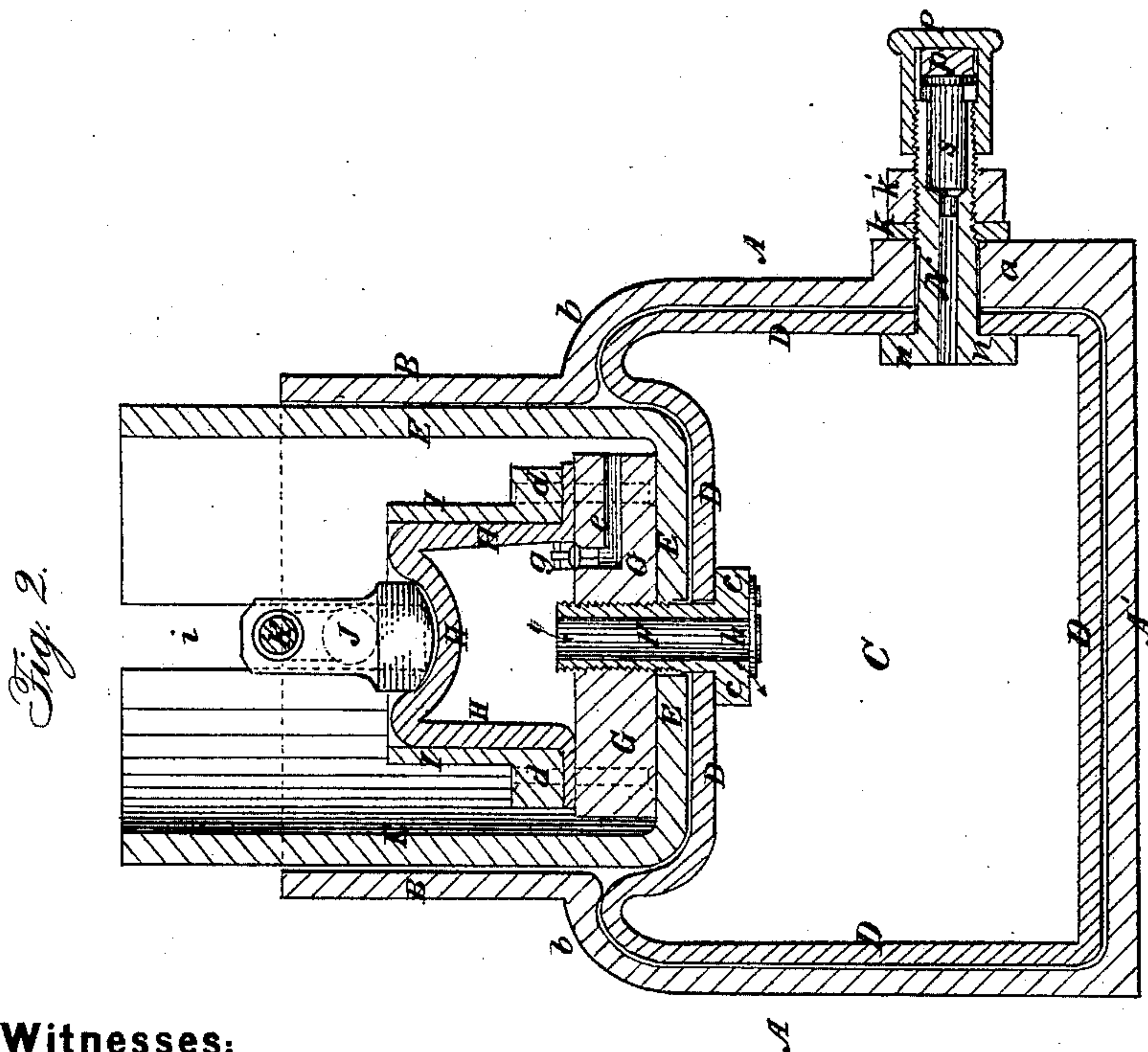
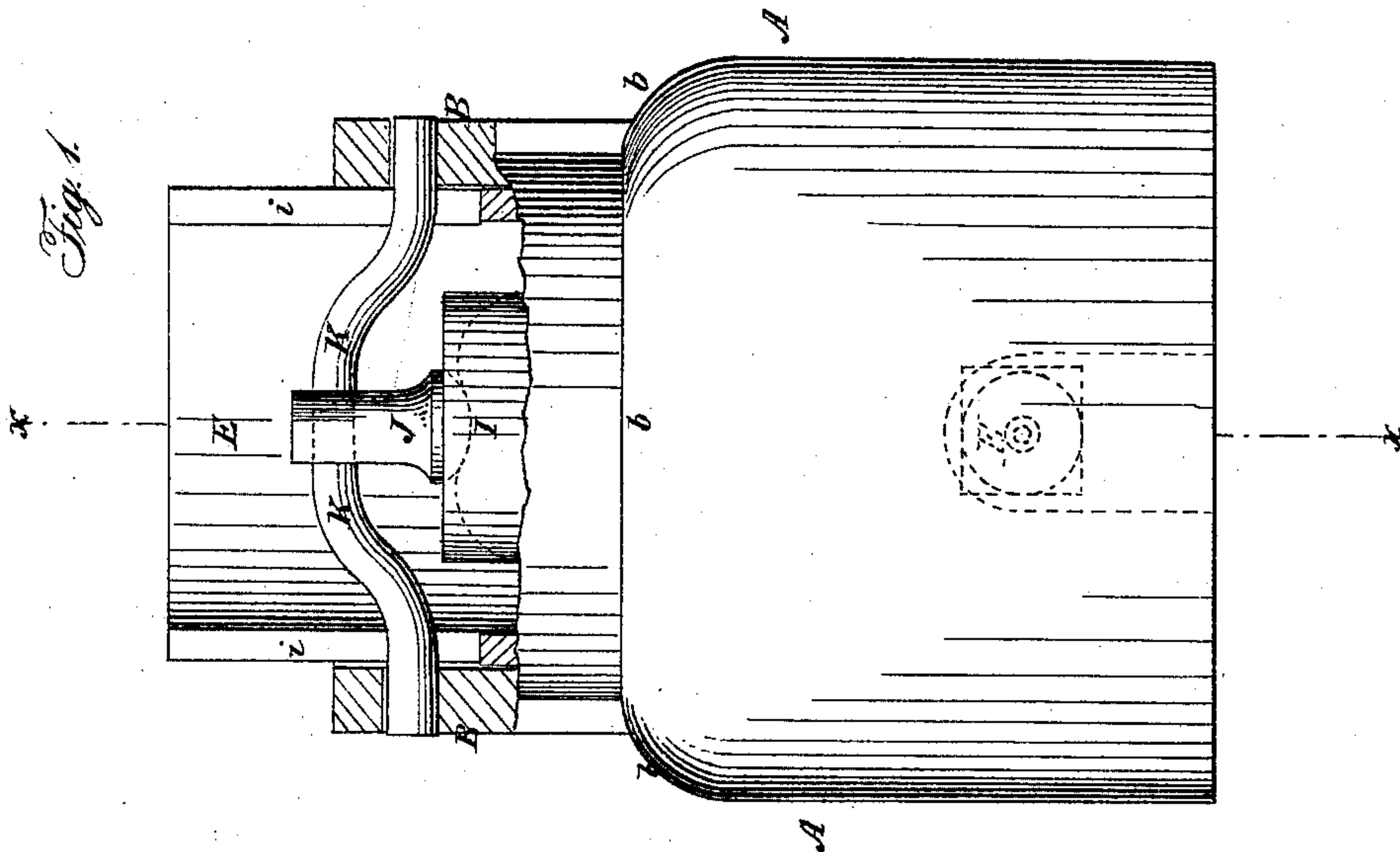


I. W. HOAGLAND.

Carriage-Spring.

No. } 1,844, {  
32,848. }

Patented July 16, 1861



Witnesses:

*J. W. Corvill*  
*A. S. Spencer*

Inventor:

*I. W. Hoagland*



# UNITED STATES PATENT OFFICE.

I. W. HOAGLAND, OF NEW BRUNSWICK, NEW JERSEY, ASSIGNOR TO HIMSELF AND RICHD. McMULLEN, OF NEW BRUNSWICK, NEW JERSEY.

## PNEUMATIC SPRING.

Specification of Letters Patent No. 32,848, dated July 16, 1861.

*To all whom it may concern:*

Be it known that I, I. W. HOAGLAND, of New Brunswick, in the county of Middlesex and State of New Jersey, have invented a new and Improved Pneumatic Spring; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a diametrical section through the spring box, exhibiting the interior of the spring. Fig. 2, is an exterior view of the spring box, wherein a portion of the neck is broken away to show the application of the plunger to the box.

Similar letters of reference indicate corresponding parts in both figures.

This invention relates to certain novel improvements in constructing air springs which are intended more especially for railroad cars.

The nature of my invention consists, firstly, in lining the chambers of the metallic boxes which are to contain the condensed air, with india-rubber, as will be hereinafter described for the purpose of making these air chambers perfectly tight. Secondly in combining with the plunger of the spring and the diaphragm of the air chamber an air-pump as will be hereinafter described, for supplying the chamber with air. Thirdly in combining with the air chamber and air pump, an escape or safety valve constructed as will be hereinafter described, for regulating the atmospheric pressure of the spring and allowing the air above a desired pressure to escape from the air chamber.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A, represents a cylindrical box having a solid bottom A', and a reduced cylindrical neck B. This box is cast solid with a thick portion at a, and rounded shoulders at b, b.

D, represents an india-rubber bag or lining which fits against the inside surfaces of the lower portion of the box A, and forms the air-tight chamber C. This bag or lining, D, of rubber is of a suitable thickness to prevent air from escaping through it and when it is inflated with air it will be forced out tightly against the sides of the box A, and confine the condensed air in it, which

might otherwise escape through the box a, on account of imperfections in casting this box.

E, is a hollow plunger having a solid bottom, the corners of which are slightly rounded as shown in Fig. 1 of the drawings. This plunger E, works loosely within the cylindrical neck B, and the lower end of the plunger E, rests on the upper portion, or diaphragm of the air bag D, as shown in Fig. 1, so that when the plunger is depressed it compresses the air bag and when the plunger is released the elasticity of the air in the bag raises the plunger again to its original position. A tubular bolt F, having a head c, on its lower end is used to connect the plunger E, to the diaphragm of the air bag D, and for this purpose the head c, of this tubular, or hollow bolt F, is passed through a small orifice made through the bag D, and the stem of this bolt F, is passed through a hole in the center of the bottom of the plunger E, and through a thick plate G, then by means of a nut the bolt can be drawn tightly, and the three parts D, F, and G, secured tightly together; the head c, on bolt F, will now compress the edges of the rubber bag surrounding the neck of the bolt and thus form a very tight joint which should be air-tight. The plunger E, may be secured to the bag D, in any other suitable manner provided an opening is left such as is formed by the tube F, shown in Fig. 1, of the drawings. An air-pump is now arranged within the hollow plunger E, for supplying air to the bag D, through tube F. This air pump consists of a hollow rubber cushion H, confined within a cylindrical box I, which is completely filled by this cushion. The edges of the cushion are drawn under the flange d, of the box I, and when this box is bolted down on the plate G, the rubber which is under the flange d, forms a tightly packed joint. An orifice e, is made through the edge of plate G, communicating with the inside of cushion H, and this orifice is closed by a suitable valve g, which opens to admit air into the cushion, but closes when the cushion is compressed so as to allow the air which it contains to be forced down through the tube F, into the air chamber C. The tube F, is closed by a suitable valve h, which opens and admits air from cushion H, into the chamber C, but will not allow the air in this chamber to escape back again into the air cushion H.

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J, is a plunger which is connected to the middle of a transverse bar K. This plunger J, rests upon the top of cushion H, and compresses this cushion at every upward movement of the main plunger E. For this purpose the plunger J, is stationary, that is to say, the bar K, to which it is fixed is secured to the top of the neck B, and passes through vertical slots *i, i*, in the plunger E, which slots will allow this plunger E, a free vertical movement in the neck B.

Now it will be seen from the foregoing description that the pressure put upon the main plunger E, will be supported by the air which is confined in the bag D, the density of which may be increased or diminished according to the pressure which it is desired to put upon the plunger E, when the plunger E, is suddenly thrown up by the recoil of the bag D, the cushion H, comes in contact with the lower end of the stationary plunger J, and this cushion is thus compressed causing it to force air into chamber C, through the tube F, then when the plunger E, is depressed the cushion H, is released and air rushes into it through orifice *e*, and again fills the cushion. This action being kept up as long as the plunger E, receives any movement, it will be seen that air is constantly supplied to the chamber C.

As there is a continued supply of air to the chamber C, when the plunger E, is in motion it is desirable to provide some means for allowing the excess of air to escape from this chamber C, and, at the same time, to so regulate the escape of the air that the spring may be made to sustain a greater or less pressure according to circumstances. For this purpose I employ a safety valve which is constructed and applied to chamber C, in the following manner: A tubular bolt N, having a head *n*, formed on one end and a male screw thread cut on the other end is passed into a small hole which is made through rubber bag D, before this bag is put into the metal box A, then when the bag is put into box A, and properly adjusted therein the stem of bolt N, is passed through a hole which is made through the solid portion *a*, of the box A. A packing *h*, is now slipped over the stem of the bolt and then a nut *h'*, is screwed tightly on this bolt so as to draw its head *n*, tightly against that portion of the rubber bag surrounding the bolt and thus make a tight joint. That portion of the bolt N, which projects beyond the nut *h'*, is split longitudinally, and this split portion receives a screw cap P, which contains in its end a spring *p*, of rubber or metal.

In the outer end of the solid portion (that portion which is not split) of bolt N, a valve

seat is made for receiving the valve *s*, which is slipped through the split portion of the bolt N, and projects out from the end of this split portion, so that when the cap P, is screwed on the bolt, the outer end of the valve will abut against spring *p*, and thus the valve will be kept in its seat by the elastic force of spring *p*, upon it. Now the condensed air in chamber C, can only escape from the safety valve *s*, when the inward pressure becomes so great as to overcome the resistance of spring *p*, upon the valve stem *s*, and by adjusting the cap P, so as to increase or diminish the resistance of the spring *p*, any desired amount of air may be confined within chamber C. The cap P, may be so nicely adjusted that all air exceeding a certain determined pressure in chamber C, may be allowed to escape through the safety valve as above described. The stationary plunger J, which acts upon the cushion H, when the main plunger E, is released should be of such a diameter that when it is forced down on the cushion H, and carries down this cushion the space between the sides of this plunger J, and the inside surface of the box I, will be completely filled up by the thickness of rubber of which the cushion is composed. The air in the cushion H, will thus be kept below the plunger J, until it is made more dense than the air in chamber C, when the air will be forced from the cushion into the chamber C, as before described.

Having thus described my invention what I claim as new, and desire to secure by Letters Patent, is—

1. Combining with the metallic box A, B, the india-rubber lining, or box D, and plunger E, substantially as and for the purposes described and represented.

2. Combining with the hollow main plunger E, the elastic air cushion H, confined within a box I, and operated by the stationary plunger J, at each upward stroke of the main plunger, said cushion being so arranged in relation to air chamber C, as to keep up a supply of air to this chamber, substantially as herein set forth.

3. Combining with the air chamber of a self supplying pneumatic spring the safety valve S, spring *p*, and adjustable screw cap P, for the purposes herein set forth.

4. Securing the main plunger E, to the diaphragm of the rubber bag D, by means of a tubular bolt or stem F, provided with a valve, opening in the chamber C, as herein set forth.

I. W. HOAGLAND.

Witnesses:

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