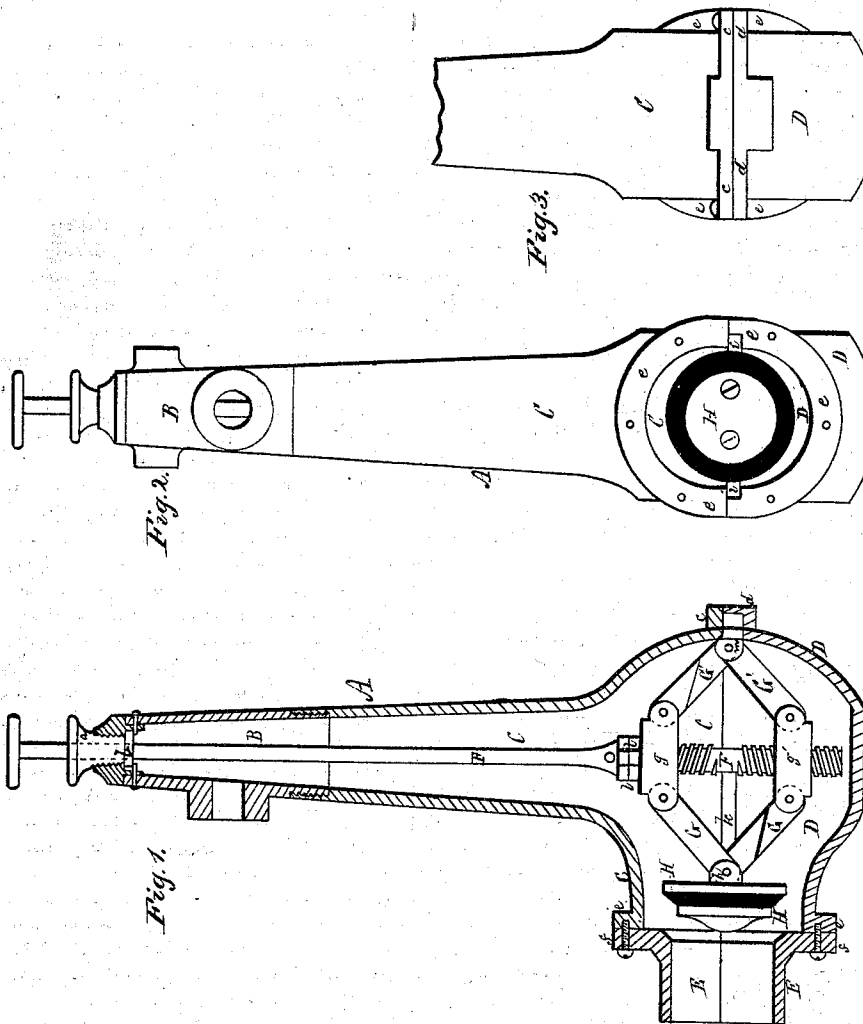


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Valve-Motions for Gates and Hydrants.

No. 144,048.

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IMPROVEMENT IN VALVE-MOTIONS FOR GATES AND HYDRANTS.

Specification forming part of Letters Patent No. **144,048**, dated October 28, 1873; application filed October 9, 1873.

To all whom it may concern:

Be it known that I, PHINEHAS BALL, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain Improvements in Valve-Movements for Gates and Hydrants, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a hydrant having my improved mode of constructing and operating the valve applied thereto, the side of the case being removed to illustrate the working parts. Fig. 2 represents a front elevation of the same with the valve-seat removed; and Fig. 3, a rear view of the same, the upper portion of the hydrant being broken off.

My improvement relates to a new and improved mode of constructing the operative mechanism of a valve, whether single or double faced; and it consists in attaching, by means of a pivot-joint, the valve or valves, when properly arranged for operation, to the outer ends of a pair of toggle or knuckle jointed levers, which, through the action of a pair of nuts and a right-and-left-hand-threaded screw-rod, on which they are mounted, are made to approach or recede from each other, and by that means impart to the valve a motion toward and from its seat, thereby opening and closing the throat of the pipe to which the valve is connected, according to the direction it is caused to move. This mode of opening and closing the valve possesses peculiar advantages over most others, as it gives to the valve, when fully open and about to be closed, a comparatively fast motion at first, when but little back strain can be imparted to the service-pipes, and a correspondingly slow motion as it nears its seat to entirely cut off the flow of the fluid, when the back or reactionary strain has full force, thereby obviating a most serious difficulty, and that without lessening the action of the screw-rod on the nuts in the least—a practical point, the importance of which can scarcely be over-estimated.

To enable others skilled in the art to make, construct, and use my improvement, I will now proceed to describe its parts in detail, as applied to a fire-hydrant.

The hydrant A proper is represented as being made in four parts, B, C, D, and E, al-

though not necessarily so. The upper part, B, is provided with the usual bosses and openings for the attachment of hose-couplings or water-cocks. In its upper end is secured the stuffing-box *a*, through which the outer end of the actuating screw-rod F passes. As the lower end of this rod, when a valve with a single face is used, has an oscillating movement imparted to it by the levers G G', a compensating device is attached to it, which consists of a simple washer, *b*, mounted on the rod F underneath the packing-box and packing, and on which the latter rests, whereby a corresponding lateral movement is permitted to the washer without impairing in any degree the efficiency of the packing. The part C is secured to the part B by means of a male screw taking into a female screw cut in the lower end of part B, and by being thus made in two parts facilitates the putting together of the upper or packing end of the hydrant. The lower end of C swells out so as to form the one-half of the casing of the working parts of the valve, and may be made of any suitable form and of any required size or capacity. On its lower end it is provided with a flange, *c*, by means of which it is secured, by screw-bolts and nuts or by simple screws, to the lower part D of the casing, the latter being provided with a corresponding flange, *d*, for that purpose. The casing C D, thus put together, is entirely closed at one end and open at the other; and is provided at this end with an outer flange, *e*, by means of which it is connected, through a corresponding flange, *f*, to the fourth piece E, and which piece more particularly forms the valve-seat and the coupling that connects the hydrant with the service-pipe.

A hydrant constructed as described forms a suitable casing for the application of my improved mode of operating the valve; but it may, if desired, be made of any other suitable shape and construction.

The parts which operate the valve H may now be briefly described, as follows: A right-and-left-hand-threaded screw, F, is made to work through nuts *g* and *g'*. To the one end of each of these nuts is pivoted an arm or lever, G, and to the other end of each another lever or arm, G'. The outer end of each of the pair of levers G is connected by the same pivotal pin to the center of the piece which forms the valve H, for which purpose suitable

provision is made on the inner side of the valve, in the shape of lugs *h*, or other suitable device, for the support of the pivotal pin. In the same manner the outer end of each of the pair of levers *G'* is connected by the same pivot to lugs *m*, formed on the shell of the hydrant or valve case, and at a point directly opposite to the point at the center of the valve to which the levers *G* are connected. Each pair of arms—that is to say, *G* and *G*, and *G'* and *G'*—are made of the same length from pivot to pivot, as are the two nuts from pivot to pivot. By being so made, and the right-and-left-hand screws having the same pitch but in reverse directions, the valve is moved back and forth, according to the direction in which the screw *F* is turned, in a right line. This is effected by the action of the screw on the nuts *g g'*, which, when forced apart, draws the valve away from its seat, and thereby opens connection between the service-pipe and the hydrant, and, when drawn together by reversing the direction of the screw, forces it directly into its seat, thereby closing the connection. On the periphery of the valve, next the flanges *c d* of the casing, are formed two guides, *i i*, one on each side, which move in guideways *k*, cut or otherwise formed in the casing, or in one or other, or both, of the inner edges of the flanges *c d*, the sides of the casing being flattened for this purpose. These guides serve, in conjunction with the motion of the levers, to cause the valve to travel steadily back and forth in a line with its center or that of its seat. By attaching the one end of each of the levers *G'* to the shell of the hydrant, it will be apparent that, as the nuts are forced apart, the end of the screw *F* on which the nuts *g* and *g'* are mounted must be drawn toward that side of the shell, and when drawn together forced apart again. This motion requires at the opposite end of the screw *F* a compensating device when it passes through the stuffing-box, and which is provided for, as before described, by the use of a movable washer, as arranged below the packing. This motion, however, would be unnecessary, and need not be provided for, were both pairs of levers to carry or operate a valve, as in such case that end of the screw on which the nuts work, if desired, might with advantage be mounted in a stationary bearing, as in neither case does it have endwise—that is to say, an up-and-down—motion; it having lateral motion only when used to operate a single valve-face.

In making the valve I use the ordinary leather or metal faced, and conical or bevel seat, valve, and which, through the great power I can command to operate it by this combination of the screw with the lever, I can always close with ease against any pressure of the passing fluid, whether water or steam, which would probably be brought to operate against it. This mode of construction not only simplifies the working parts of the valve, but peculiarly adapts it to the requirements of a good

hydrant, as they are more under the control of the operator when endeavoring to shut it against heavy pressure, and can be lifted from its seat with the same facility as it is forced into it. This is of very great importance in case a slight frost has caused the valve barely to adhere to its seat, in which event the great power of the screw and levers, aided by the pressure of the water, at once operates the valve. Moreover, by this mode of operating the valves, they, on being opened, are made to move very slowly on the start, but with a regularly increasing motion as they are carried farther from their seat, and vice versa when shutting—that is to say, fast at first, and slower and slower toward the end, until firmly pressed against their seat. This is a point of great practical importance, as before stated, as it allows the fluid to be let on and shut off under the most favorable conditions to the pipes on which they are used, when conveying the fluid under a heavy head or pressure, such as in hydrant-pipes, &c. As applied to hydrants, the screw *F* becomes, as it were, a simple valve-rod, on the outer end of which a wrench or key can be applied to operate it, and the upper end of the casing *A*, from its seat to the end that projects above the ground, an open channel or water-way, so constructed that hose or water-cocks, or both, may be attached to it in any of the modes now in common use.

In order to prevent the great power of the screw as applied between the nuts *g* and *g'* from destroying the mechanism of the valves by being drawn asunder too far, I place a check-nut, *l*, on the screw above the upper nut at the proper point to limit the travel of the same. This point, of course, is so arranged as to allow the valve to be drawn sufficiently far back from its seat to give full and free access to the water from the service-pipe to the upper or discharge end of the hydrant.

Such a valve and mechanism to operate it, it will be obvious, can be applied to a great variety of purposes here unnecessary to be enumerated.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method, substantially as described, of operating a valve—that is to say, by means of a right-and-left-hand screw, and one or two pairs of arms or levers, *G*, or *G* and *G'*, and nuts *g g'*, for the purposes set forth.

2. The combination of a valve, *F*, and its actuating mechanism with the valve-seat, in such manner that the movement of the former from or toward the latter shall be at right angles to the face of the latter, and with a regularly increasing and decreasing velocity during said movements, for the purposes described.

PHINEHAS BALL.

Witnesses:

H. H. STERNS,
J. P. WALL.