(No Model.)

H. S. PARK.

VALVE.

No. 385,521. Patented July 3, 1888.

Fig. 1.

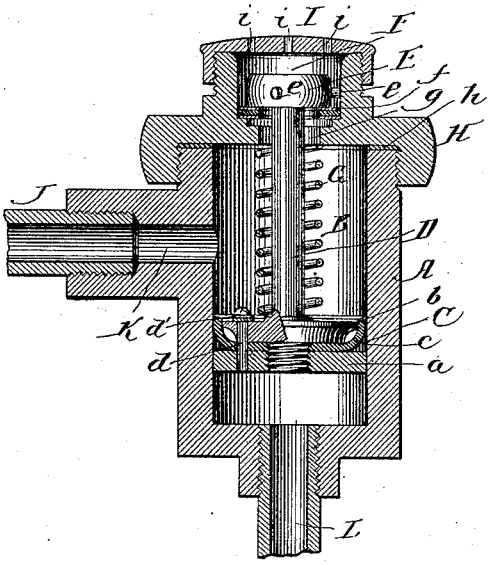


Fig. 2.

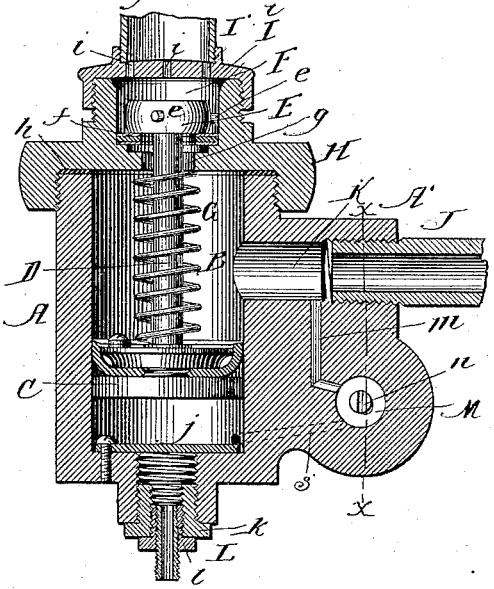


Fig. 3.

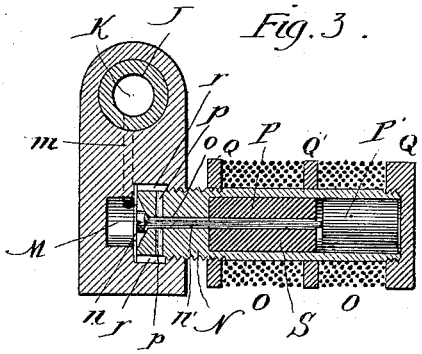
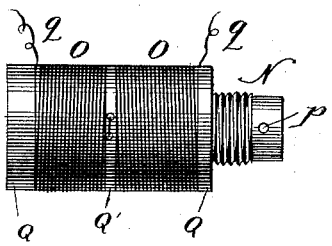


Fig. 4



Witnesses.

Frank B. Blanchard.

Harry T. Jones.

Inventor.

Harry S. Park.

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

HARVEY S. PARK, OF CHICAGO, ILLINOIS.

VALVE.

SPECIFICATION forming part of Letters Patent No. 385,521, dated July 3, 1888.

Application filed November 28, 1887. Serial No. 256,351. (No model.)

To all whom it may concern:

Be it known that I, HARVEY S. PARK, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented new and useful Improvements in Valves, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation showing the valve for use with steam, air, oil, water, or other vapor or fluid pressure. Fig. 2 is a sectional elevation, with the addition of an electrically-operated valve for equalizing the pressure. Fig. 3 is a section on line *x x* of Fig. 2, and Fig. 4 is an elevation showing the coil for the electric valve.

This invention relates to valves which are held to their seats by a differential pressure of the element used with the valve, such differential pressure being employed in connection with a traveling piston connected with the valve and controlling the movement thereof through pressure on the valve and traveling piston.

The objects of the invention are to improve the construction and operation of the piston and its relation to the valve, the presser-chamber and its supply-port, to insure a canceling of the piston and give the valve a quick, reliable, and positive action; to improve the means for canceling the piston, and to improve generally the construction and operation of the several elements entering into the construction of the valve as a whole; and its nature consists in the several parts and combination of parts, hereinafter more specifically described, and pointed out in the claims as new.

In the drawings, A represents a cylinder.

B is a chamber of the cylinder A of a diameter to correspond to that of the piston working therein.

C is a piston, formed, as shown, of a solid head, *a*, and a solid head, *b*, with a concave edge, and a packing, *c*, between the two heads, but which can be otherwise formed so long as it has a close fit in the chamber. The piston C as a whole has a vent hole or passage, *d*, leading from its bottom side to its top, which passage is controlled by a valve, *d'*, opening at the front of the piston, and by which passage *d* and valve *d'* communication is had with the chamber B on both sides of the piston C.

D is the stem of the piston C.

E is a valve on the outer end of the piston D, and having, as shown, in its periphery a series of guide-pins, *e*.

F is a chamber in which the valve E is located.

G is a coil-spring encircling the stem D, bearing at one end on the piston C and at the other end on the end wall of the chamber B, by which the piston is held down, closing the valve E onto its seat.

H is a cap screw-threaded onto the end of the cylinder A and forming the end wall of the chamber B, and in which cap is formed the chamber F for the valve E. The cap H is provided with a hole, *g*, of a larger diameter than the stem D, and through which the stem passes, and between the cap H and end of the cylinder A is a suitable packing, *h*, and between the valve E and the bottom of the chamber F is a packing, *f*, on which the valve E seats closely, and, as shown, the valve E is guided and directed in its chamber F by the pins *e*, which lie against the wall of the chamber.

I is a cap closing the chamber F and having a series of holes, *i*, by which the chamber F vents into the outside air. The cap I can be provided with a pipe, I', leading to the outside air, or other discharge.

J is a supply-pipe for the steam, air, oil, water, or other vapor or fluid used with the valve.

K is a port or passage communicating with the pipe J and with the chamber B.

L is a pipe entering the cylinder A and communicating with the chamber B below the piston C. As shown in Fig. 1, the pipe is screw-threaded into the boss on the cylinder A, and, as shown in Fig. 2, the pipe L is of a smaller diameter and is screw-threaded into a stuffing-box, *l*, which in turn is screw-threaded into a stuffing-box, *k*, which in turn is screw-threaded into the boss of the cylinder A, and, as shown, the opening through the cylinder for communicating the pipe L with the chamber B below the piston is controlled by a flap-valve, *j*.

M is a chamber formed in a side extension, A', of the cylinder A, having communication with the port or passage K by a passage, *m*.

N is a core or stem, one end of which is

screw-threaded to enter a screw-threaded opening in the extension A′ in line with the chamber M, and on the inner end of this core or stem N is a seat for the valve *n*, secured to the end of the stem *n′*, which passes through a hole or passage, *o*, in the core or stem. Leading from the passage *o* on each side is a passage, *p*, which communicates with a chamber, *r*, formed around the end of the stem N in the extension A′ adjacent to the chamber M, separated from the chamber by a packing at the end of the stem N, and this chamber *r* has communication with the chamber B below the piston C by a passage, *s*, which passage opens into the chamber B above the valve *j*.

O is a coil wound around the core or stem N.

P is a stationary armature located in the opening of the core or stem N, and P′ is a movable armature, also located in the opening of the core or stem N, and to which the outer end of the valve stem *n′* is secured.

Q are the end plates, and Q′ the middle or division plate, of the coil O. As shown, the wires *q*, from which the coil O is formed, are wound in one direction on one division of the core and in the other direction on the other division, as clearly shown in Fig. 4.

The operation of the construction of valve shown in Fig. 1 is as follows: The valve E is held down to its seat by the action of the spring G and the pressure of the element in the chamber B supplied through the pipe J and port K, and the valve will remain seated so long as the chamber B below the piston C is without pressure; but when pressure is supplied to chamber B below the piston equal to the pressure of the element in the said chamber above the piston from the supply source either by the pipe L or other means, equalizing the pressure in the chamber B both above and below the piston, allowing the pressure in chamber B above the piston to act directly on the valve E, raising such valve and allowing an escape from the chamber B through the passage *g* into the chamber F, and thence into and through the valve-cap I or its pipe I′ to the delivery or other discharge, and with the equalization of the pressure in the chamber B above and below the piston D the valve *d′* will be canceled, producing an equalization of pressure above and below the piston through the passage *d*, thus insuring a perfect cancellation of the piston for the pressure in the chamber B above the piston to act only on the valve E. This construction controls the valve by equalizing the pressure on both sides of the piston of the steam, air, oil, water, or other vapor or fluid used with the valve, and this same result is obtained with the construction shown in Figs. 2 and 3, in which an electrically-controlled valve is provided as a positive means for supplying the pressure below the piston to cancel the piston, and in this construction the operation is as follows: The element used passes through the port or opening K, through the passage *m* to the chamber M, and so long as the valve *n* is seated the pressure in the chamber B above the piston will hold the valve E firmly down to its seat by the excess of pressure on the piston in the chamber B over that on the valve, there being no pressure in the chamber B below the piston; but by sending a current of electricity through the coil the armature P′ will be drawn to the magnet or armature P, moving the valve *n* from its seat and allowing an escape from the chamber M through the passage *o* and ports or passages *p* into the chamber *r*, and through the passage *s*, above the valve *j*, below the piston C, to equal the pressure above the piston, which pressure opens the valve *d′*, allowing an escape through the passage *d* into the chamber B, equalizing the pressure both sides of the piston, as before described, canceling the piston and causing the pressure in the chamber B above the piston to raise the valve E and allow an escape through the opening *g* into the chamber F, and thence through the cap I or its pipe I′ to the delivery or other discharge. The magnet or armature P′ when down closes the opening *o* at that end, so that the escape will be through the ports or passages *p*. The stem *n* plays somewhat loosely through the core and magnet, permitting a slight leakage of air around it when the valve *n* is seated, but when the valve is unseated the magnet or armature P′ prevents leakage, as already described.

The parts in Figs. 1, 2, and 3 are shown in their normal positions, in which the pressure acts against the piston C, which is larger in area than that of the valve E, and holds the valve E seated.

The shutting off of the flow below the piston, either through the pipe L or through the electrical valve by breaking the circuit, produces a decrease in the pressure below the piston, allowing the pressure above the piston to act and move the piston back to its normal position, again seating the valve E, preventing any escape at that point.

The solid piston C, with its vent-passage *d* and valve *d′*, forms a traveling partition by which the chamber B is divided into two compartments—one above and the other below the piston—and it will be seen that with pressure in the chamber above the piston and with the chamber below the piston without pressure the valve E, connected with the piston by the stem D, must be held to its seat firmly by reason of the excess of pressure on the piston over that on the valve, as the pressure in the chamber B is exerted in both the valve and the piston, and the piston is larger in diameter than the valve, and this excess of pressure in the piston is the force that holds the valve seated. Now if an equal pressure to that in the chamber above the piston be admitted into the chamber below the piston the piston is canceled thereby, leaving the valve free to be unseated by the pressure thereon from the chamber B, which acts against the inner face of the valve, and as the piston is free to travel when canceled the valve can open. The valve *d′* in the piston is only open when the pressure

on both sides of the piston is equalized, and this valve serves to maintain an equalization of the pressure, and by placing the supply for the chamber below the piston under an electrical-controlled valve, as shown and described, entire certainty and reliability in the operation of the valve as a whole are assured. The valve E is always normally seated by the unequal pressure on the piston over that on the valve, and is unseated by the action of the pressure as the piston is canceled or the pressure thereon eliminated.

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

1. The combination, in a valve, of a cylinder, a chamber in said cylinder, a solid piston traveling in said chamber and having a vent-passage, a normally-seated valve connected to said piston and controlling a discharge-port from the chamber, a chamber for the valve, a supply-port for the chamber between the valve and the piston, and a supply-passage for the chamber below the piston for canceling the piston and opening the valve by the pressure in the chamber, substantially as specified.

2. The combination, in a valve, of a cylinder, a chamber in said cylinder, a solid piston traveling in said chamber and having a vent-passage, a normally-seated valve connected to said piston and controlling a discharge-port from the chamber, a chamber for the valve, a supply-port for the chamber between the piston and valve, a passage leading from the supply to the chamber below the piston, and an auxiliary valve controlling said passage and electrically operated for admission of pressure below the piston to cancel the piston, substantially as specified.

3. The combination, in a valve, of a cylinder, a chamber in said cylinder, a solid piston traveling in said chamber and having a vent-passage, a normally-seated valve connected to said piston and controlling a discharge-port from the chamber, a supply-port for the chamber between the valve and piston, a supply-passage for the chamber below the piston, a valve normally closed for said passage, a moving armature connected to said valve, a stationary armature, and an electric coil inclosing both armatures for electrically controlling the valve for the passage below the piston, substantially as and for the purposes specified.

4. The cylinder A, having the chamber B, piston C, having the passage *d*, controlled by a valve, *d'*, and dividing the chamber into two compartments, the piston, stem D, and the valve E, controlling the port *g* from the chamber B, in combination with inlet ports or passages leading to the chamber B on opposite sides of the piston for canceling the piston to unseat the valve E, substantially as specified.

5. The cylinder A, having the chamber B, piston C, having the passage *d*, controlled by the valve *d'*, the stem D, the valve E, and the port *g*, leading from the chamber B, in combination with the inlet-port K, between the piston C and valve E, the passage *m*, the chamber M, the passage *n*, leading from the port K to the chamber M, the passage *s*, leading from the chamber M to the chamber B below the piston, and a valve for the passage *s*, electrically controlled for supplying pressure to the chamber B below the piston to cancel the piston, substantially as and for the purpose specified.

6. The cylinder A, having the chamber B, the piston C, having the passage *d* and valve *d'*, the stem D, the valve E, and the port *g*, in combination with the supply-port K, the chamber M, the passage *m*, leading from the port K to the chamber M, the core or stem N, having the longitudinal passage *o*, the chamber *r* at the inner end of the core, the ports *p*, leading from the passage *o* to the chamber *r*, the passage *s*, communicating with the chamber B below the piston C, and a valve, *n*, electrically controlled for admitting a pressure from the supply-port to the chamber below the piston, substantially as specified.

7. The chamber M and passage *m*, communicating with the supply-port K, in combination with a valve, *n*, controlling a passage, *s*, leading from the chamber M, a valve-stem, *m'*, a core, N, having a passage, *o*, a stationary armature, P, through which the stem of the valve N passes, a movable armature to which the stem of the valve *n* is attached, and a coil inclosing the armatures for electrically operating the valve *n*, substantially as and for the purpose specified.

8. The chamber M, having communication with the supply-port of a valve and with a chamber below a piston in said chamber, in combination with a valve, *n*, a valve stem, *n'*, a core, N, having the longitudinal passage *o* for the valve-stem *n'*, ports *p* in the core, chamber *r*, communicating with the passage *o* by ports *p*, stationary armature P, movable armature P', having the stem *n'* connected thereto, and a coil around the armatures for supplying pressure to cancel the piston, substantially as specified.

9. The coil O, stationary armature P, and movable armature P', in combination with the core N, valve-stem *n'*, attached to the armature P', passage *o* in the core N, and valve *n*, for operating the valve to open and close communication with a supply, substantially as and for the purposes specified.

10. The coil O, stationary armature P, movable armature N, valve-stem *n'*, and valve *n*, in combination with the core M, passage *o*, passages *p*, and chambers *r* for controlling the supply to the chamber B, substantially as and for the purposes specified.

HARVEY S. PARK.

Witnesses.
ALBERT H. ADAMS,
HARRY T. JONES.