

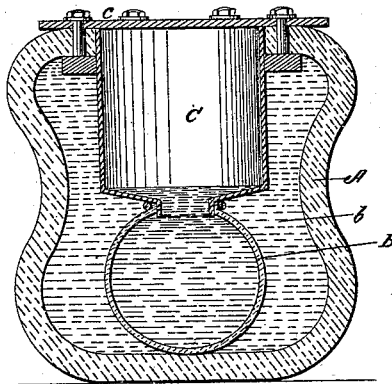
BEVAN & HITCHCOCK.

Car Spring.

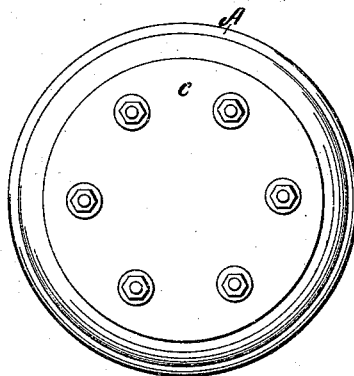
No. 111,303.

Patented Jan'y 31, 1871.

*Fig: 1.*



*Fig: 2.*



Witnesses:  
*Fred Haynes*  
*R. R. Rabeeus*

Inventors:  
*John Bevan*  
*Ben. W. Hitchcock*

# United States Patent Office.

JOHN BEVAN, OF PORT RICHMOND, AND BENJAMIN W. HITCHCOCK, OF  
WEST FLUSHING, NEW YORK.

Letters Patent No. 111,303, dated January 31, 1871.

## IMPROVEMENT IN PNEUMATIC SPRINGS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that we, JOHN BEVAN, of Port Richmond, in the county of Richmond and State of New York, and BENJAMIN W. HITCHCOCK, of West Flushing, in the county of Queens and State aforesaid, have invented a new and useful Improvement in Pneumatic Springs; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a vertical section of a pneumatic spring constructed in accordance with our improvement, and

Figure 2, a plan of the same.

Similar letters of reference indicate corresponding parts.

Our invention consists in a pneumatic spring, composed of three leading elements, namely—an outer flexible water-proof case, made inelastic to prevent alteration of its form, an interior flexible or collapsible device, and an inflexible air-cylinder or chamber also arranged within the outer case and connected with the latter at its top, preferably by a surface or pressure plate, and in open communication with the collapsible device below. To give to this combination its vitality as a spring, on the pneumatic principle of action, the outer flexible case and interior collapsible device are both charged with a fluid, preferably a fluid mixture incapable of freezing under natural exposure, so that, on weight or force being applied to the top of the outer case, the latter, in flexing, will cause the fluid contained in it to produce a contraction of the inner flexible device that thus, by the fluid contained in it, produces a compression of the air in the cylinder. A pneumatic spring thus constructed is cheap, durable, and powerful, and exempt from the friction of sliding parts.

Referring to the accompanying drawing—

A represents a close outer India-rubber shell or case, of a reduced size or diameter immediately of its height, and of a thickness that, while admitting of its being flexed, renders it inelastic or incapable of being stretched out of form so as to interfere with its action.

Arranged within this flexible shell or case is a flexible and contractile or collapsible hollow device, B, of a ball or other suitable shape, and which may also be made of rubber, but much thinner than the outer case, and is of considerably smaller dimensions than the latter, so as to leave a clear fluid space, *b*, all around it, and to provide for the further arrangement within said outer case of an inflexible air-cylinder or chamber, C. This air-cylinder or chamber is connected with the top of the outer case by a surface or pressure plate, *c*, suitably attached by bolts to an inner plate, and is in open communication at its bottom with the flexible hollow ball or collapsible device B that is secured to said cylinder, so as to be exempt from leakage.

The space *b*, surrounding the ball B and cylinder C, also the interior of the ball B are both charged with a fluid which may be composed of glycerine and water to prevent freezing. Any suitable simple or compound fluid, however, may be used.

Upon weight or force being applied to the top, or, in fact, to either end, or both ends of the spring, the outer case A is flexed inward, which causes the fluid within it to compress the contractile or collapsible device B, the fluid in which, in being displaced, compresses the air in the cylinder C, thereby communicating to the spring its necessary pneumatic elasticity.

We do not restrict ourselves to any particular shape, either of the spring as a whole or of its parts separately.

What is here claimed, and desired to be secured by Letters Patent, is—

The combination of the outer flexible case A with the interior contractile or collapsible device B and inflexible air-cylinder or chamber C, for operation with or through an interior fluid or mixture, substantially as specified.

JOHN BEVAN.  
BEN. W. HITCHCOCK.

Witnesses:

FRED. HAYNES,  
R. E. RABEAU.