companion head and similar bars connecting the fingers of the first-mentioned plunger with the arms of the second-mentioned plunger, substantially as described.

5. In a cushion, the combination of a rigid elongated cylindrical casing, a pneumatic receptacle within the casing consisting of an elastic inner bag and a non-elastic surrounding sheath, oppositely-disposed plunger-bodies slidably mounted within the casing, each connected with a portion of the structure to be cushioned and adapted to be inwardly projected by a thrust due to the bound of such portion, and each of the plunger-bodies being further connected to the companion portion of the structure to be

cushioned for receiving a compressing movement due to the rebound, substantially as described.

6. In combination with a vehicle axle and body, a cushion consisting of a rigid elongated outer shell or casing having slidably mounted therein oppositely-arranged plunger-bodies, one of the plunger-bodies being connected with the axle and adapted to receive an inward thrust therefrom due to the bound, and the other plunger-body being connected to the vehicle-body and adapted to receive an inward thrust therefrom due to the bound, a pneumatic receptacle within the casing adapted to be compressed from either direction by the oppositely-disposed plunger-bodies for providing a cushioning action between the vehicle-body and the axle, a connection between the first-mentioned plunger-body and the vehicle-body, and a connection between the second-mentioned plunger-body and the axle for providing an inward compressing action for the plungers to prevent an excessive rebound after the inward compression, substantially as described.

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