

(No Model.)

F. O. KILGORE.  
LOG CARRIAGE CUSHION.

No. 546,118.

Patented Sept. 10, 1895.

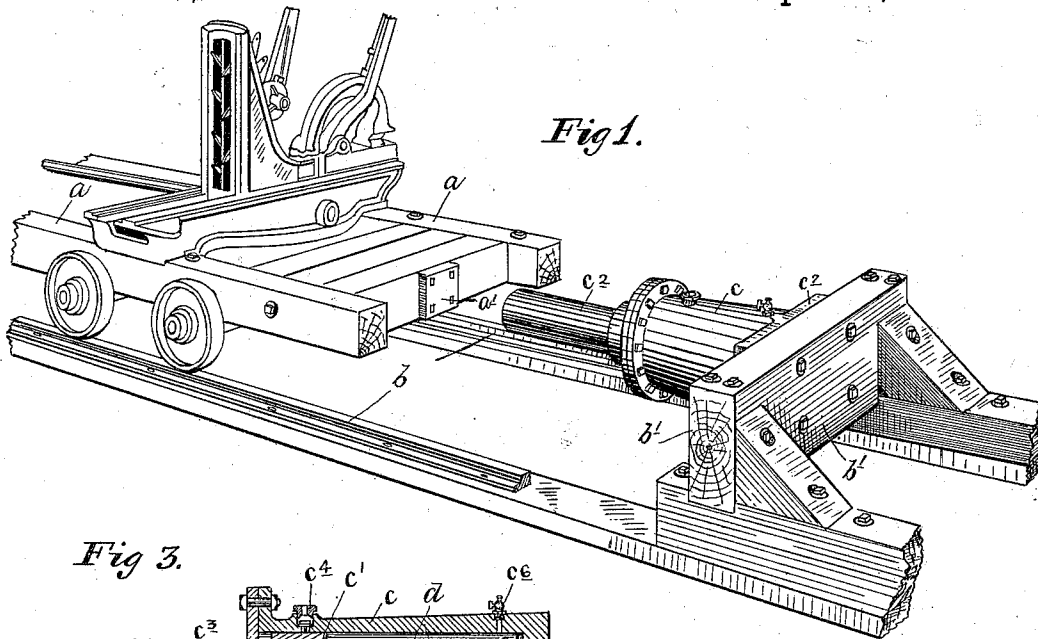


Fig. 1.

Fig. 3.

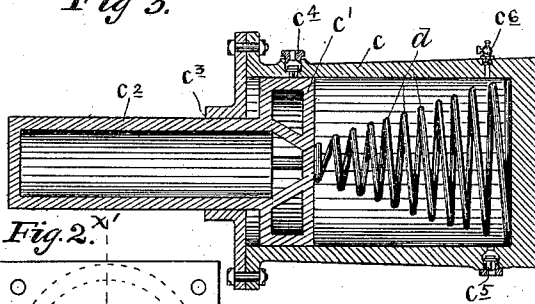


Fig. 2.

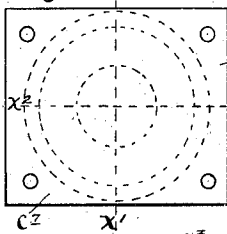


Fig. 4.

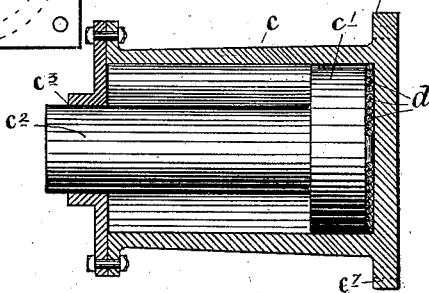


Fig. 7.

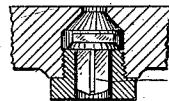


Fig. 8.



Fig. 9.

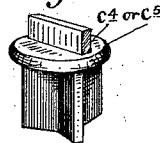


Fig. 5.

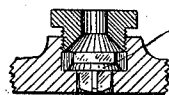
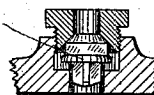


Fig. 6.



Witnesses:

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By his Attorney.  
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# UNITED STATES PATENT OFFICE.

FREDERICK O. KILGORE, OF MINNEAPOLIS, MINNESOTA.

## LOG-CARRIAGE CUSHION.

SPECIFICATION forming part of Letters Patent No. 546,118, dated September 10, 1895.

Application filed February 5, 1895. Serial No. 537,341. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK O. KILGORE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Log-Carriage Cushions; and I do hereby 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.

My invention has for its object to provide an improved elastic fluid-cushion for log-carriages or other moving bodies, and is in the same line as my former patent, No. 517,222, of date March 27, 1894.

My present invention will be hereinafter fully described, and defined in the claims.

The accompanying drawings illustrate my improved cushion, wherein like letters refer to like parts.

Figure 1 is a perspective view, with some parts broken away, showing my cushion in working position. Fig. 2 is a rear end view of the cushion detached. Fig. 3 is a longitudinal vertical section of the cushion on the line  $x' x'$  of Fig. 2 or in the plane of the valves. Fig. 4 is a horizontal section of the cushion on the line  $x^2 x^2$  of Fig. 2 with the piston in its innermost or rearmost position and the spring in its most compressed position. Figs. 5 and 6 are details in vertical section showing the front end check-valve respectively in its closed and in its open positions. Figs. 7 and 8 are similar views showing the rear end check-valve in its closed and in its open positions, respectively; and Fig. 9 is a perspective view of one of the check-valves detached.

$a$  represents a log-carriage of the ordinary standard construction.  $b$  represents the carriage-track, and  $b'$  represents the back stop-block for the carriage.

Referring now to the cushion,  $c$  represents a closed cylinder, which is fitted with a piston  $c'$ , having a projecting bumper-stem  $c^2$ , which works outward through the front end or removable cap-plate of the cylinder. The joint  $c^3$  between the piston-stem and the cylinder-head is a close one, so as to exclude the air, but does not necessarily need to be packed. At its forward end or near the same

the cylinder  $c$  is provided with an inwardly-closing and outwardly-opening check-valve  $c^4$ , which, on the inward or rearward movement of the piston in the bumping action, is closed by atmospheric pressure, but which on the outward or forward movement of the piston will open, if necessary, to avoid compression in advance of the piston. At or near its rear end the cylinder  $c$  is provided with an outwardly-closing and inwardly-opening check-valve  $c^5$ , which, on the rearward or inward movement of the piston in the bumping action, will be closed by the pressure from the confined volume of air within the cylinder behind the piston, and which, on the outward movement of the piston, will open inward from atmospheric pressure to afford a fresh supply of air within the cylinder behind the piston. The valve  $c^4$  is shown in its closed position in Fig. 5 and in its open position in Fig. 6. The valve  $c^5$  is shown in its closed position in Fig. 7 and in its open position in Fig. 8. The cylinder  $c$  is also provided at or near its rear end with a vent-valve or stop-cock  $c^6$ , which may be set to give any desired limited vent-opening for the purpose of avoiding an excessive compression on the inward movement of the piston in the bumping action, if necessary, but especially for permitting enough air to escape before the carriage can change direction to avoid an excessive rebound from what would otherwise be the compressed body of air within the cylinder behind the piston.

The cylinder  $c$  is provided with rear end flange-lugs  $c^7$ , which adapt the same to be bolted to the back stop-block  $b'$ , as shown in Fig. 1.

The check-valve shown detached in Fig. 9 may be taken to represent either the member  $c^4$  or the member  $c^5$ , as the said valves  $c^4$  and  $c^5$  are exactly alike, but occupy reverse positions in relation to their respective seats.

Within the cylinder  $c$  is located a spring  $d$ , which is in the form of a conical helix and is applied with its base or large end bearing against the rear end of the cylinder and with its tip or small end bearing against the back of the piston  $c'$ . This spring must be of considerable strength, and is preferably made of steel ranging from one-half to five-eighth inch cross-section. The primary purpose of this

spring *b* is to return the piston outward to its limit after the inward stroke of the piston in the bumping action; but the spring also resists the inward movement of the piston and co-operates with the confined volume of air behind the piston and the vacuum in front of the piston to cushion the carriage in the bumping action. The construction of this spring *d* in the form of a conical helix is an important feature of advantage in this cushion, for the reason that it permits the spring to be compressed, if necessary, into a perfect coil, as shown in Fig. 4, without any crushing, breakage, or undue strain on the spring.

The operation of this cushion is probably clear from the foregoing statements and an inspection of the drawings. When the parts of the cushion are in the position shown in Figs. 1 and 3, the cylinder *c*, behind the piston *c'*, will be filled with air at atmospheric pressure. When the piston begins to move inward in the bumping action, the rear end check-valve *c<sup>5</sup>* will be closed by the pressure from within and the front end check-valve *c<sup>4</sup>* will be closed by the pressure from without, and hence the piston must move against the confined body of air within the cylinder behind the piston and against the suction caused by the vacuum in front of the piston. The resistance thus offered increases, of course, very rapidly as the piston moves inward, but is elastic throughout the whole stroke of the piston. The spring also co-operates in the cushioning action, as above noted, but is of minor consequence for that purpose in comparison with the elastic resistance due to the compression of the air behind the piston and the suction in front of the same. The vent *c<sup>6</sup>* must, of course, be set for a very limited escape in order to get the benefit of the proper amount of compression; but this vent may be sufficient to afford the desired leakage, to avoid undue rebound when the piston is permitted to change direction with the carriage, as above noted.

The carriage *a* is shown as provided with the bumper-plate *a'* for making the stroke against the end of the piston bumper-stem *c<sup>2</sup>*.

The cushion has been shown and described as secured to the back stop-block *b'* with its projecting stem *c<sup>3</sup>* in the path of the carriage, and this is the preferred arrangement; but it will, of course, be understood that the reverse arrangement with the cushion carried on the carriage, with its projecting piston-stem in position to strike the back stop-block, would work equally well so far as the cushioning action is concerned, but would involve the transportation of an altogether unnecessary weight by the carriage.

It should also be noted that the cushion would be operative without the spring *d*. The fact of the vacuum in front of the piston, when the piston is in its innermost or rear-most position, would render atmospheric

pressure effective to force the piston outward into the position shown in Fig. 3, even if the piston and carriage had remained stationary long enough to permit all of the confined and compressed air to have leaked out through the vent-valve *c<sup>6</sup>* before the change of direction.

It should be further noted that the location of the front end check-valve *c<sup>4</sup>* is such that the passage will be closed by the piston before the piston reaches the end of its outward stroke, and hence there will be a small volume of fluid confined within the forward end of the cylinder in advance of the piston, which will serve to cushion the outstroke of the piston and prevent noise or wearing of the parts.

It will also be understood that this cushion would be operative with the use of steam-gas or other form of elastic fluid. The use of air, however, as the elastic fluid is in every way to be preferred.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. An elastic fluid cushion for log carriages or other moving bodies, comprising a closed cylinder, fitted with a piston having a projecting bumper stem, and provided with an inwardly closing check-valve, at or near its forward end, and with an outwardly closing check-valve, at or near its rear end, whereby the confined fluid behind the piston and the vacuum in front of the piston are made to co-operate, for cushioning the carriage in the bumping action, substantially as described.

2. The combination with a cushion cylinder and piston, of a conical helix spring within said cylinder, applied with its base or large end bearing against the rear end of the cylinder and its tip or small end bearing against the back of the piston, whereby the spring may be compressed by the piston into a perfect coil, without crushing, breakage or undue strain on the spring, under the bumping action, substantially as described.

3. The combination with the closed cylinder *c*, of the piston *c'* having the projecting bumper-stem *c<sup>2</sup>* working through the cylinder head with a close joint, the inwardly closing check valve *c<sup>4</sup>*, at or near the forward end of the cylinder, the outwardly closing check-valve *c<sup>5</sup>*, at or near the rear end of the cylinder, the vent valve *c<sup>6</sup>*, at or near the rear end of the cylinder, and the spring *d*, in the form of a conical helix, applied with its large end bearing against the rear end of the cylinder, and its tip or small end bearing against the back of the piston, all operating substantially as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK O. KILGORE.

Witnesses:

JAS. F. WILLIAMSON,  
E. F. ELMORE.