

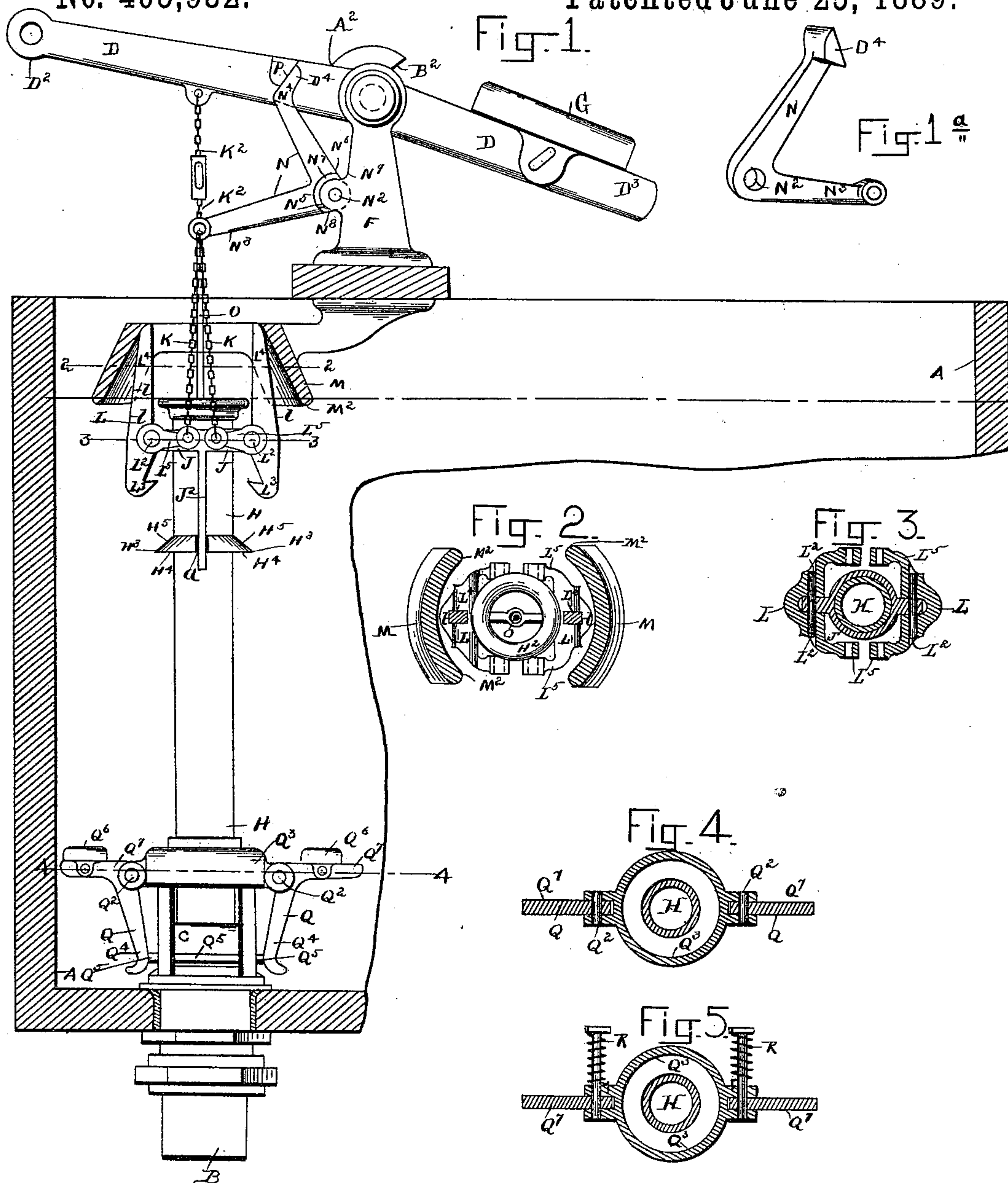
(No Model.)

2 Sheets—Sheet 1.

P. W. DOHERTY.
OPERATING MECHANISM FOR VALVES OF WATER CLOSET AND
OTHER TANKS.

No. 405,952.

Patented June 25, 1889.



WITNESSES:
C. S. Gooding—
Marion C. Brown.

INVENTOR:
Patrick W. Doherty
by Brown Bros.
Atys.

(No Model.)

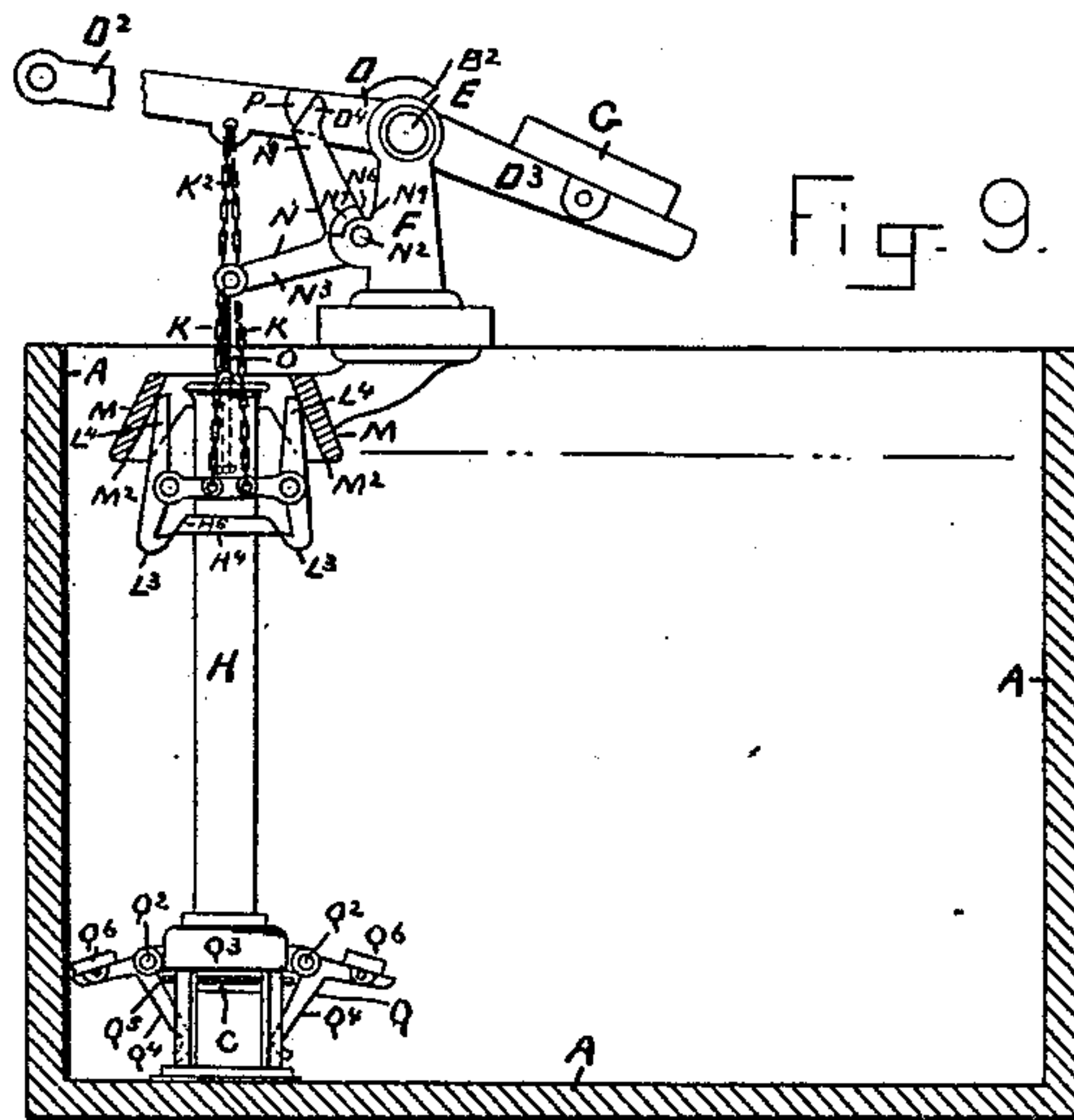
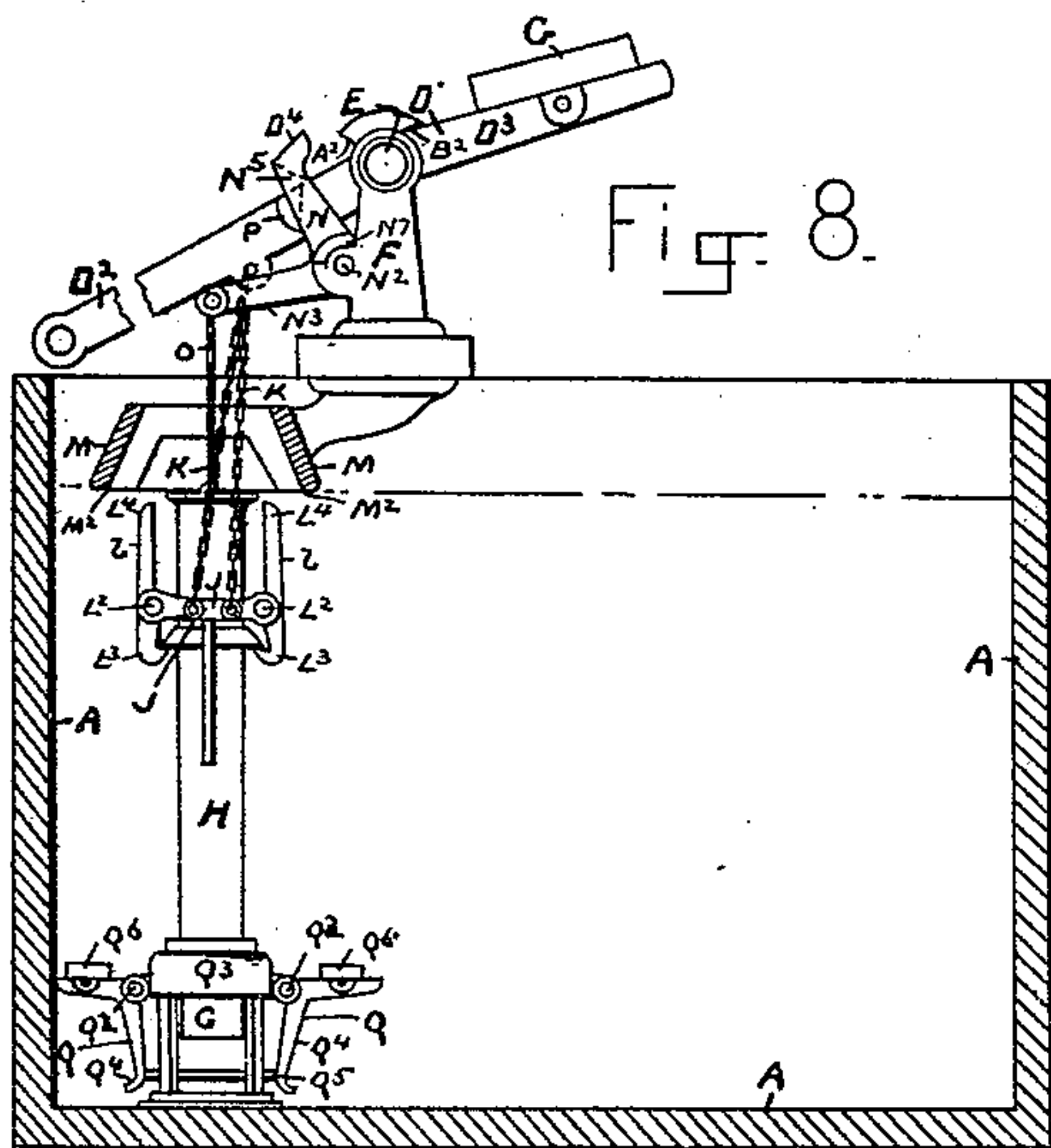
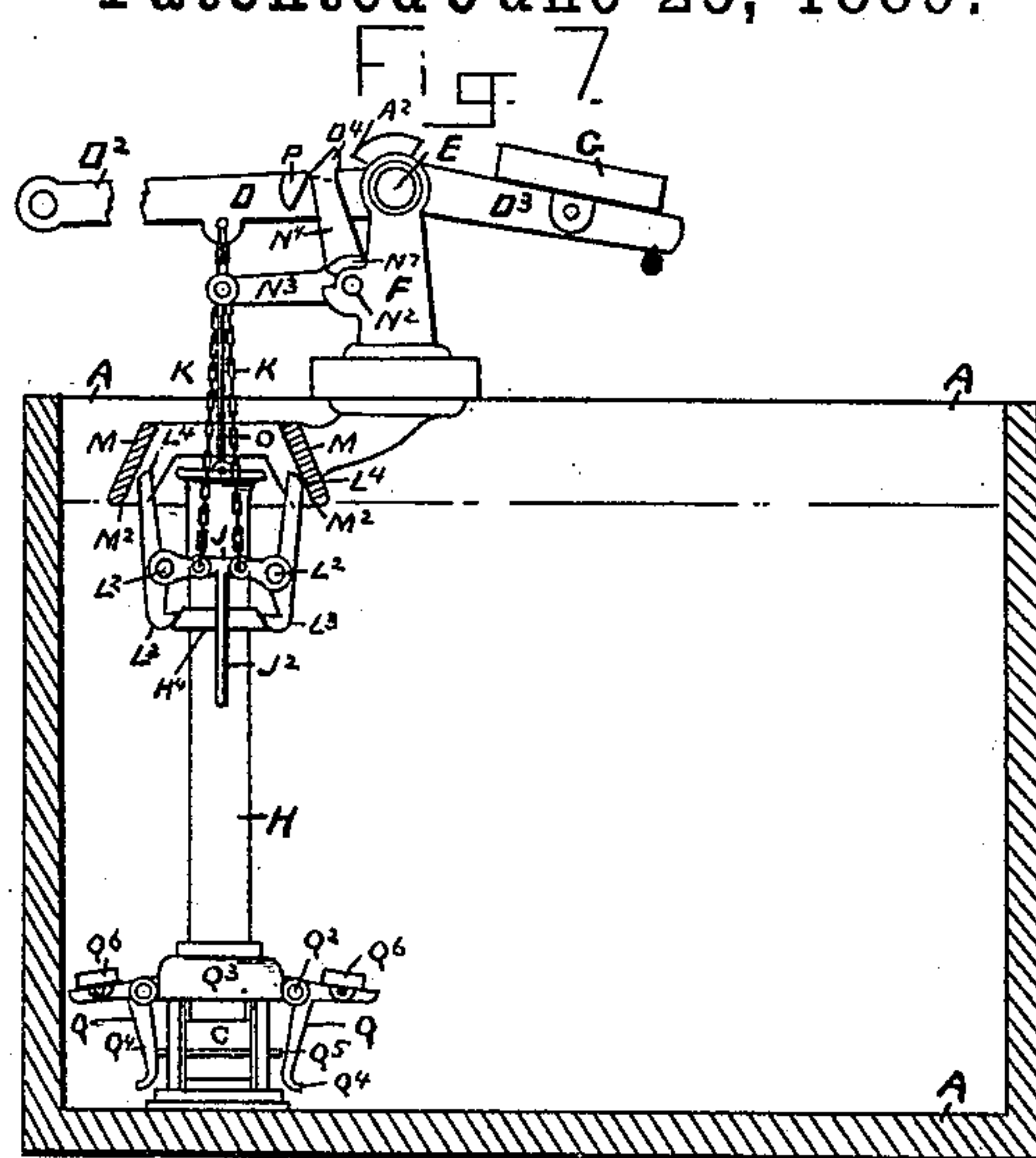
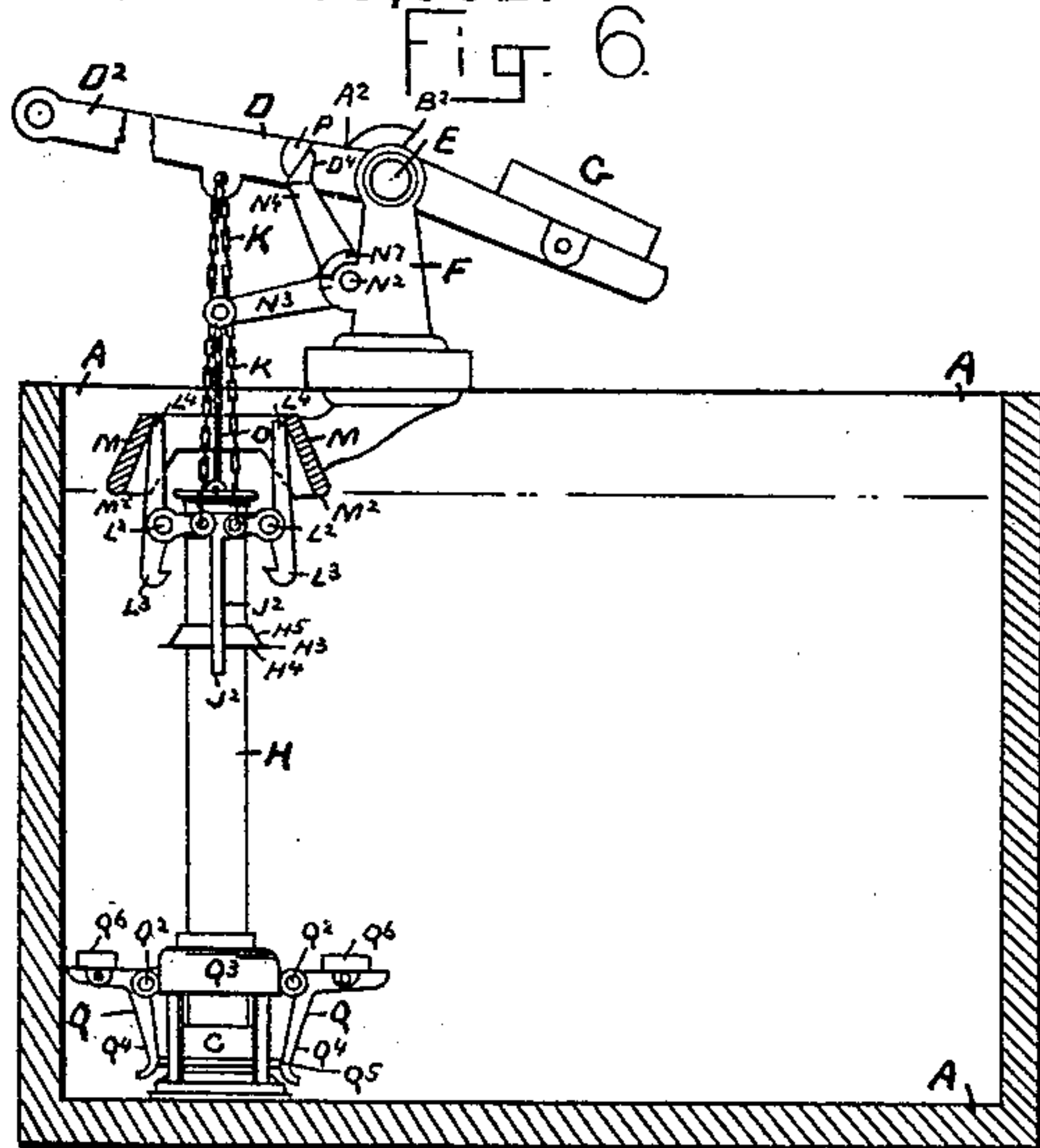
2 Sheets—Sheet 2.

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WITNESSES:
C. S. Gooding.
Geo. B. Bent-

INVENTOR:
Patrick W. Doherty.
By: Brown Bros.
Atlys.

UNITED STATES PATENT OFFICE.

PATRICK W. DOHERTY, OF BOSTON, MASSACHUSETTS.

OPERATING MECHANISM FOR VALVES OF WATER-CLOSET AND OTHER TANKS.

SPECIFICATION forming part of Letters Patent No. 405,952, dated June 25, 1889.

Application filed August 22, 1888. Serial No. 283,471. (No model.)

To all whom it may concern:

Be it known that I, PATRICK W. DOHERTY, of the city of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Operating Mechanisms for Valves of Water-Closet and other Tanks, of which the following is a full, clear, and exact description.

This invention relates to mechanism for operating valves of water-closet and other tanks to secure their opening and closing, and to mechanism for regulating or controlling or governing the movement of the valve in its closing or opening, or in both its closing and opening.

The invention, in substance, consists, first, in the combination, with the opening and closing valve, which may be otherwise of the usual or any other suitable construction or arrangement, and a lever which is fulcrumed on a support or equivalent mechanism therefor and suitably adapted to be operated, of a vertical arm or extension of the valve, a vertical lever or levers, preferably at least two, opposite each other and each fulcrumed on a yoke or carrier surrounding and movable up and down on the valve-extension and severally suspended from the operating end of the operating-lever, and each vertical lever at its lower end adapted to engage with and disengage from said valve-extension, and a stationary abutment for the upper ends of said vertical levers as the levers are raised and lowered, and all otherwise, so that on the lowering of the vertical levers and their movable yoke or carrier by a lowering of the operating end of the operating-lever, or otherwise suitably, their lower ends engage the valve-extension and on a then raising of them by the raising of the operating end of the operating-lever, or otherwise suitably, they remain so engaged, and they lift the valve from its seat and thus open it, and finally, by the operation of the stationary abutment on their upper ends, they are released from said engagement with the valve-extension and the valve is left free to close; second, in the combination, with the above, of a vertical angular lever fulcrumed on a suitable support and having the valve suspended from one and the lower of its arms and an abutment on

said operating-lever for the rest or engagement with and disengagement from it of the upper arm of said angular lever, and all otherwise, so as in each direction of movement of the operating-lever to secure an opening of the valve, to be followed in each instance by its close; third, of an opening and closing valve, which may be of the usual or any other suitable construction or arrangement, and mechanism suitable to secure its opening and closing, in combination with a lever or levers fulcrumed on a stationary support, and constructed and arranged substantially as hereinafter described, to produce in a suitable direction a yielding pressure against and friction on the valve or some part moving with it, and thereby secure a retardation of the valve in its movement to close.

In the drawings forming part of this specification, Figure 1 is a longitudinal vertical section of a water-tank and its discharge-pipe and a side elevation of the valve closed, and mechanisms of this invention to secure an opening of the valve on both movements of an operating-lever and to allow the valve to close after each opening and to retard it in each closing movement. Fig. 1^A is a view in detail. Figs. 2, 3, and 4 are cross-sections, lines 2 2, 3 3, and 4 4, respectively, Fig. 1. Fig. 5 is a view in detail illustrating a modification hereinafter described. Figs. 6, 7, 8, and 9 are similar views to Fig. 1 on a reduced scale, and otherwise as will hereinafter appear.

In the drawings, A is a tank.

B is a discharge-pipe leading from the bottom of the tank.

C is a valve for opening and closing the discharge-pipe at the tank, suitably arranged, and, as well known, in opening and closing to move and be guided directly vertically, and D is a lever having a fulcrum E of a stationary support F of the tank, and at one end D² suitably connected by a chain and pull, (not shown,) or otherwise, (not shown,) as well known, so as thereby to be moved in one direction, and at its other end D³ weighted at G, or otherwise suitably adapted and as well known, so as thereby to be moved in the other and opposite direction on a release of the power or force applied to its end D² to move it, and all and otherwise, except as to

the features of this invention, as well known in water-tank systems of dwelling-houses, buildings, &c., or otherwise suitably, and therefore needing no more particular description herein.

H is an upright or vertical arm or extension of the valve C, and, as shown, constituting the overflow-pipe of the tank, opening (not shown) at its upper end H^2 to the water-space of the tank, and at its lower end (not shown) having communication through the thickness of the valve with the discharge-pipe B, and in itself, neither as a whole nor as to its separate parts, forming, except as hereinafter stated, any part of this invention.

H^3 is a horizontal flange surrounding valve-extension H intermediate of its height, and H^4 is a shoulder on under side of flange H^3 , and the upper side H^5 of flange, preferably, is inwardly and upwardly flaring.

J is a collar or yoke loosely surrounding and above the shoulder H^4 of the valve-extension H. The yoke J has two downwardly-projecting arms J^2 on its opposite sides, and which, co-operating with the lateral notches α on corresponding opposite sides of the valve-extension H, and into and through which they extend, serve as guides to the up and down movement of the yoke over the valve-extension, as will hereinafter appear.

L L are two vertical levers on opposite sides of the valve-extension and its encircling yoke J. Each lever L is hung on a separate horizontal fulcrum L^2 of the yoke, and the outer end of the lower arm L^3 of each is of hook shape, to engage and, as it were, grip and bear upwardly against the shoulder H^4 of the valve-extension.

K K are chains, but they may be other lines of a flexible or other suitable character, preferably flexible, two for each vertical lever. These chains K K at their lower ends are hung to the side horizontal projecting arms L^5 of the several levers L on opposite sides of the valve-extension H, and at their upper ends to the operating end D^2 of the operating-lever D. The upper arm L^4 of each valve-gripping lever projects upward and into a vertical shell or casing M. This shell M is open at its lower and upper ends, and interiorly it is of a conical shape and its inner side or wall M^2 is upwardly-inclining from its lower to its upper end. The inner wall of the shell in the rise and fall of the gripping-levers makes, as hereinafter appears, an abutment for the outer edges l of the upper arms L^4 of the valve-gripping levers, and, again, the lifting of the operating end D^2 of the operating-lever, through the chain K K, lifts the valve-gripping levers L, and, furthermore, first swings them on their fulcra in a direction by which their lower arms are moved toward each other and firmly closed on the flange H^3 and engaged with the shoulder of the valve-extension, both being properly situated therefor, in which position they are held by their continued lift from the movement of the operating-lever, and

finally the upper arms of the gripping-levers by their outer edges being brought into contact with the abutment-wall M^2 of the shell M, suitably situated therefor. The upper arms of the levers are thereby moved toward each other and the lower arms away from each other and released from their grip of the valve-extension, by which the valve is set free to close.

N is a vertical angular lever fulcrumed at its angle N^2 on a suitable stationary support, and below but at one side and between the operating end D^2 and fulcrum E of the operating-lever D, and its arms project toward said operating end.

O is a rod at its opposite ends hung from the outer end of the lower arm N^3 of angular lever N and the upper end of valve-extension H.

P is a vertically-extending abutment-face on and projected from one side of the operating-lever D, and D^4 is a foot-piece of the angular lever N, which rests against the abutment-face P of the lever D when the two levers are in their normal positions, Figs. 1 and 6. The angular lever N swings on its fulcrum N^2 , and its movement in opposite directions is limited by the abutment of the opposite ends N^5 N^6 of its projection N^7 against the stops N^8 N^9 of the standard F and suitably located therefor. The foot-piece D^4 in its part resting on the abutment-face P of lever D projects from the side of the angular lever N, so that in the operation of the levers D N, as hereinafter appears, the projecting abutment P of lever D can pass under it, (see Fig. 8,) the angular lever N then being in its normal position. A chain may be substituted for the rod O connecting angular lever N with valve-extension H.

In the normal position of the operating-lever D and with the valve closed the valve-gripping levers L are out of engagement with and above the shoulder H^4 of the valve-extension, and their upper arms L^4 are under pressure of the abutment-wall M^2 of the stationary shell M. On pulling down on the operating-lever D at its operating end D^2 the angular lever N is swung by the pressure of the abutment of the operating-lever against its upper arm N^4 in a direction, acting through its lower arm N^3 and chain connection with the valve-extension, to raise the valve from its seat, and thus to open it, when, by the continued downward movement of the operating end D^2 of the operating-lever D, said lever D and upper arm of the angular lever escaping from each other, and the abutment P of operating-lever D passing under the foot D^4 of the angular lever, the valve is left free to close, on which, and on the operating-lever having reached the limit of its movement stated, the valve-gripping levers, being then released from the pressure of the abutment-shell M on their upper arms, automatically engage the shoulder H^4 of the valve-extension. On the return of the operating-lever to its normal position the op-

erating-lever, through its chain connection with the yoke J, carrying in common the valve-gripping levers, because of the engagement of said levers with the shoulder H^4 of the valve-extension, then raises or lifts the valve from its seat and so opens it, when, from the continued return movement of the operating-lever, said gripping-levers, by the then abutment of their upper arms against the inner side of the shell M, are automatically released from their engagement with the shoulder of the valve-extension, leaving the valve free to close. The operating-lever and several parts connected with and operated by it, all as described, finally return to their normal positions.

Figs. 6 to 9, both inclusive, illustrate the operating, angular, and valve-gripping levers severally in their position at different portions of the movement of the operating-lever and the valve when opened and closed in relation thereto. In Fig. 6 the several levers are shown in their normal positions and the valve is closed. In Fig. 7 the operating-lever D is shown as having been moved sufficiently at its operating end from its normal position, Fig. 6, to have secured an opening of the valve by the operation of the angular lever N connected therewith, and said angular lever and the abutment therefor of the operating-lever as having escaped from each other, leaving the valve free to close. In Fig. 8 the operating-lever is shown with its operating end as having reached the limit of its movement and the valve-gripping levers suspended from it as then engaged with the shoulder H^4 of the valve-extension. In Fig. 9 the operating-lever is shown as on its return movement and sufficiently to have secured an opening of the valve through its lift by the operation of the valve-gripping levers thereon and their escape from engagement with the valve-extension, leaving the valve free to close, the whole ending in a return to the normal positions, Fig. 6, of the several parts.

From the description above given it is plain that in each direction of movement of the operating-lever the valve is opened followed by its closing, thus securing two separate discharges of water from the tank, which, preferably, should be unequal in quantity, the smaller on the first and the larger on the second opening, so as to give to the closet-bowl connected to the discharge-pipe of the tank what are known as "preliminary" and "after" washes. This inequality in quantity of the washes is obtained by a less opening of the valve for the preliminary than for the after wash, and in the mechanism described it is provided for by an adaptation of the parts to open the valve on the first movement of the operating-lever to a less extent than on the second movement of the operating-lever.

To prevent thumping of the valve on its seat in closing, and injury and undue wear of the valve and its seat therefrom, and also to obviate disagreeable and annoying noises

consequent on a rapid close of valve, under this invention a self-acting and yielding pressure and friction mechanism is combined with the valve, all as now to be described in detail.

In Figs. 1 and 4, Q Q are two vertical angular levers on opposite sides of the valve, and each hung at its angle Q^2 on a separate fulcrum of a stationary support Q^3 , surrounding and constituting, as it is particularly shown, one of the guides for the valve in its vertical movement. In the normal or closed position, as also in all positions of the valve, the lower arm Q^4 of each pressure-lever Q rests and bears against the outer edge of a horizontal peripheral flange Q^5 , surrounding or a part connected to and moving with the valve, and each lever is held at said bearing, as, for illustration, by weighting, as at Q^6 , their upper arms Q^7 , or otherwise suitably, and thus a yielding pressure and frictional contact in a suitable direction are produced on the valve, and all in a manner capable, under proper adjustment, to secure a retard of the movement of the valve at or just prior to its seating, and without practical interference with it, and so obviating a thumping of the valve on its seat, and preventing injury to valve and seat, as also disagreeable and annoying noise of valve, &c. Preferably the weights weighting the pressure-exerting levers Q Q are applied so as to be adjustable in their action, and, in lieu of weights separately applied to the levers, the levers themselves may be integrally suitably weighted and a spring or other elastic cushion substituted for or used with the weight, for illustration, as shown at R, Fig. 5, the spring R being confined endwise for a torsion action on the lever. The standard or support F for the operating-lever D has stops A^2 B^2 to limit the movement of lever in opposite directions.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a tank for liquid, an outlet-pipe for the liquid, and an opening and closing valve to the outlet-pipe, of mechanism to secure an opening of the valve and to release the valve to close, consisting of a vertical lever or levers L, adapted at their lower ends to grip the valve or part connected therewith, a yoke J movable up and down, and on which said levers L, intermediate of their length, are fulcrumed, a line K, suspending each of said levers L, a reciprocating operating-lever D, from which said line or lines K are suspended, and a stationary abutment M^2 for the upper end portions of levers L, substantially as described, for the purpose specified.

2. The combination, with a tank for liquid, an outlet-pipe for the liquid, and an opening and closing valve to the outlet-pipe, of mechanism to secure an opening of the valve and to release the valve to close in one portion, consisting of a vertical lever or levers L, adapted at their lower ends to grip the valve

or part connected therewith, a yoke J movable up and down, and on which said levers L, intermediate of their length, are fulcrumed, a line K, suspending each of said levers L, a
5 reciprocating operating-lever D, from which said line or lines K are suspended, and a stationary abutment M² for the upper end portions of levers L, and in its other portion consisting of an abutment P of said operating-
10 lever D, an angular lever N, fulcrumed at its angle, and having on one arm a foot-piece D⁴ to rest and work on said abutment P, and a line O—such as a chain, rod, &c.—connected to valve, or part connected therewith, and to
15 arm N³ of angular lever N, substantially as described, for the purpose specified.

3. The combination, with a tank for liquid, an outlet-pipe for the liquid, an opening and

closing valve to the outlet-pipe, and mechanism adapted to secure an opening and closing of the valve, of a lever or levers Q, fulcrumed on a stationary support, and at one side of its fulcrum having a bearing on the valve, or some part connected therewith, and at the other side of its fulcrum having an applied resistant—such as a weight—whereby to exert pressure by the lever on the valve or some part connected therewith, substantially as described, for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PATRICK W. DOHERTY.

Witnesses:

ALBERT W. BROWN,
GEO. C. BENT.