W. B. CHISHOLM.

Valve for Pneumatic Pumps.

No. 167,604. Patented Sept. 14, 1875.

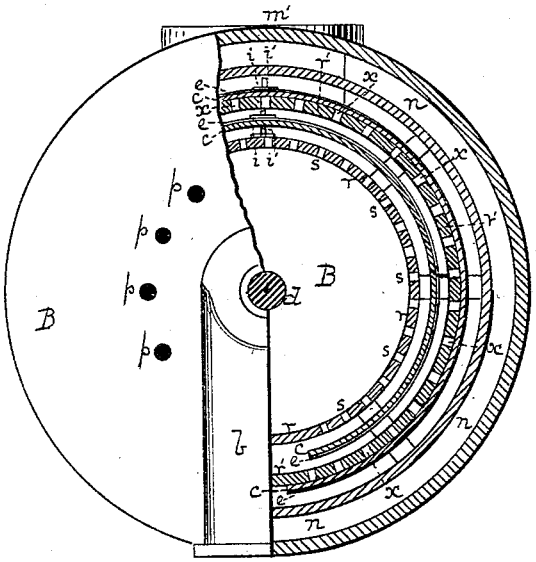

Fig. 1

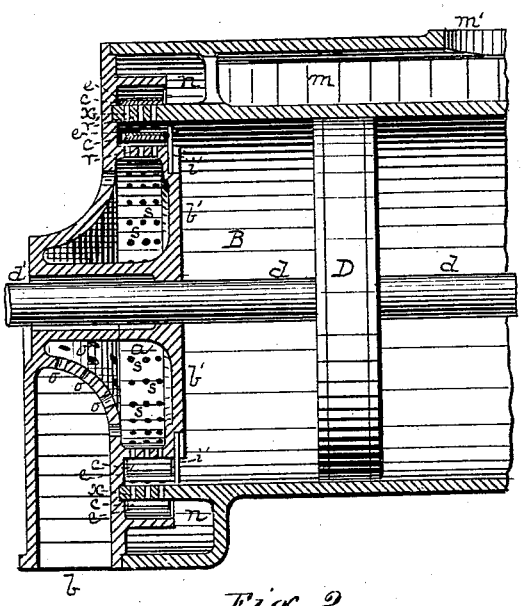

Fig. 2

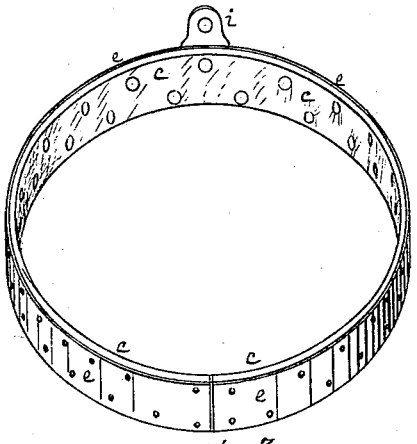

Fig. 3.

Fig. 4.

Witnesses { J. E. Boggs
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by George N. Christy
his Atty.

UNITED STATES PATENT OFFICE.

WILSON B. CHISHOLM, OF CLEVELAND, OHIO.

IMPROVEMENT IN VALVES FOR PNEUMATIC PUMPS.

Specification forming part of Letters Patent No. **167,604**, dated September 14, 1875; application filed July 29, 1875.

To all whom it may concern:

Be it known that I, WILSON B. CHISHOLM, of Cleveland, county of Cuyahoga, State of Ohio, have invented or discovered a new and useful Improvement in Valve for Pneumatic Pump; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—like letters indicating like parts—

Figure 1 is partly an end view of my improved air compressing or blowing cylinder, and partly a transverse section of the same through the air-valves and valve-chambers. Figure 2 is a longitudinal section through one end of the cylinder. Fig. 3 is a perspective view of my improved valve; and Fig. 4 shows a transverse section thereof.

In large air compressing or blowing cylinders an endless india-rubber or gutta-percha ring or band has been employed as a valve on an annular series of air-ports, so as by its elasticity, in connection with exterior air-pressure, to close the ports, and by its distension or elongation, in connection with interior air-pressure, to open the ports. The degree of heat evolved in the compression of air by means of such engines is so great as often to be destructive to the india-rubber band which constitutes the valve, so much so that the material of the band loses speedily its cohesiveness, becomes brittle, tears or breaks, and has to be frequently renewed. I have found that by combining with such india-rubber bands a spring-steel backing I am enabled to add vastly to its durability. By riveting the two together I combine the practically indestructible spring action of the steel with the soft, yielding, or pliable face of the india-rubber, so that, even when the latter has become partly broken, torn, or disintegrated, the separate parts of it, still held to the steel backing by means of the rivets, will perform their proper office-work of effectually closing the ports at the proper times.

The air blowing or compressing cylinder B is made of the usual or any desired form, with ordinary air-ports *p*, or an air-supply passage, *b*, connected by air-ports *o* with the chamber *a*. This chamber is closed at its cylinder end by a head, *b'*, and in its cylindrical periphery is a series of air-inlet ports, *s*. In the cylinder-case, at or near the end of the cylinder, is a like annular series of ports, *x*, for the egress of air, which, entering a chamber, *n*, is conducted by a chamber, *m*, and pipe, connected at *m'*, to the receiver or place of use. D is the usual piston or plunger, with a stem, *d*, playing through a stuffing-box, *d'*, in one head or in each head. My improved valve is composed of a strip of india-rubber, *c*, of a length and width equal or about equal to the circumference and breadth of the ring *r* or *r'* in which the air-ports *s x* are made. On the outside of this india-rubber I rivet a circular strip of spring-steel, *e*, of corresponding length and width, and previously bent and tempered so as to assume and preserve a circular or annular form, and by its own elasticity tightly encircle or clasp the air-port rings *r r'*. A considerable number of these rivets should be inserted, so that even if the rubber should become partially disintegrated by the action of the heat thereon, the rivets will still hold the broken pieces in place. At the same time, the tension or strain, which formerly was wholly on the rubber, is now transferred to the steel, so that the rubber is much less liable to break or to become disintegrated than when the steel was not used. These band-valves, of combined india-rubber and steel, are applied to the air inlet and outlet valves, as indicated in Figs. 1 and 2, and are steadied in place by lugs *i* and pins *i'*. Then, with a stroke of the piston D to the right, the band-valve on *r'* will be seated, and that on *r* will be raised for the entrance and supply of air, as shown in the drawing. With a reverse stroke of the piston, the band-valve will be seated on *r* and opened on *r'* for the egress of air. The yielding elastic face of the rubber strip *c*, coming on the ports *s* or *x*, effectually closes them when the band-valves are seated, and the steel backing of the band-valves yields sufficiently to lift the rubber from the ports, but, not being to any practical extent affected by the heat, reseats by its own elasticity the rubber lining without deterioration by use or destruction by wear.

The devices described are duplicated at the opposite end of the cylinder, where a double

action is required, the operation there being the same. Instead of the india-rubber, other like suitable flexible and pliable material may be employed, and any metal, possessing in band form the elasticity desired, may be substituted for the steel spring as the mechanical equivalent thereof.

I claim as my invention—

1. A band-valve, composed of an elastic metallic-spring back and a flexible pliable lining, substantially as set forth.

2. The band-valve described, in combination with the lug *i* and pin *i'*, substantially as set forth.

3. An air-port ring, *r* or *r'*, in combination with a combined steel and india-rubber band-valve, substantially as described.

In testimony whereof I have hereunto set my hand.

WILSON B. CHISHOLM.

Witnesses:

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