

J. A. NICHOLS.
Valves.

No. 145,964.

Patented Dec. 30, 1873.

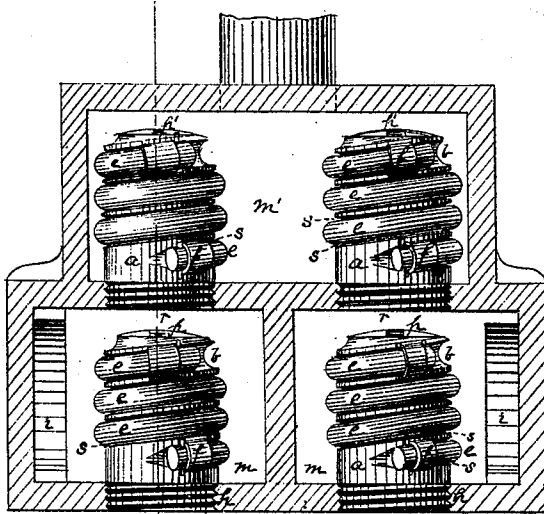


Fig. 1

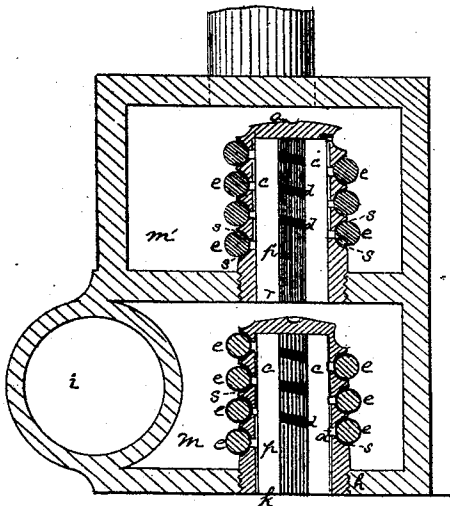


Fig. 2



Fig. 3

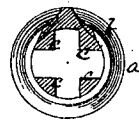


Fig. 4

Witnesses

James I. Kay
Fred. Standish

Inventor John A. Nichols
by Bakewell Christy & Son
his attorneys

UNITED STATES PATENT OFFICE.

JOHN A. NICHOLS, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN VALVES.

Specification forming part of Letters Patent No. **145,964**, dated December 30, 1873; application filed October 25, 1873.

To all whom it may concern:

Be it known that I, JOHN A. NICHOLS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valves; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing forming a part of this specification, in which—

Figure 1, by a vertical view through the valve-chamber of a pump, illustrates the method of applying my improvement thereto. Fig. 2 is a vertical cross-section through the cylinder and the valves. Fig. 3 is a view of the valve-shell, and Fig. 4 is a section through *xx* of Fig. 3.

Hitherto valves for pumping-engines have been made in the form of a simple disk, extending across the water-opening and resting upon a suitable seat. It has been impossible to give these valves a greater lift than would admit more than one-third of the water which is supplied through the water-tube without enlarging the valve-chamber. If more lift than this is given to the valve, a large quantity of water will escape back into the pipe before the valve is seated. To facilitate and hasten the seating of the valve, it is customary to place a spiral spring above it, bearing directly down upon it, so that when the force of the inflowing current is checked by the return of the piston, the spring acting upon the valve shall seat it immediately.

The object of my invention is the construction of a valve that shall have sufficient lift to permit the passage of the whole volume of water which enters through the pipes at each stroke of the piston.

To enable others skilled in the art to make and use my improvement, I will describe it more fully.

I cast a valve-shell, *a*, of cylindrical shape, open at one end, and having a series of ribs, *c*, extending longitudinally through it. I then cut a spiral groove, *b*, around the shell, of sufficient depth to cut entirely through it at the points between the ribs *c*, forming a series of openings, *d*. In this groove I place a round strip of rubber, *e*, secured at the ends of the grooves by means of the clamps *f*. The diameter of the grooves *b* is greater than that of

the strip *e*, in order to provide a passage, *g*, around the latter when raised off its seat. The shell *a* is threaded around its mouth. This shell I screw into the threaded opening *h* in the water-chamber of a pump or engine, and a similar one in the discharge-opening *r* of the same pump.

In the drawings, Figs. 1 and 2 illustrate my invention as applied to a steam fire-engine. The pump-cylinder is shown at *i*. The induction-opening (shown at *k*) is fitted with my improved valve, and the discharge-opening (shown at *r*) is fitted with a like valve. This valve-chamber is operated in connection with the pump-cylinder *i*.

Upon the operation of the piston in the cylinder *i*, the water is lifted in the induction-pipe, in the usual way, and enters the shell *a*. The pressure of the water forces the rubber *e* from its seat over the openings *d*, and permits the passage of the water around its sides into the water-chamber *m*. Upon the cessation of the forward stroke of the piston, the weight of the water acting upon the elastic rubber instantly reseats it on all of the openings, closing them. The extent of opening in the valve is equal to the area of the pump. The lift of the rubber from the openings *d* is very small, so that with its own elasticity it is seated almost instantaneously, when the piston ceases its stroke. By stretching the rubber tightly in the clamps its elasticity is increased, and it is caused to seat more quickly. Upon the return stroke of the piston this operation is performed in the second chamber *m'*, while the force of the piston upon the water in the first chamber opens the discharge-valve and discharges the water therefrom. The operation of the pump, it will thus be seen, is the same as that when fitted with the ordinary valves. The valve-shell *a* may be made of any desired form, either cylindrical, spherical, or conical.

The great advantage of my valve is its capacity to accommodate all of the inflowing water, while it is not necessary to increase the size of the water-chamber on account of its height, because the water-chambers at present used are sufficiently high to permit its insertion and use. The rule governing the construction of this valve is, that the sum of the size of the openings *d* should equal the area

of the pump. By this means I gain about two hundred per cent. increased capacity in the pump without an increase of power in the operating force, or in the size, weight, and cost of the pump. This valve may be applied to pumps and engines generally.

Instead of a spiral groove, *b*, a series of annular grooves may be made around the shell, each having a separate strip, *e*, secured by a separate clamp.

The shell *a* may be made perfectly plain on the interior—that is, without the ribs *c*. In such case the groove *b* does not cut through the shell, but the openings *d* are drilled by a subsequent operation.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The shell *a*, having a series of openings, *d*, in the groove *b*, covered by an elastic strip, *e*, which operates to open and close them, as described.

2. The within-described valve, in combination with the cylinder *i* and receiving and discharging openings of a pump or engine.

3. The shell *a*, having longitudinal ribs, so that in grooving, as at *b*, to form the seat for the strip *e*, the shell may be cut through between them, thereby forming the openings *d*.

In testimony whereof I, the said JOHN A. NICHOLS, have hereunto set my hand.

JOHN A. NICHOLS.

Witnesses:

T. B. KERR,
JAMES I. KAY.