

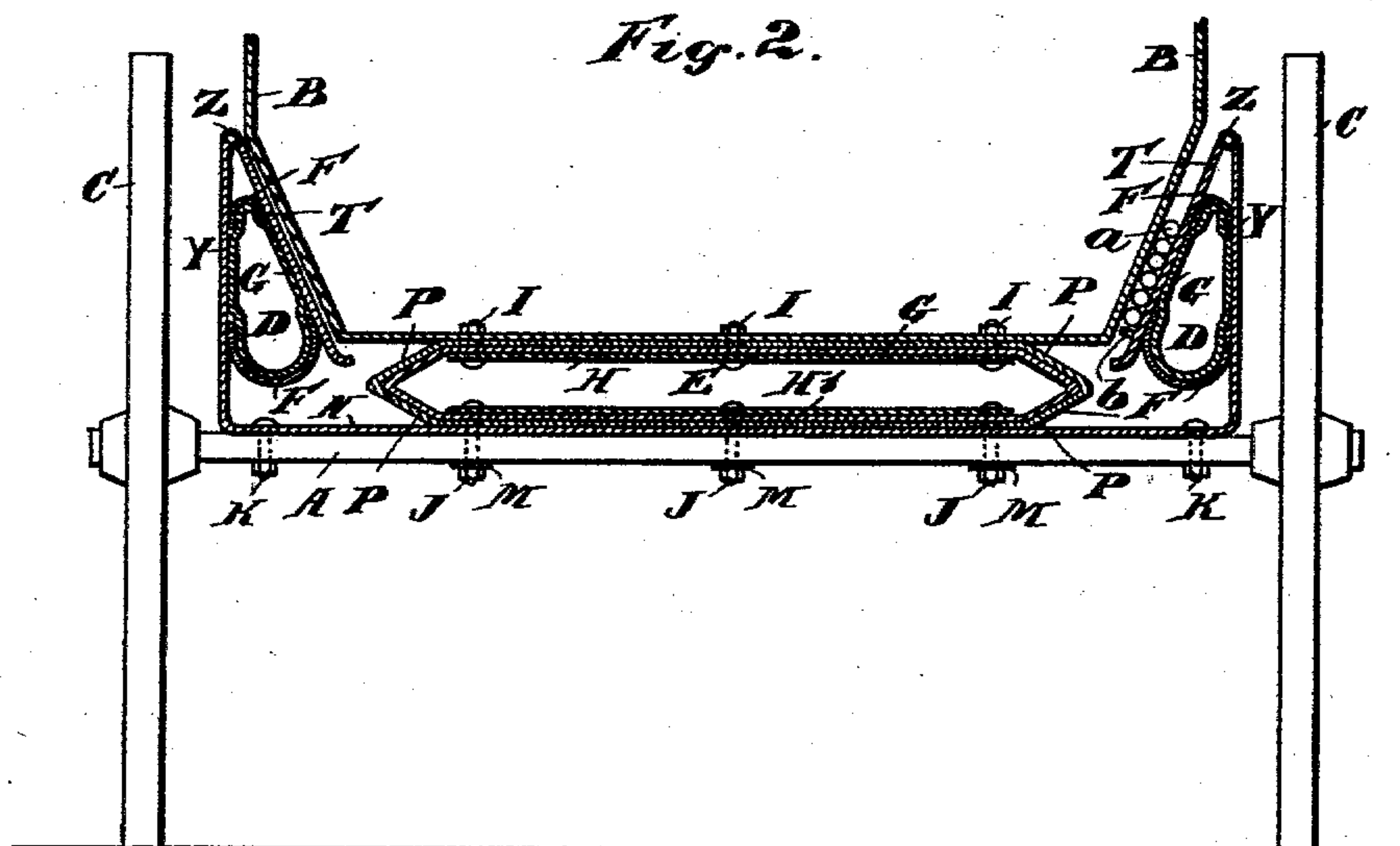
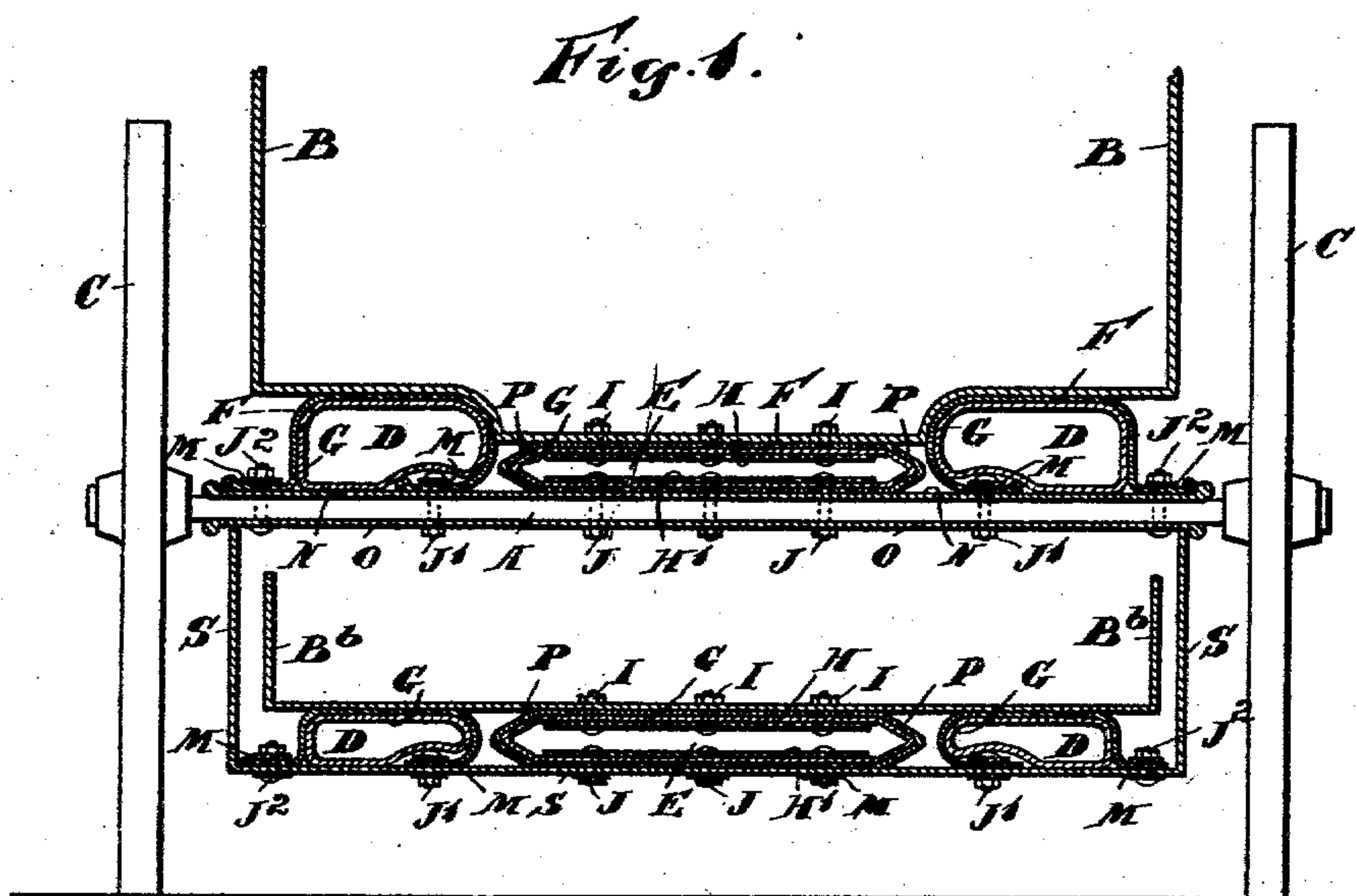
No. 720,966.

PATENTED FEB. 17, 1903.

A. PULBROOK.  
ELASTIC SUPPORT FOR VEHICLES.

APPLICATION FILED DEC. 26, 1902.

NO MODEL.



Witnesses.

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## ELASTIC SUPPORT FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 720,966, dated February 17, 1903.

Application filed December 26, 1902. Serial No. 136,625. (No model.)

*To all whom it may concern:*

Be it known that I, ANTHONY PULBROOK, a subject of the King of Great Britain, residing at London, England, have invented certain  
5 new and useful Improvements in or Connected with Elastic Supports to Vehicles; 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  
10 to which it appertains to make and use the same.

The invention consists in improved elastic devices for supporting the bodies of vehicles of every description and insulating the same  
15 from shock or vibration.

When a body suspended from or resting on a spring is free to rise or fall, except so far as its motion is checked by the strength or elasticity of the spring, any jolt tends to raise or  
20 lower the body to the limit allowed by the elasticity of the spring, and excessive jolting is liable to make the body rise and fall too much for safety or comfort. The improved method I adopt is to hang or support the body  
25 or the body and something connected therewith or secured thereto so that the movements of the body actuate two oppositely-acting springs or sets of springs or elastic cushions of suitable material and construction  
30 in such a manner as will cause one spring or set of springs or the like when acting in compression to be counteracted by the other set acting in tension, and vice versa. I may make the pressure exerted by the springs adjustable  
35 by any suitable means. Excessive motion will thus be prevented by one spring or the like after a certain amount of motion has taken place, being checked by the action of the other, and the motion of the body in  
40 either direction will be confined in extent without losing the advantages of the elasticity of its supports.

The invention is illustrated in the accompanying drawings, in which—

45 Figure 1 is a transverse sectional view, and Fig. 2 is a similar view of a slightly-modified form.

A is the axle; B, the body portion of the vehicle above the axle; Bb, the like below the  
50 axle; C, the wheels; D, air-tight compartments containing a compressible fluid; E, air-tight compartments containing air at or be-

low atmospheric pressure; F, pliable material, such as canvas, which may form insertion restraining the expansion or collapsing  
55 of the compartments D and E or parts thereof; G, bags or bladders of air-tight material, such as india-rubber, placed inside the compartments D and outside or attached to canvas  
60 F of E. It will be understood that non-return valves (not shown in the drawings) are fixed in suitable positions. Safety valves may also be fixed.

H and H' are plates secured to the top and bottom, respectively, of compartment E, so  
65 that on their being drawn apart the contained air in the compartment is attenuated; I, nuts and bolts securing the top plate H, bladder G, and pliable material F to the body B or to something attached or secured thereto; J,  
70 nuts and bolts securing the lower part of the compartments E to the under carriage or to something attached or secured thereto in the same manner; J', nuts and bolts securing  
75 one side of the compartment D, Fig. 1, to the under carriage or to something attached or secured thereto. The contained bladder G need not be fastened, being held in place by the canvas.

J<sup>2</sup> represents nuts and bolts securing the  
80 other side of compartment D, Fig. 1, in like manner, so that it can be opened for examination; K, nuts and bolts securing platforms N and O, or either, to underframe; M, plates or bars to bridge over and strengthen  
85 intervals of space between each nut and bolt; N, platform or frame secured to the underframe as support for air-compartments D and E; O, Fig. 1, platform or frame secured to the under side of the axle; P, more or less  
90 rigid material to prevent the atmospheric pressure forcing the canvas inward on attenuation of the air in air-tight chambers E. They are fitted with hinges or connected by  
95 pliable material to allow them to straighten.

S, Fig. 1, represents vertical sides or rods fixed to the under carriage; T, Fig. 2, diagonal plates or sides of air-compartments capable of movement on hinges or the like; Y,  
100 Fig. 2, vertical sides or plates to prevent lateral expansion of air-compartment; Z, hinges in connection with diagonal plates T; a, Fig. 2, ball-race to prevent friction; b, projection to retain balls a in place.



Fig. 1 illustrates the body of a vehicle divided into two parts, one part, B, above the axle, and the other, B b, below. Each part is secured from vibration by counteracting  
 5 air-cushions, one set represented by the letters D, operating by supporting the body on compressed air, and the other represented by the cushions E, operating in the converse direction by attenuated air. These latter  
 10 cushions E are secured both to the body and to the under carriage in such a manner as will cause the air inclosed in them to be attenuated below that of the outer atmosphere by any increase in the distance between the  
 15 bottom of the body and the top of the under carriage. It is obvious that the division of the body into parts is one for convenience only. I may have one part only. When using more than one part, one part can be  
 20 used for passengers and the other or others for goods, and in the case of motor-cars for machinery. It is equally obvious that I may obtain the same object by means of separate horizontal platforms operated on by cushions.  
 25 Fig. 2 illustrates the supporting of the body on rigid material T, secured by means of hinges to the under carriage in such a manner as will allow of the material T, forming one side of a wedge, to compress air contained in  
 30 cushions D, preferably wedge-shaped, placed between the movable arm T and a fixed side Y. To prevent jamming of the body with the arm T, I may use ball-races on both sides of the body between the two parts, as shown  
 35 at one side only of the figure at a. I may retain the balls in place by a projection of less height than that of the balls, so that on any rising of the body taking place which would increase the space between the top of the  
 40 projection from the arm T and the body, whereby the balls might escape, it will be understood that the air-compartment D, expanding against the arm T, will cause the latter to work on its hinges and close up the  
 45 space. I may connect the body with the under carriage by restraining-bands to prevent the body leaving the under carriage.

I wish it to be understood that I do not use the expression "springs" in relation to metallic springs, which I am aware have been  
 50 used in a counteracting manner in many ways.

I claim—

1. In a vehicle, the combination with compressed-air cushions supporting the body of  
 55 said vehicle, of a second set of air-cushions having the air contained therein, at or below atmospheric pressure and top and bottom plates within said second air-cushions, said plates being secured respectively to the body  
 60 and the frame of said vehicle, substantially as described.

2. In a vehicle the combination of a wedge-shaped compressed-air cushion D, a movable  
 65 hinged arm T and a fixed part Y for the purpose of supporting the body part of the vehicle, substantially as described.

3. In a vehicle, the combination with compressed-air cushions supporting the body of  
 70 said vehicle, of other cushions, containing air at or below atmospheric pressure, and consisting of an inner casing of soft rubber, an outer casing of stiff material and top and bottom plates within said inner casing and secured respectively to the body and to the  
 75 frame of said vehicle, substantially as described.

4. In a vehicle, the combination with the frame having vertical sides, downwardly-extending plates pivotally secured to said sides  
 80 and air-cushions secured between said sides and said plates, of a body having beveled corners adapted to rest on said plates, ball-bearings between said body and said plates and air-cushions secured to said body and to  
 85 said frame, the air in said cushions being at or below atmospheric pressure, substantially as described.

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

ANTHONY PULBROOK.

Witnesses:

STEPHEN EDWARD GUNYON,  
 WILLIAM ANDERSON SMITH.