T. G. WILKINSON.

PNEUMATIC VEHICLE SPRING.

APPLICATION FILED JULY 18, 1907.

898,712.

Patented Sept. 15, 1908.

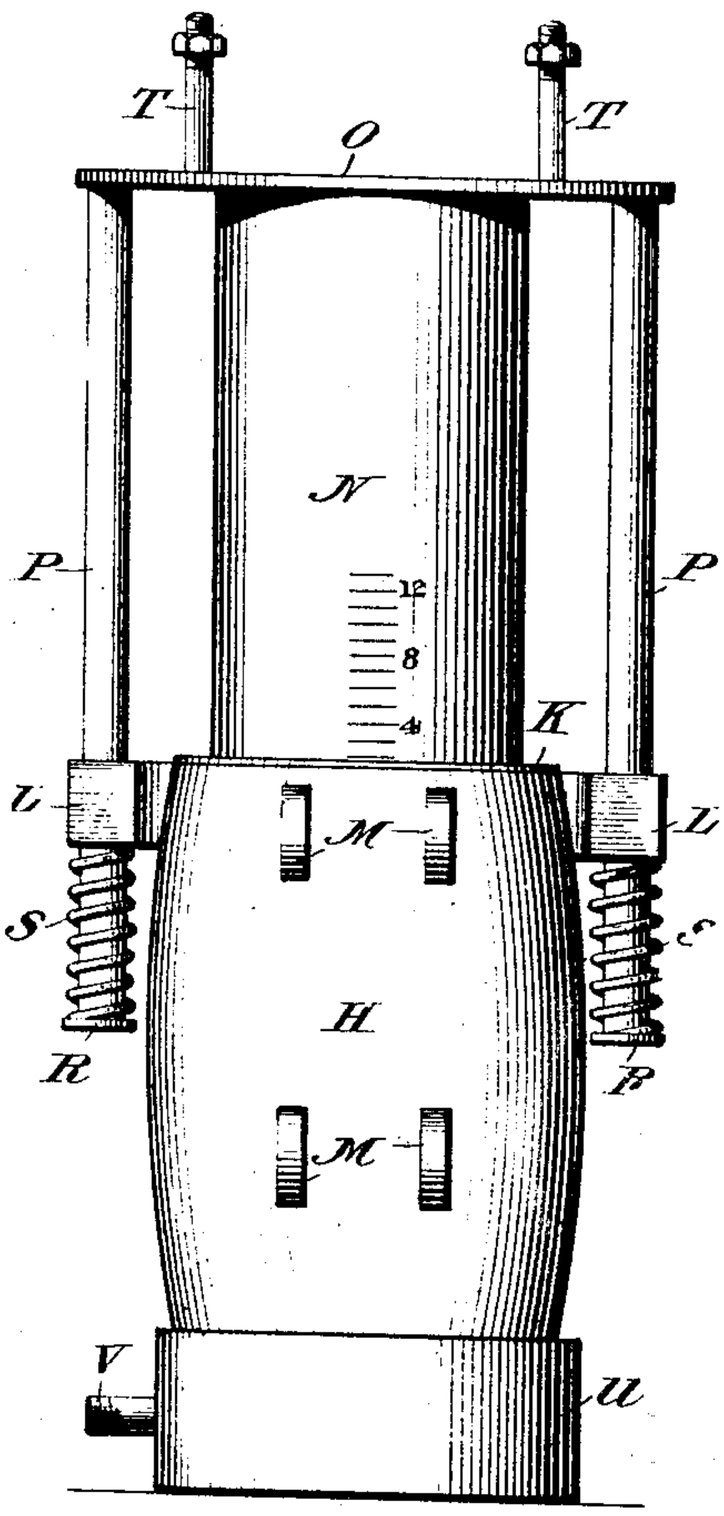

Fig. 1.

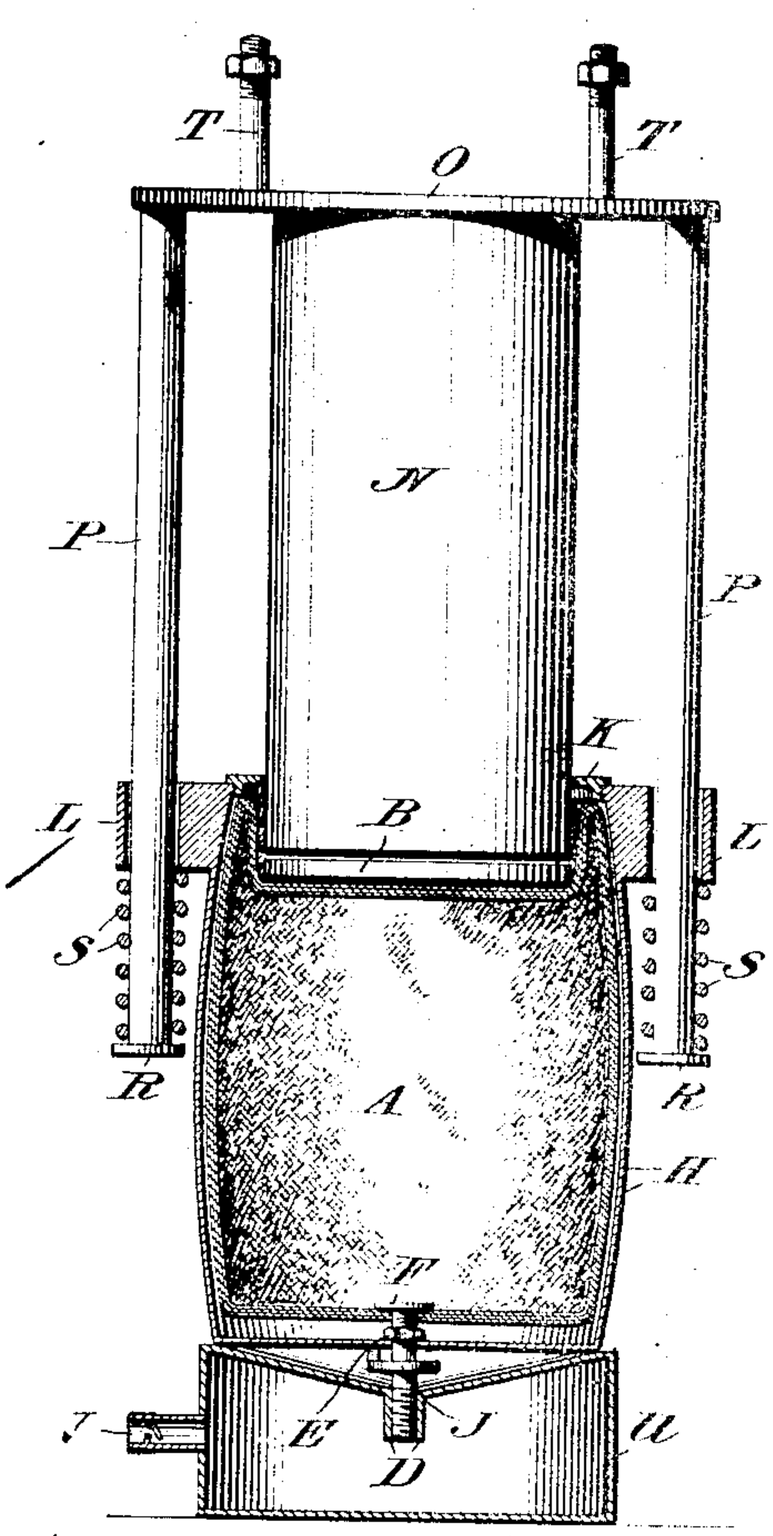

Fig. 2.

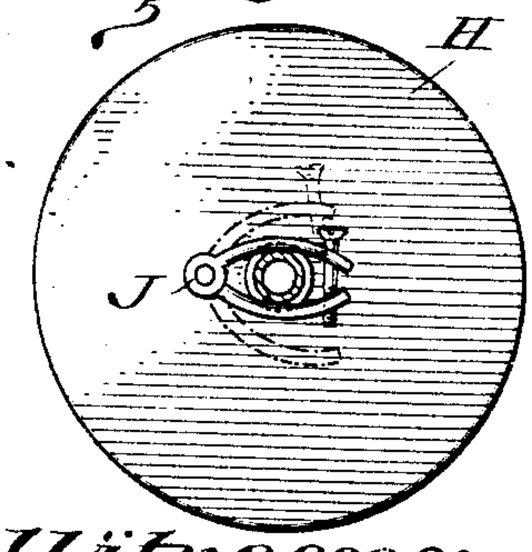

Fig. 5.

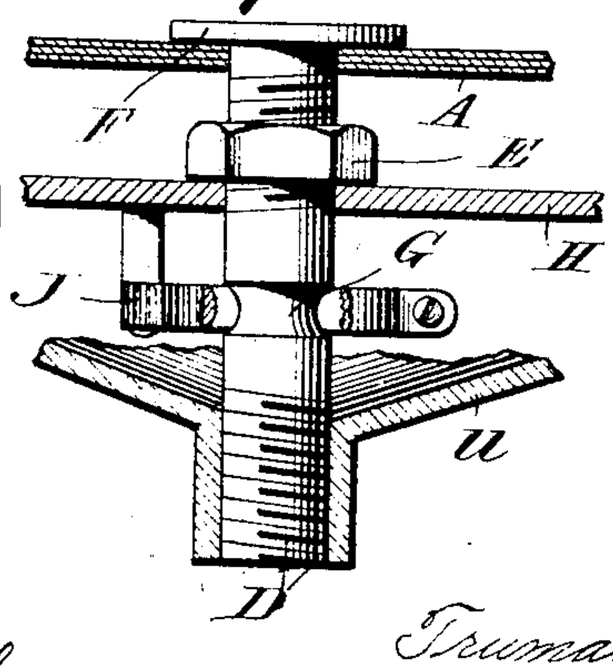

Fig. 3.

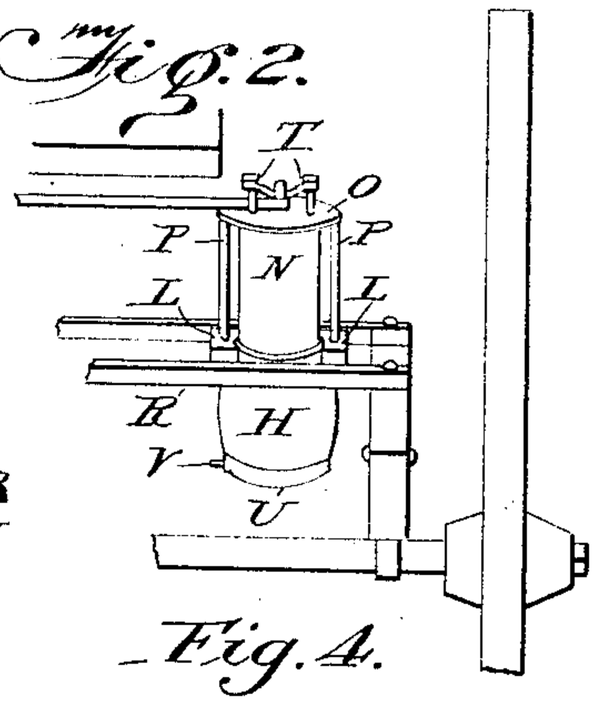

Fig. 4.

Witnesses:

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UNITED STATES PATENT OFFICE.

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PNEUMATIC VEHICLE-SPRING.

No. 833,712. Specification of Letters Patent. Patented Sept. 15, 1906.

Application filed July 14, 1905. Serial No. 269,697.

To all whom it may concern:

Be it known that I, TRUMAN G. WILKINSON, a citizen of the United States, residing at South Williamsport, in the county of Lycoming and State of Pennsylvania, have invented a new and useful Pneumatic Vehicle-Spring, of which the following is a specification.

My invention relates to improvements in pneumatic vehicle springs, in which a vertical plunger operates in conjunction with an air chamber within a flexible air cell, and the objects of my improvements are to provide a spring with its elasticity furnished by compressed air and having facilities for the adjustment of the spring to the load it will carry and to the shock it will receive. I attain these objects by the mechanism illustrated in the accompanying drawings in which

Figure 1 is an outside view, Fig. 2 is a vertical section of the springs and Fig. 3, is a vertical section of the air cell and connecting tube. Fig. 4, shows the position of the pneumatic vehicle spring, fastened between frames that are secured to the steel springs of a vehicle. As the pneumatic vehicle spring is more resilient than a pneumatic tire, in this position it serves the same purpose as a pneumatic tire, by absorbing the short jars and vibrations that are not absorbed by the ordinary vehicle spring. Fig. 5, is a view of the lower surface of the cell box, pivot and clamp. The clamp inclosed is shown in dotted lines.

Similar letters refer to similar parts throughout the several views.

The air cell A, is an air tight sack of strong flexible material, preferably composed of layers of textile material, between which are layers of rubber, all layers being securely fastened together. The air cell is either cylindrical or cask shaped and a little larger at the bottom than at the top. The illustration shows a cask shaped air cell. On the top of the air cell is secured an inflexible disk B, of the same diameter as the plunger. Through the bottom of the air cell is an annular opening into which is secured a tube D, provided with screw threads and furnished with a nut E. The end of the tube within the air cell is enlarged at F. Below the nut is a groove G, adapted to be held by a clamp.

The cell box H, is a rigid receptacle which supports and partly surrounds the sides and bottom of the air cell. It is of the same shape and a little larger than the air cell.

Through the bottom of the cell box is a central opening, permitting the passage of the tube D and at the edge of the opening is a clamp J, attached to the lower surface of the cell box by means of a pivot and adapted to fasten in the groove on the tube, to prevent rotation of the tube. The top of the cell box is partly covered by a cap K, secured in position by screw threads around the cap; fitting in other screw threads around the top of the box. Through the cap is a central opening through which the plunger passes. At the sides, on the outer surface of the cell box, are attached frames L, L, adapted to receive guide bars and to permit the guide bars to reciprocate. On the front and back of the cell box are secured lugs M M, with openings through them, adapted to be secured to the steel spring or a fixed part of a vehicle.

The plunger N, is above the air cell, its lower end passing through the opening in the cap and resting on the disk B. The plunger acting and reacting with the air cell causes the disk to reciprocate by inversion and eversion of the top part of the air cell.

The plunger is composed of rigid material, is cylindrical in shape and is of about the same length as the air cell. Its diameter is enough smaller than that of the air cell, to permit two widths of the air cell wall and an air space to be interposed between the circumference of the plunger and the inside surface of the cell box, see Fig. 2. On the front of the plunger is marked a scale adapted to show its length below the cap, when adjusting the spring. On top of the plunger is secured a plate O, and at the sides of the plate are secured guide bars P, P, adapted to reciprocate in frames L, L. Near the bottom of the guide bars are secured collars R, R, adapted to restrain the spring in case of accidental stress and also to give attachment to check springs. Coiled around the guide bars, between the collars and frames and secured to the collars are springs S S, adapted to serve as check springs. From the top of the plate O, screw rods T T, rise vertically and are adapted to be secured to the steel spring or a fixed part of a vehicle.

The accessory air chamber U, is an air tight receptacle of any desired shape, that in the drawing being cylindrical for conven-

ience. Through the top of the accessory air chamber is an annular opening provided with screw threads adapted to secure it to the lower end of the tube D, which tube serves as a means of communication between the accessory air chamber and the air chamber within the air cell.

Through the wall of the accessory air chamber is a tube V, supplied with an inlet valve suitable for introducing air under pressure into the air chambers.

The size of the accessory air chamber will vary in proportion to the size of the chamber in the air cell according to the roughness of the surface to be traveled by the vehicle, so that about half of the length of the air cell will react with the average degree of shock received.

To operate: An accessory air chamber of a proper size is attached and the load is placed in position. By any suitable means, air under pressure, is forced through the tube V, containing the inlet valve, until the pressure in the air cell forces the plunger nearly to the top of the cell box, permitting a small part of the plunger to remain within the cell box, to avoid strong rebound, and by the same means the check springs are brought into contact with the guide frames. On force being transmitted to the supporting spring, the plunger is forced downward, inverting the top of the air cell and reducing its capacity, so further condensing the air in the air chambers until the air-pressure is in proportion to the force applied. At the same time the pressure of the air holds that part of the air cell which is not inverted, in its proper position and a portion of the air is forced between the inverted and vertical parts of the air cell, preventing friction between the surfaces. See Fig. 2. When the force is discontinued the condensed air expands, everting the top of the air cell and forcing the plunger into its former position where any further upward motion is restrained by the check springs.

While the pneumatic spring is especially desirable, interposed between the steel spring and a fixed part of a vehicle, it will be understood this construction may also be secured between other parts of a vehicle where a spring may be used, this simply involving a slight modification of the means of guiding and of the means of attaching to a vehicle.

I am aware that prior to my invention pneumatic vehicle springs have been devised but I am not aware that the flexible air cell, plunger and other attachments herein described have been used.

I claim—

1. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, an inflexible disk secured to the top of the air cell, a cell box supporting the air cell, a plunger directed by guides acting on the air cell, and with check springs adapted to retain the plunger in contact with the air cell, as described.

2. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, a cell box adapted to support the air cell, a plunger directed by guides acting on the air cell, and with coil springs on the said guides adapted to form check springs, with the said pneumatic vehicle spring interposed between an extra frame, composed of bars secured to the highest point of, and extending from one to the other of the ordinary steel springs commonly used on a vehicle, and the body of a vehicle as described.

3. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, a cell box, a plunger, a plate secured to the said plunger and guide bars attached to the said plate, with check springs to restrain the rebound as described.

4. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, a cell box with guide frames secured to the said cell box, a plunger acting on the air cell, a plate secured to the plunger and guide bars attached to the said plate, with an accessory air chamber to adjust the spring as described.

5. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, a cell box, with means of securing the said cell box to a vehicle, a plunger directed by guides acting on the air cell, a plate attached to the plunger, with means of securing the said plate to a vehicle and with check springs acting on the guides as described.

6. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, a cell box, a plunger acting on the air cell, a tube serving as a means of communication between the air cell and an accessory air chamber, a second tube with an inlet valve leading into the said accessory air chamber, with guide bars and guide frames to direct the plunger, and with check springs to restrain the plunger, all as described.

7. The combination in pneumatic vehicle springs of an air chamber within a flexible air cell forming the supporting spring, a cell-box, provided with a cap and adapted to support the air cell, a plunger directed by guides acting on the air cell and with coil springs on the said guides, adapted to form check springs and to retain the plunger in contact with the air cell.

8. The combination in pneumatic vehicle springs of an air chamber within a flexible air-cell forming a supporting spring, a cell-box

adapted to support the air cell, a plunger acting on the air cell, with means of guiding the said plunger, with coil springs interposed between the guide frames and the collars on the guide bars, adapted to serve as check springs.

9. The combination in pneumatic vehicle springs of an air chamber within a flexible air-cell forming the supporting spring, a cell box adapted to support the air cell, a plunger acting on the air cell, with guides to direct the plunger, and check springs attached to the guides, with an accessory air chamber serving as a means to adjust the spring, all substantially as described.

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Witnesses:

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