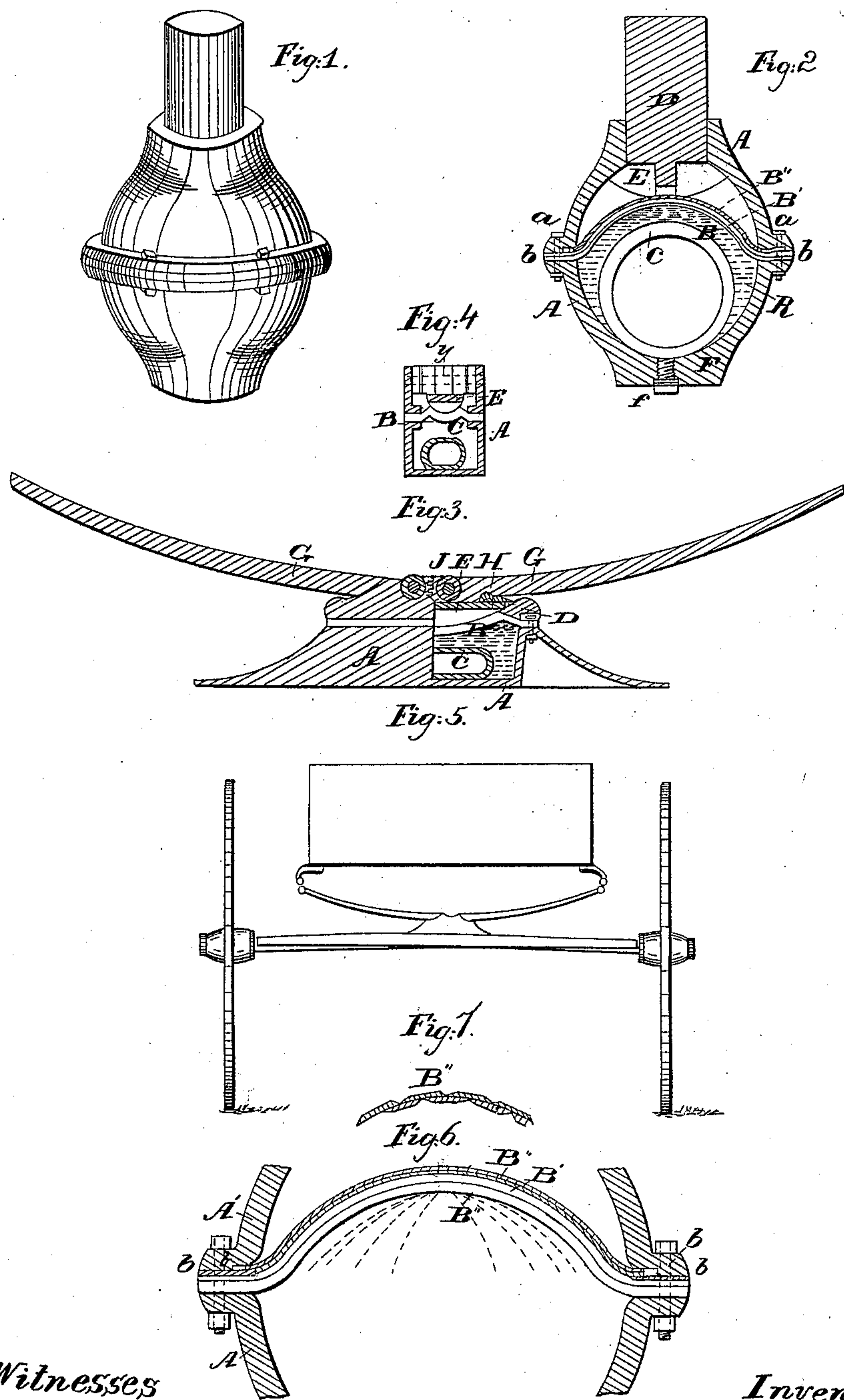


G. M. ALSOP.  
Carriage-Spring.

No. 24,184.

Patented May 31, 1859.



Witnesses  
Alexander Brown  
John Apple

Inventor  
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# UNITED STATES PATENT OFFICE.

GEORGE M. ALSOP, OF PHILADELPHIA, PENNSYLVANIA.

## AIR-SPRING FOR RAILROAD-CARS.

Specification of Letters Patent No. 24,184, dated May 31, 1859.

*To all whom it may concern:*

Be it known that I, GEORGE M. ALSOP, of the city of Philadelphia, and State of Pennsylvania, have invented a new and useful  
5 Improvement in Air-Springs for Railroad-Cars and other Vehicles; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being  
10 had to the annexed drawings, which make part of this specification, in which—

Figure 1 is a perspective view of a car spring; Fig. 2 a vertical section; Fig. 3 a longitudinal elevation of a spring for carriages with part of one side of the box removed to exhibit the internal arrangement.  
15 Fig. 4 is a transverse section of the same; Fig. 5 a back view of a carriage with the spring attached. Fig. 6 is an enlarged view of part of Fig. 2 and Fig. 7 is a transverse section of B'', Figs. 2 and 6, and ground plan of do.

Description of drawings in which the same letters and figures are used to designate  
25 similar parts in all.

A is a metal box or chamber between whose flanges and the top A' the flexible diaphragm B B' is fastened by means of the bolts and screws *a a*; B'' a convex steel  
30 plate or plates, cut into leaves so as to form a series of springs radiating from a common central plate and whose peripheries are inserted in a recess in the top A' and rest upon the metal plate *b b*.

35 C is an elastic air vessel filled with air; D a block or piston to which is attached the elastic pad or cushion E.

40 F is a screw with its washer *f*, fitting into an opening in the bottom or side of it through which the water or fluid is introduced into the interior of A.

45 G G, Figs. 3 and 4, are two arms or levers whose axes 1, 1 are inserted in ears or projections on the top of A', H H studs or projections on the top of the piston D and I I are toothed segments on the short arms of the levers G G by which they are connected together.

50 In order to enable any person skilled in the art to make and use my invention I will proceed to describe its construction and operation.

55 In constructing springs for rail road cars I usually make use of the metal box or shell between whose two parts A A' is secured the

flexible diaphragm B B' by means of the bolts or screws *a a* or their equivalents. This diaphragm is composed of an inner layer or portion B of rubber or some other flexible  
60 water proof substance and an outer covering B' of leather or its equivalent on the top of the outer edge or rim of the latter is placed the metal plate or ring *b b* through which and the flanges of A A' and diaphragm B  
65 B' the bolts *a a* pass and the whole fastened together so that the joint between B' and it may be perfectly water tight. The diaphragm is made of nearly the same form as the inner surface of A so as to admit of its  
70 being pressed nearly down to the bottom of the chamber without being strained by so doing outside of the diaphragm is placed the convex steel plate or plates which are cut so as to form radiating leaves which are  
75 connected together at the center and whose outer ends or peripheries are inserted in a recess at the bottom of A' and rest on the plate *b*, and are capable of a lateral and horizontal motion in the recess and on the  
80 plate, and thus serve as flexible supporters to the diaphragm. The edges of the leaves are rounded or beveled off, as represented in Fig. 7 for the purpose of preventing the diaphragm from being caught between them.  
85 In the watertight chamber formed by the box A' and the diaphragm B B' is placed the elastic air vessel C, made of rubber or its equivalent and filled with air of any required density and then hermetically closed.  
90 This air vessel is surrounded with water or some other suitable fluid, which fills the space in the chamber not occupied by the air vessel, and is forced in through an aperture in the bottom or side of the chamber which  
95 is afterward closed by means the screw F and its washer *f* so as to be perfectly water tight. In the top A' is a hole or opening through which the piston D, made of wood or metal, is inserted and in which it moves.  
100 This piston has an elastic pad or cushion made of rubber attached to it, which rests on the diaphragm.

In constructing springs for carriages I make use of a shallow rectangular box A' Fig. 3 on whose top are ears or projections  
105 in which are inserted the axes 1 1 of the levers G G whose long arms bear upon and are supported by the studs H H on the top of the piston, and have their ends attached to the body or bar of the carriage by means  
110



of shackles &c. in the usual way. The short arms of the levers are connected together by the toothed segments I I or their equivalents.

From the foregoing description and by referring to the drawings it will appear that the operation of these springs will be as follows, viz. When these springs are attached to cars or carriages it is evident that any weight or force exerted upon the piston will tend to depress the diaphragm and thereby contract the space in the chamber of the spring and as water is incompressible the effect will be to compress the air vessel and its contained air into a smaller compass, and the air by its elasticity will react upon the water and through its medium upon the piston and thus form a perfectly elastic spring. And as the pressure of fluids is equal in all directions it is evident that any force exerted on the piston will be equally distributed through the medium of the water or fluid over the whole surface of the air vessel and thus the water will serve both as a medium for the transmission of the pressure of the piston upon the air vessel and as a support to the latter, and thereby prevent its rupture either by external or internal force, and the escape of the air there from.

In the spring for carriages it will appear that as the bearing on the piston on which the arms or levers rest is near their center of motion any vertical motion at that point will be greatly increased at the ends of the levers which are attached to the body of the carriage, and thus afford sufficient play for the latter. Also as the levers are connected or linked together at their short ends it follows that any pressure exerted on either arm or lever will be simultaneously communicated to the other and thus both sides

of the vehicle will be elevated or depressed equally, and as the piston D has an elastic end or cushion attached to it which rests on the diaphragm the latter will be more or less spread out or distended over the diaphragm according to the pressure upon the piston and thus increase or diminish its bearing surface.

What I claim in the arrangement and construction of these springs is—

1. Is the method or arrangement of enclosing an elastic air tight vessel filled with air, in a box or chamber with a flexible water proof cover or diaphragm and surrounding the air vessel with water or some other suitable fluid, substantially as herein before described and for the purpose set forth.

2. I claim the arrangement of the convex steel plates B'' which are divided into radiating leaves or segments connected together at the center, whose outer edges or periphery rest upon and slide on the metal ring or plate b and in the recess in the bottom of the top A', the whole being arranged as herein before described for the purpose of forming a flexible metallic support or covering to the diaphragm to prevent its being strained or ruptured, substantially as set forth.

3. I claim the combination and arrangement of the piston D with its elastic cushion E, the flexible steel plate or plates B'' the metal plate or ring b b and the diaphragm B B', the whole being arranged and combined substantially as described and for the purpose set forth.

GEORGE M. ALSOP.

Witnesses:

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