(No Model.)

F. H. RICHARDS.

PISTON VALVE.

No. 435,322. Patented Aug. 26, 1890.

Fig. 1.

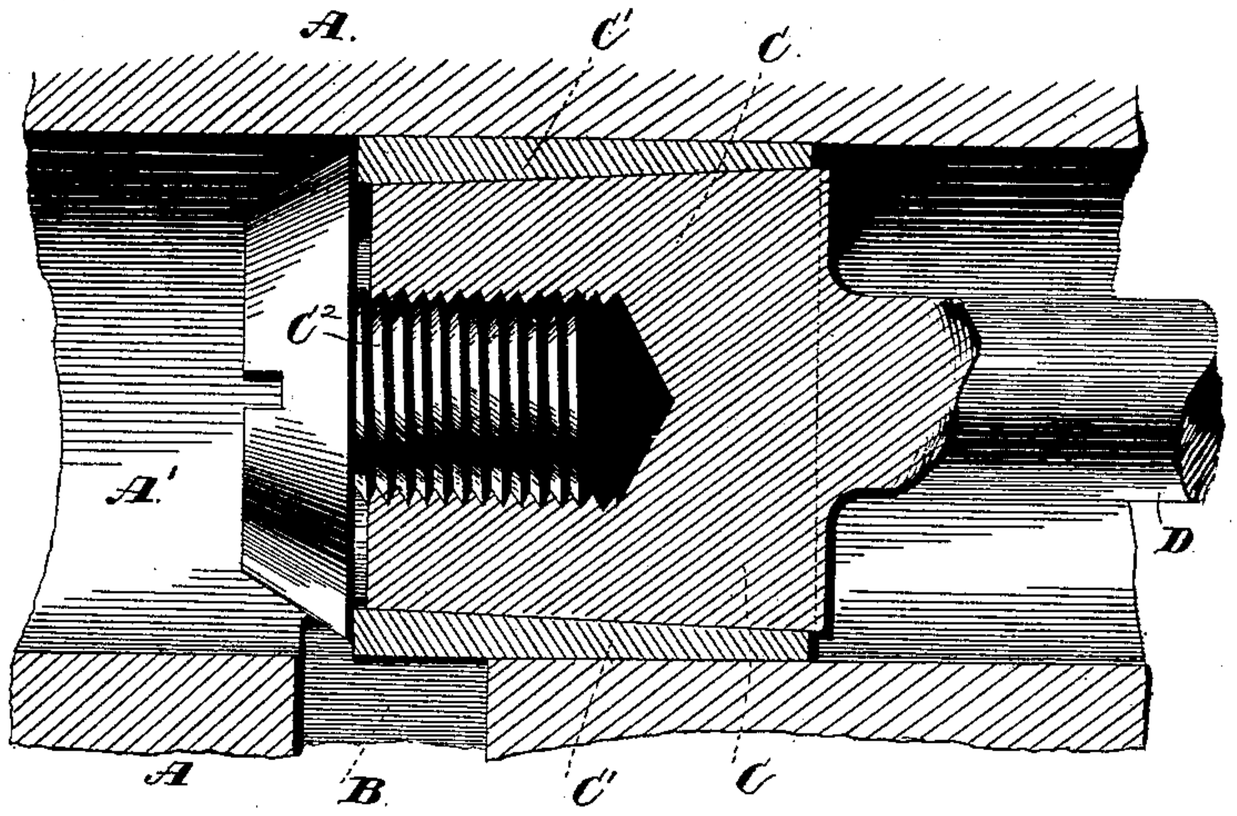
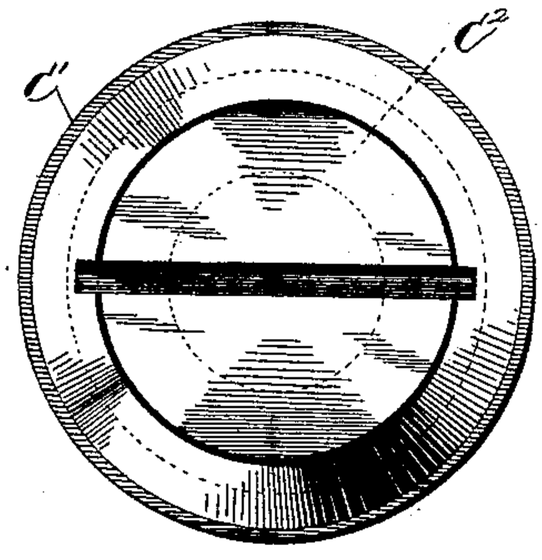


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO ECKLEY B. COXE, OF DRIFTON, PENNSYLVANIA.

PISTON-VALVE.

SPECIFICATION forming part of Letters Patent No. 435,322, dated August 26, 1890.

Application filed December 13, 1889. Serial No. 333,602. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, of Hartford, in the county of Hartford, and in the State of Connecticut, have invented certain new and useful Improvements in Piston-Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows a view of my valve partly in central longitudinal section and partly in elevation, and Fig. 2 a view of the valve in end elevation.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide an improved piston-valve for use in pneumatic apparatus or motors—as a throttle-valve—or in other places and for other purposes wherever a free but close-working valve is desired, and with this end in view my invention consists in the adjustable valve and in the construction, arrangement, and combination of the parts thereof, whereby the diameter of the valve can be adjusted as desired to make it fit its seat closely and to compensate for any wear of the valve or the seat, or both.

With my valve constructed and arranged as set forth hereinafter, not only can said valve be fitted closely to any seat or any passage in which it is to be moved, but the desired close fitting can be kept up or maintained indefinitely by a simple adjustment easily and quickly made.

In the drawings, A A designate the walls or casing of the cylindrical passage A′, forming the seat for the piston-valve to be described, and B designates the port to be closed and opened by the valve as it reciprocates.

Situated in passage A′ is the conical head C on the end of the valve-rod D. Such head, which is made conical with but a gradual taper toward its outer end, can be formed on or made integral with the rod, or can be made separate and attached to the latter, as desired. I prefer, however, to have the rod and head integral, as shown in the drawings. On this conical head C is placed a shell C′, cylindrical on its outer side, but having its inside coned to correspond with the coning or tapering of the head. The taper of the shell bore or opening is a uniform and gradual one, preferably agreeing exactly in pitch with the taper of the head, while such bore or opening is not at its opposite ends as large as the corresponding ends of the head. At its outer end the shell-bore tapers down to an opening of less diameter than the outer head end. With this construction of head and shell, as the latter is passed longitudinally over the head, it will fit the same closely before its outer end comes flush with the corresponding end of the head. The projecting end of the shell is engaged by the flange or head of screw C^2, which is tapped into head C, as shown. With this construction and arrangement the shell C′ can be forced farther upon the head C by turning the screw C^2 inward, so that the shell will, by the engagement of its conical bore with the conical face of head C, be expanded equally throughout its length, so as to increase its diameter to adjust it to the desired degree of closeness in its valve-seat, or to take up wear of the seat or the valve periphery, or both.

In order to provide for the desired expanding of the shell, I prefer to make the latter of elastic metal, which, while it can be stretched to a certain extent, will contract to substantially its original condition or size when the strain exerted upon it by the conical head is removed, as the shell is moved outward on the latter when screw C^2 has been loosened.

In practice I prefer to make the core or head C of hard steel and the shell C′ of softer steel, bronze, or cast-iron.

With the shell made of either of the three materials last mentioned, I have found that it can be expanded in the manner and by the means described to a considerable degree without any slotting or splitting of the sleeve being necessary.

The shell in the form of a continuous sleeve can be changed in diameter sufficiently to cause it to fit the valve bearing or seat with the desired degree of closeness and to compensate for any wear of the seat or shell. The shell as adjusted acts in conjunction with the valve-seat and port B just as does

the outer portion or surface of any ordinary piston-valve.

The manner and method of adjusting my valve to its seat will be fully understood from the description hereinbefore given, and need not, therefore, be further set forth or explained herein.

It is desirable that the taper of the core or head and shell-bore should be quite gradual or at a slight pitch. It is also especially desirable that the pitch of the taper should be uniform throughout, as then the shell as it is forced inward upon the core or head will be equally expanded throughout its length and its cylindricity will be maintained, whatever the amount of the shell's expansion or change in size may be.

Having thus described my invention, what I claim is—

1. In a piston-valve, in combination with a conical core or head, an expansible shell thereon adapted to be adjusted longitudinally with reference to the head and kept in the position to which it may be adjusted, substantially as and for the purpose specified.

2. In a piston-valve, in combination with a conical core or head, an expansible shell thereon having the conical bore and adapted to be adjusted longitudinally on the head and kept in the position to which it may be adjusted, substantially as and for the purpose shown.

3. In a piston-valve, in combination with the conical core or head, an expansible shell thereon, and means for forcing the shell longitudinally upon the core or head and retaining it at the point to which it may be moved, substantially as and for the purpose set forth.

4. In a piston-valve, in combination with the conical head, the expansible shell thereon, and the screw on the head adapted to force the shell longitudinally upon the head, substantially as and for the purpose described.

5. In a piston-valve, in combination with the conical head on the valve-rod, the shell of expansible material made cylindrical outside and having its bore or interior opening conical, and the screw on the head having the flange or head engaging the outer end of the shell, substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 21st day of November, 1889.

FRANCIS H. RICHARDS.

Witnesses:

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