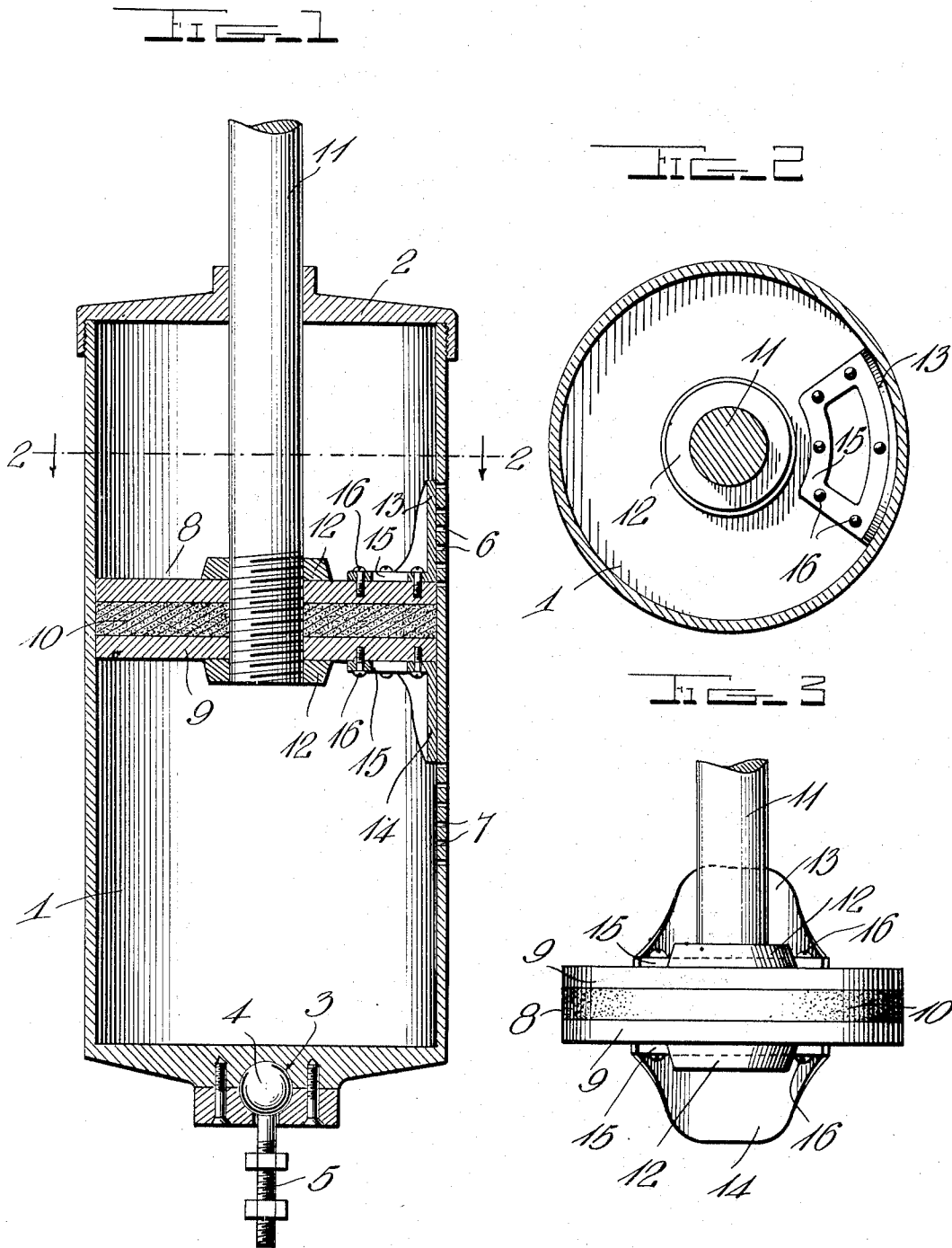


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 PNEUMATIC CUSHION FOR VEHICLES.
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Patented Oct. 10, 1911.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC CUSHION FOR VEHICLES.

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To all whom it may concern:

Be it known that I, CALEB STEVENS GURNEY, a citizen of the United States, residing at Portsmouth, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Pneumatic Cushions for Vehicles; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in pneumatic cushions for vehicles.

One object of the invention is to provide a cushion of this character having an improved construction and arrangement of air inlet and discharge passages and means for opening and closing the same at the proper time for admission and discharge of air from the cylinder whereby the air forms a perfect cushion on both sides of the piston, thus yieldingly supporting the weight of the vehicle and preventing the quick rebounding of the same.

Another object is to provide a cushion of this character which will be simple, strong and durable in construction, efficient and reliable in operation, and well adapted to the purpose for which it is designed.

With these and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts as will be more fully described and particularly pointed out in the appended claim.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my improved pneumatic cushion; Fig. 2 is a horizontal sectional view of the same on the line 2—2 of Fig. 1; Fig. 3 is a detail view of the piston and valves controlling the inlet and discharge of the air to and from the cylinder.

In the embodiment of the invention, I provide a cylinder 1 which may be of any suitable size and is closed at its lower end and provided on its upper end with a head 2 which is bolted or otherwise suitably secured thereto. On the lower end of the cylinder is formed a socket 3 in which is adapted to be secured the ball end 4 of a cylinder attaching bolt 5, by means of which the cylinder may be secured in any suitable position to the axle of the vehicle, preferably between the upper and lower branches of the elliptical spring. In one side of the cyl-

inder, in the upper portion thereof, a slight distance above the center, is formed a vertical series of air inlet and discharge passages 6, while in the lower portion of the cylinder, below the center, is arranged a vertical series of air inlet and discharge passages 7.

Slidably mounted in the cylinder 1 is an air compressing piston 8, said piston preferably comprising upper and lower metal clamping disks 9, between which is arranged a disk 10 formed of suitable packing material whereby the edges of the piston will form a close engagement with the sides of the cylinder. The disks 9 and 10 are clamped together and in operative engagement with the inner end of a piston rod 11 by clamping nuts 12, which are screwed onto the threaded inner end of the piston rod, as shown. The outer end of the piston rod is adapted to be secured in any suitable manner or by any suitable means (not shown) to the lower side of the vehicle body or frame.

To the upper side of the piston 8 and closely engaging the inner side of the cylinder having the air inlet and discharge passages, is an upper segmental valve plate 13, while to the under side of the piston immediately below the valve 13 is arranged a similar valve plate 14. The valve plates 13 and 14 have a curvature corresponding to the curvature of the inner surface of the cylinder, which they closely engage. The plates 13 and 14 have arranged on their inner ends attaching frames 15 in which are formed screw holes adapted to receive fastening screws 16, which are driven into the disks 9 forming the opposite sides of the piston.

In the operation of the cushion, as the piston is forced down by the weight of the vehicle thereon, the lower valve 14 will be moved over the air passages 7 in the lower portion of the cylinder, thus gradually cutting off the escape of the air which is being forced out by the downward movement of the piston. When the piston has moved downwardly a sufficient extent to cause the valve 14 to close the lowermost passage 7, further escape of the air is prevented and the remaining air in the lower end of the cylinder is compressed and forms a cushion which yieldingly supports the weight of the vehicle. By thus gradually cutting off the discharge of the air in the lower end of

the cylinder, the downward movement of the piston is gradually brought to a point where the air is compressed to a sufficient extent to form a cushion for supporting the weight of the vehicle, thus preventing any abrupt stoppage of the piston which would cause a shock or jar to the vehicle. As the piston is thus forced downwardly the upper valve will gradually uncover the upper series of air passages 6, thereby gradually drawing air into the upper end of the cylinder, which will form a cushion in said end and thus yieldingly hold the piston against sudden rebounding, the air in the upper end of the cylinder being acted upon by the return stroke of the piston in the same manner as the air in the lower end is acted on by the downward movement of the piston. This arrangement of the air controlling mechanism causes the air to form an extremely elastic cushion, which acts upon the piston in both its upward and downward movement, as will be readily understood.

It will be readily seen that the arrangement of the openings and the valve plates is such that all the upper openings and all the lower openings cannot be covered nor uncovered at the same time, so that as the air is gradually forced out through one series of openings it is simultaneously and at the same rate drawn in through the other series of openings. Inasmuch as the air is not forced out nor drawn in through a single large opening there is no sudden increase of pressure on either side of the piston, but the compression of air against the end of the cylinder is very gradual so that the cushioning action is not abrupt and gradually arrests the movement of the vehicle instead of accomplishing that result suddenly and sharply so as to increase the

jolting effect. Furthermore, the piston cannot assume a position in which both series of openings will be above or below the piston and, consequently, there is no such preponderance of pressure upon either side of the piston at any time as will interfere with the free movement of the same under the vibrations of the vehicle.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claim.

Having thus particularly described my invention, what I claim is:

A device for the purpose set forth comprising a cylinder closed at both its ends and provided in one side with upper and lower vertical series of lateral openings extending only partway to the ends of the cylinder, a piston slidably mounted in said cylinder, and valve plates secured to the upper and lower sides of the piston and fitting closely against the inner surface of the cylinder to alternately cover and uncover the lateral openings in the cylinder when the piston is reciprocated.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CALEB STEVENS GURNEY.

Witnesses:

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