

UNITED STATES PATENT OFFICE.

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TWO-MOTION CONE-VALVE.

Specification of Letters Patent No. 13,075, dated June 19, 1855.

To all whom it may concern:

Be it known that I, HORATIO ALLEN, of the city, county, and State of New York, have invented certain new and useful Improvements in Valves and Cocks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawings, making a part of this specification.

My invention is for certain improvements in the method of constructing and operating conical valves and stop-cocks.

These improvements in valves have for their object, firstly the reduction of the friction, and consequently of the wear and power required to operate them; and secondly, the obtaining of great rapidity of action. This latter feature has particular reference to its adoption as a steam valve. It is well known to those conversant with the steam engine that the more instantaneously the ports can be opened and closed the better. In valves, either of the slide or puppet kind, there is a limit to the speed at which they may be actuated with safety, and much within the degree which it is believed would be found advantageous. By my improvement in the cone-valve, those forces, viz., friction and momentum, which are the chief obstacles in the way of rapid motion in the other kind of valves, especially when of large size, are present only in a slight degree, and hence the rapidity of motion may be increased accordingly.

My improvement consists in giving to the valve at each operation two motions in succession, said motions being in directions at a right angle with each other. The first motion is a slight one, parallel with the axis of the cone, and directed toward its larger end; the other is in a direction tending to rotate said cone. Now inasmuch as both the valve and its seat are conical, the first motion (and that may be a very slight one,) effects the separation of the valve from its seat so that although still very close, they are not in contact. The other or rotary motion, can then be given without friction upon those parts, and hence the reduction of the power required to operate it, as well as of the wear, to the minimum. These results will be more clearly shown by the following description of the manner of constructing and operating my said valve.

In the drawings several different forms

of construction are given, showing the valve adapted to steam, and to water-ways. I shall first describe it as a balance-valve, applicable to steam purposes.

Figures I II and III represent such valve.

At A is the conical seat; the steam chest B partly surrounds this so as to embrace the two apertures or ports on either side and which the valve covers, said ports being shown at (a), and C being the nozzle. The valve is shown at D and is a longitudinal segment of a cone, the two faces of which have the same taper as the seat A, the width and length of the faces also being sufficient to cover the ports (a), as shown in Figs. I and II. As already remarked, the valve is to be operated by two motions performed in succession. The first motion is in a direction parallel with its axis, or from the smaller toward the larger end of the chamber. This is the movement which effects the separation of the valve from contact with its seat. The next movement is to turn the axis partly around and thereby open the ports (a) for the passage of the steam, the valve being then in the position shown by the dotted lines D'. These movements are effected by the following mechanism;—upon the cap covering the large end of the valve there are two curved and elevated rails, as shown at E, Figs. II and III, said rails being on opposite sides, and of a curve the radius of which is at the center of the valve-stem or axis. One end of each rail starts with a short inclined plane (b), the rest of the rail being level. Upon the end of the valve-stem beyond these rails, there is a crosshead (c), upon the ends of which are two friction wheels (c') at such distances from the center as to come into contact and roll upon the rails E. This crosshead is firmly attached to an arm or crank (d), and both can play loosely upon the valve-stem as an axis. The arm (d) is kept upon the end of the valve-stem by a pin (d') or other equivalent fastening. The manner of giving the first motion to the valve will now be explained; on moving the crank (d) in the direction indicated by the arrow in Fig. III, the end of the crosshead (c) will be moved toward the inclined plane (b) upon the rails E. Continuing the motion, the friction wheels will ascend, and this ascent tends to push both (c) and off the valve-stem, but inasmuch as this is prevented by the pin (d') the stem itself

and the valve D are carried along. As soon as the rollers reach the top of the rails E this first motion for separating the valve from the seat is finished, and it is time to impart the second motion which shall effect the opening of the steam ports. At (e) is a stop projecting out from the valve-stem, against which the crosshead (c) at this moment strikes. The movement of (d) and (c) being continued, carries the stop (e) along, and with it the valve-stem and valve, and thus the steam ports (a) are opened.

The closing of the valves may be effected by a mechanism working the reverse way from that just described. The plan shown however performs this by means of the recoil of springs which have been compressed during the opening operation. The first motion is to turn back the stem and shut the ports (a); this is done by the force of the feather spring at (i) Fig. III which presses against a stud (i') on the lower valve stem. And thus as the arm (d) is drawn back the spring causes the valve to follow in the same direction. The other motion, which puts the valve back into its seat, is accomplished by a spiral spring shown at (o) within a cavity upon the opposite end of the valve chamber. This spring surrounds the stem and is confined in place by a nut (o') against which it presses; thus as the rollers (c') descend the inclined planes (b), the valve is drawn back to its seat again.

The valve is balanced by the equal pressure on its two faces, as clearly represented in Figs. I and II. Two passages are only shown, but more may be introduced with equal facility of operation. The same valve-stem or axis, may also be lengthened so as to operate a series of valves by a single arm (d) and its attachments.

For many purposes a much smaller segment of the cone may be formed into a

valve to operate satisfactorily. In such cases the balancing feature will be wanting. Fig. IV, represents such valve and the same letters of reference indicate like parts in this figure. The difference it will be seen consists in there being but one steam port (a). The arrows indicating the direction of the flow of steam are only conventionally placed as the operation would be precisely the same were they reversed.

Fig. V represents a similar two motioned cone-valve, intended for water-ways. This is especially applicable to the construction of cocks of large size, and is particularly suitable for hydraulic works where the pressure is great. There is no difference in the principle of construction from those for steam. The cone however is less in length, and otherwise the shape conforms more nearly to that of a water cock.

What I claim as my invention and desire to secure by Letters Patent of the United States is—

So constructing a cone-valve, that in the operations of opening and of closing the same, two motions shall be imparted to it, in or nearly in succession, and in directions at a right angle with each other; the first of said motions effecting the withdrawal of said valve out of contact with its seat, and retaining it so withdrawn while the second motion shall be given, whereby it can by that second motion be turned without friction against the seat as described, and this I claim irrespective of the peculiar mechanism employed, as that may be considerably varied without changing the character of my invention, the whole being constructed and operating substantially in the manner set forth.

HORATIO ALLEN

Witnesses:

JOSEPH P. PIRSSON,
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