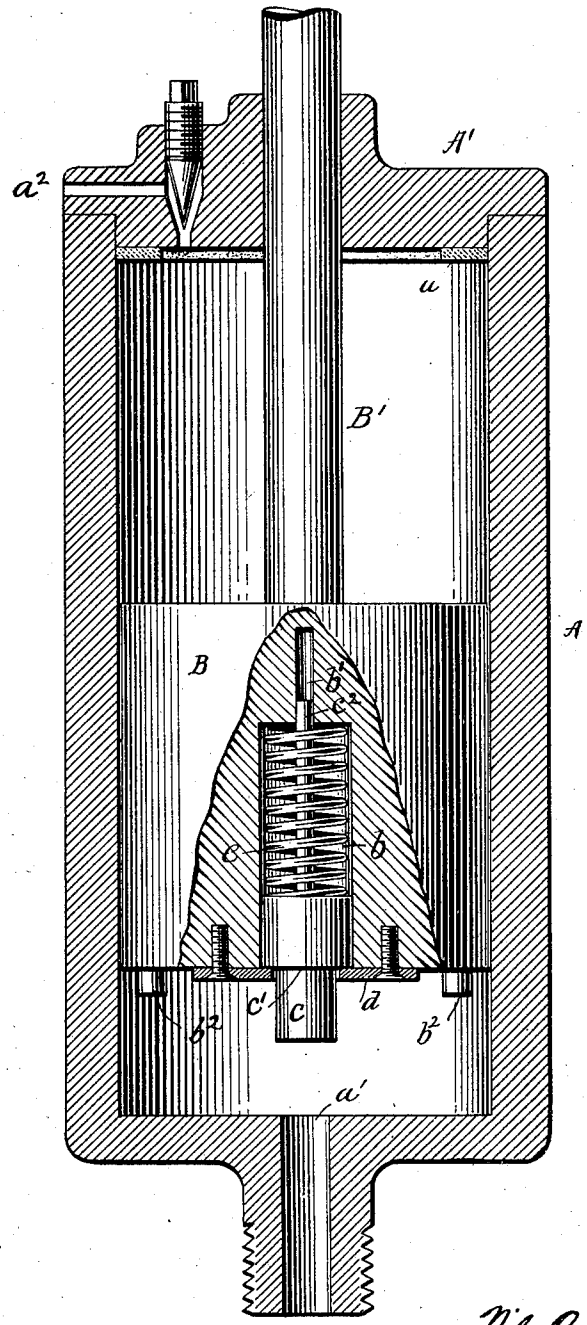
No. 671,559. Patented Apr. 9, 1901.

N. O. LINDSTROM.

PNEUMATIC POWER CYLINDER.

(Application filed Feb. 4, 1901.)

(No Model.)



WITNESSES:

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NILS O. LINDSTROM, OF NEW YORK, BOROUGH OF QUEENS, NEW YORK, ASSIGNOR TO ALONZO B. SEE AND WALTER L. TYLER, OF SAME PLACE.

PNEUMATIC POWER-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 671,559, dated April 9, 1901.

Application filed February 4, 1901. Serial No. 45,847. (No model.)

To all whom it may concern:

Be it known that I, NILS O. LINDSTROM, a citizen of the United States, residing at the city of New York, in the borough of Queens and State of New York, have invented certain new and useful Improvements in Pneumatic Power-Cylinders, of which the following is a full, clear, and exact description.

This invention relates to pneumatic power-cylinders, air-cushions, and similar apparatus, the object being to provide a cylinder and piston so constructed that the piston can be moved in one direction by the pressure of air against it to perform work and will be free to return in the other direction through a certain predetermined portion of its stroke, while during the remainder of the return stroke the progress of the piston will be retarded or cushioned.

The invention consists of the construction hereinafter described and claimed.

In the accompanying drawing the figure represents a central section of the cylinder, showing the piston in elevation, with parts thereof broken away.

A represents a cylinder; B, a piston adapted to move therein.

A′ is the cap or head of the cylinder, on the inside of which is a disk *a*, of packing material, against which the piston will rest when at one end of its stroke. The piston-rod B′ passes through the cap or head of the cylinder, in which it has its bearings in the usual manner. The opposite end of the cylinder is provided with an inlet-port *a′* for the air or gas which is admitted to the cylinder to lift the piston. This port, which is also the exhaust-port, is sufficiently large to permit the piston to fall or return rapidly. In the center of the piston is an axial chamber *b*, opening at the lower face of the piston and terminating at the opposite end in a small axial extension *b′*. In this chamber is fitted a plug *c*, having a shoulder *c′* to rest upon a retaining-collar *d*, secured to the face of the piston. The plug normally projects through this collar in the manner shown at its lower or forward end and is directed toward and adapted to cover the port *a′*. The upper or inner end of the plug carries a tailpiece c^2, which runs into the extension *b′* to furnish a bearing and guide for the plug. Surrounding this tailpiece and located in the chamber above the plug is a coiled spring *e*, which tends to force the plug outward or downward and hold its shoulder against the collar. The lower face of the piston is provided with lugs b^2, which are adapted to rest against the lower head of the cylinder when the piston is in its lowest position. When the piston is in this lowermost position, the outer end of the plug covers the inlet-port *a′* and the plug is almost entirely in the chamber *b*. If air or gas pressure is now admitted into the port *a′* from any suitable source, it first lifts the plug *c* a little higher and then fills the narrow space beneath the entire face of the piston, which is determined by the lugs b^2. The piston is then forced upward to the end of its stroke to do any work for which the apparatus is intended. In the upper position of the piston it rests again the packing *a* and prevents the escape of air or gas through the vent-hole a^2, which otherwise would take place, since the air or gas will creep past the sides of the piston, the piston being constructed with a small clearance between its annular surface and the walls of the cylinder for a purpose that will hereinafter appear. The return stroke of the piston, which may be made by gravity or other power, is permitted as soon as air or gas pressure beneath the piston is allowed to exhaust through the port *a′*. The piston will fall with comparative rapidity until the end of the plug, which is then projecting its full distance below the face of the piston, strikes the lower head of the cylinder and closes the escape-port for the air or gas. As there is then no pressure below the plug, the passage will be held closed and the air or gas remaining in the cylinder will be trapped and put under compression to thus retard the further downward movement of the piston. The piston, however, will continue to move slowly downward as the air or gas leaks past the piston and escapes at the vent above until finally the piston comes to rest with its lugs b^2 against the lower head of the cylinder and in the position before described.

The amount of air trapped in the cylinder below the piston can be determined by using

a proper length of plug *c*. The longer the plug the sooner will the cushioning effect take place.

A combined power-cylinder and dash-pot of the character described is useful for various purposes, among which may be mentioned the operation of a rheostat for electrical circuits. The piston-rod may be connected to the rheostat and caused to throw the resistance into or out of circuit rapidly on the upstroke of the piston, while on the downstroke thereof the said resistance will be thrown into or out of circuit rapidly for a portion of the stroke, while near the end the stroke will be retarded to permit other apparatus to operate.

Having described my invention, I claim—

1. The combination of a cylinder, a piston therein, said cylinder being provided with a port which serves both for the inlet and the exhaust, a valve carried by the piston and adapted to close the port at a predetermined point in the stroke of the piston and means whereby said valve will open under the incoming pressure to admit the same to the cylinder for action upon the piston.

2. The combination of a cylinder provided with a port which serves both for the inlet and the exhaust, a piston, a valve carried by said piston and having a movement independent thereof and adapted to cover the port at a predetermined point in the stroke of the piston, said independent movement permitting the piston to complete its stroke after the port is covered.

3. The combination of a cylinder having a port at one end, a piston provided with a chamber, a plug-valve located in said chamber and normally projecting therefrom, said valve being adapted to strike the wall of the cylinder and cover said port, and means whereby the piston may continue its stroke after said port is covered, substantially as described.

In witness whereof I subscribe my signature in presence of two witnesses.

NILS O. LINDSTROM.

Witnesses:
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