No. 674,293. Patented May 14, 1901.

G. A. BRONDER.

VALVE.

(Application filed Oct. 3, 1900.)

(No Model.)

Fig 1

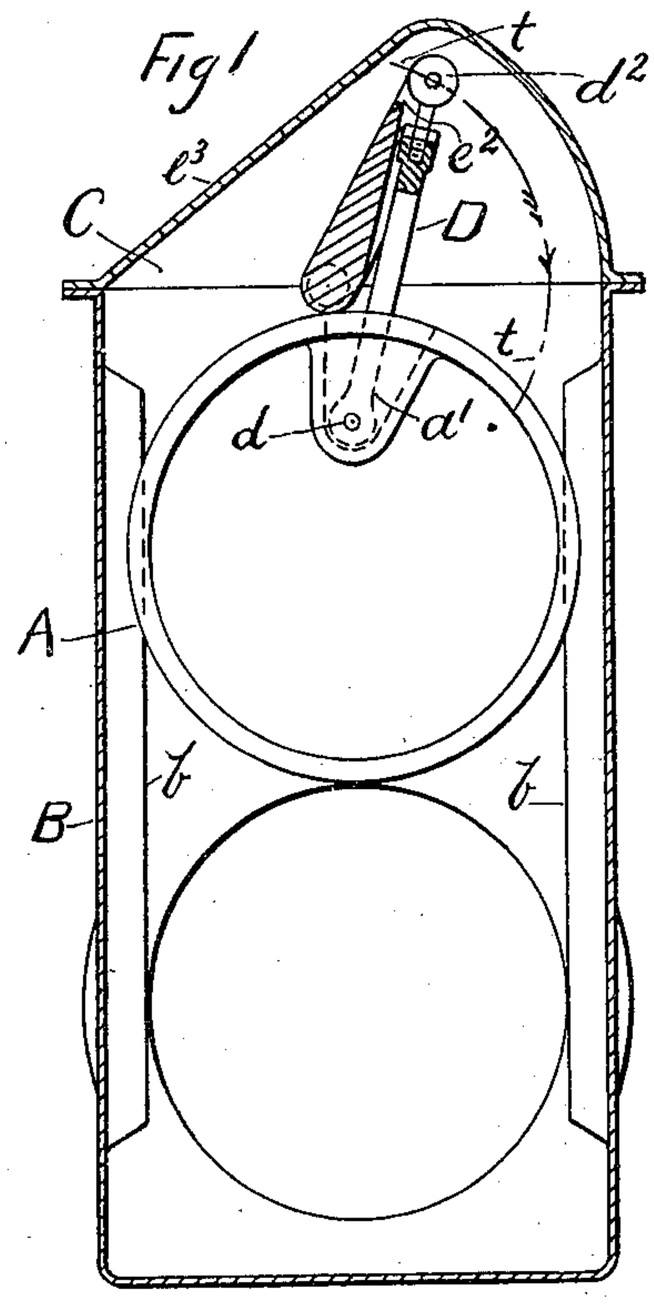


Fig 2

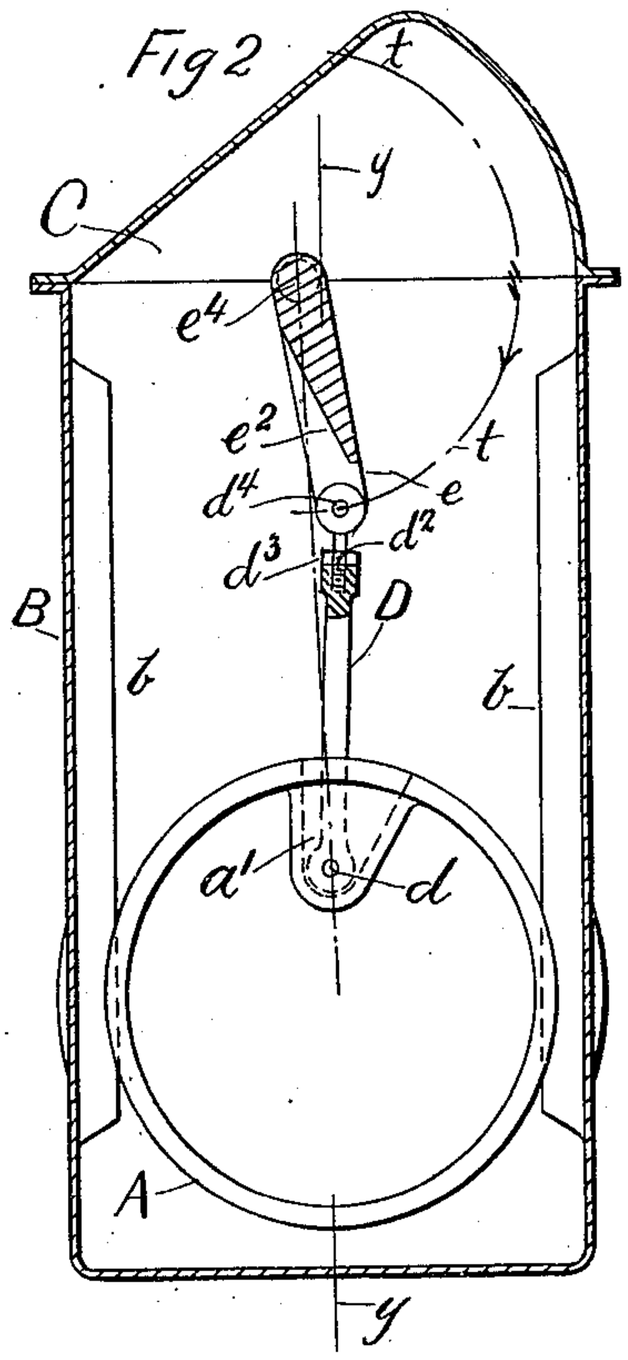


Fig 3

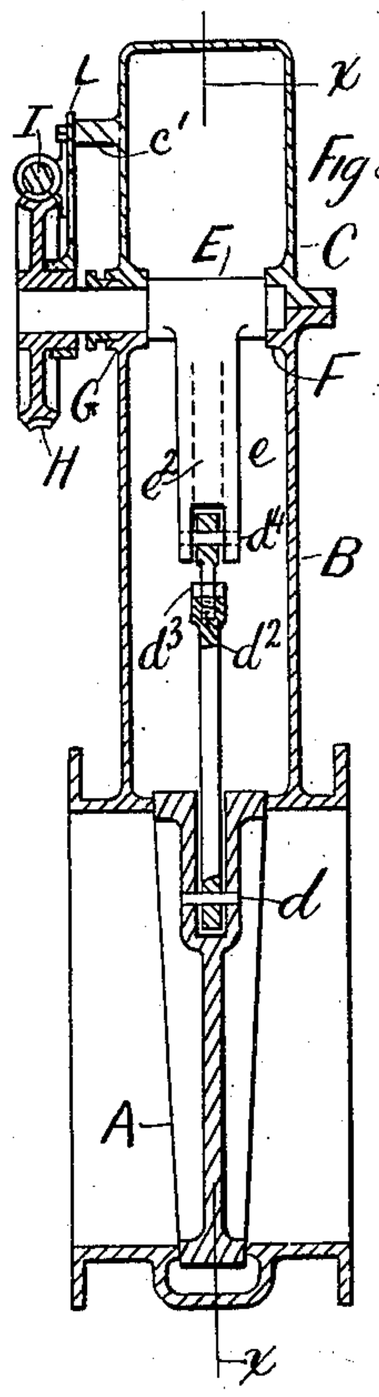


Fig 5

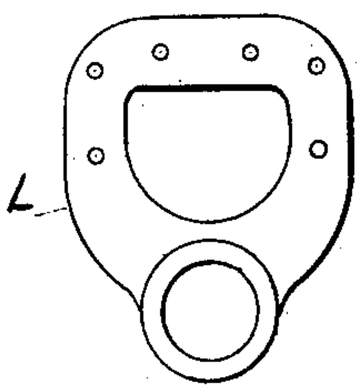


Fig 6

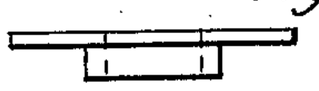
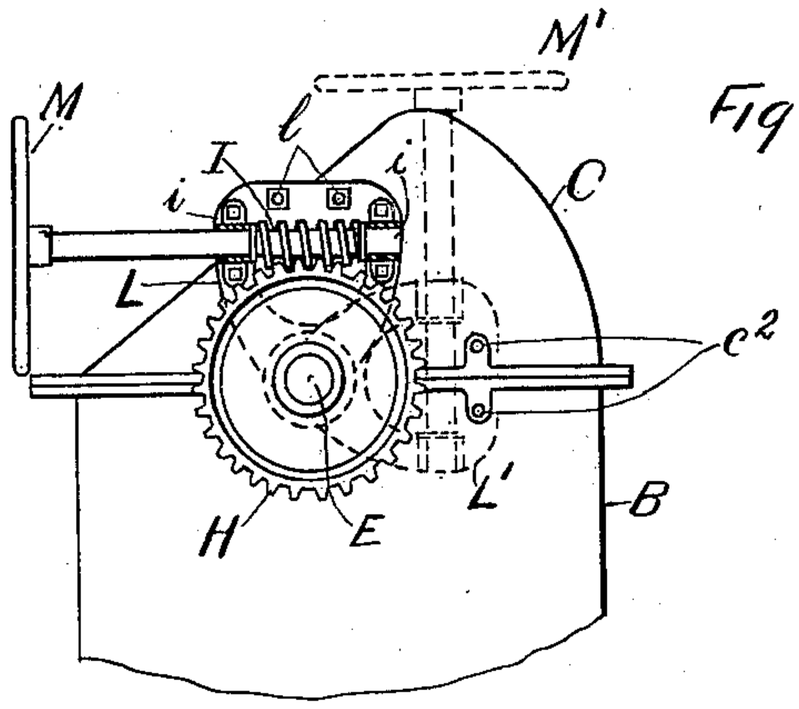


Fig 4



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GASTON A. BRONDER, OF BROOKLYN, NEW YORK.

VALVE.

SPECIFICATION forming part of Letters Patent No. 674,293, dated May 14, 1901.

Application filed October 3, 1900. Serial No. 31,830. (No model.)

To all whom it may concern:

Be it known that I, GASTON A. BRONDER, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Valves, of which the following is a specification.

The object of this invention is the production of improvements in the operating mechanism of valves, so that they can be tightly closed, easily opened, and at the same time perform these functions in the least duration of time, moving quickly when disengaged from the seats of the openings and driven against the said seats when closing the ports with the maximum force due to the applied moment of power.

In the accompanying drawings I show my invention applied to a gate-valve, although it is evident that it is of general application. Valves of this type may be moved to and from their seats by cutting threads on the valve-spindles and actuating the same with threaded hand-wheels, by means of which the valves can be tightly forced to their seats; but it consumes a long duration of time for their operation, and, again, the valve-spindles may be formed into racks and operated by pinions, in which latter case the valves can be quickly moved, but are not seated with sufficient pressure.

In my invention I obtain a mechanism which moves quickly when the valve is disengaged from its seat, and great pressure can be secured when the valve is seated or at the instant it is being released from its seat.

Figure 1 is a fragmentary section of my invention on the line $x\,x$ of Fig. 3, showing the valve in its highest position. Fig. 2 is a similar section with the valve in its lowest position. Fig. 3 shows a vertical cross-section on the line $y\,y$ of Fig. 2. Fig. 4 represents a fragmentary front view of my invention, showing the outside mechanism in two different positions. Figs. 5 and 6 show an elevation and top view of a detail.

The valve is shown at A, operating in guides b of the valve-box B, which is capped by the bonnet C. To the valve is journaled the connecting-rod D, which oscillates on the pin d, secured in the valve A, a pocket a' being provided for the same.

The crank-shaft E swings in the journal-box F and the combined journal and stuffing box G. The longitudinal axis of the crank-shaft is situated at the junction of the valve-box B and bonnet C. The connecting-rod D is pinned to the arm e of the shaft, and at the outer end of the crank-shaft E the worm-wheel H is secured, which is propelled by the worm I, held between bearings $i\,i$ on the adjustable bracket L, which can swing to various positions on the hub of the wheel. Lugs c' and $c^2\,c^2$ constitute outer supports for the end of the said swinging bracket and to which it is bolted in place by the bolts l. The worm is provided with a hand-wheel M, in place of which a sprocket chain-wheel or a crank with intervening gears could be substituted.

The crank-shaft E will be seen to be constructed so as to make it impossible to lower the valve after it has been raised without reversing the rotation of the worm-wheel. To obtain this desirable feature, the crank-arm e contains the cavity e^2, in which the connecting-rod D fits when the valve is in its highest position, and by an inspection of Fig. 1 it will be evident that the impinging of the connecting-rod on the crank-arm in the said cavity prevents the further rotation and consequent movement of the valve to rise or to lower again unless the direction of the worm-shaft is reversed. The shape of the bonnet C, with its slanting side l^3, also obtains the same result, because if the upper end of the connecting-rod comes in contact with the inner face of c^3 it will not allow the valve to travel any farther in one direction.

At $c^2\,c^2$ are shown two lugs at the junction of the bonnet C and valve-box B to secure the adjustable bracket L when it is swung into the horizontal position shown at L′, by reason of which the hand-wheel is revolved to the position M′. It is evident that any number of similar lugs could be provided to fasten the bracket in different angular positions.

The length of the connecting-rod is made adjustable by threading one end of the same, as d^2, and screwing it into the body of the rod, providing also a nut d^3 to make the

joint secure. This joint cannot unscrew because the pins d and d^4 in the connecting-rod ends prevent turning, and when it is desired to adjust the rod for lost motion the said pins are removed and the proper length of rod is secured by loosening the nut d^3 and extending or shortening the rod, as required, after which the nut is again tightened in place.

If we describe a circular arc $t\ t$ from the the axis e^4 of the crank-shaft with its arm as a radius, we can graphically show the movements of the valve, and, referring to Fig. 1, the valve is shown in its highest position, and when the crank-arm moves in the direction of the arrow it will be evident that the speed of the downward movement of the valve increases until the crank-arm assumes a horizontal position, after which the speed decreases until the valve is seated, as shown in Fig. 2. The moment of force applied to the crank-shaft through the worm-wheel is constant; but the factors of the moment—that is, the force and leverage transmitted to the pin d^4 of the connecting-rod—vary, and the moment at any instant is equal to the pressure on that pin and the perpendicular distance of the pin from the line connecting the center e^4 of the shaft and the center of the pin d, and that distance is greatest when the arm e is approximately horizontal and least when in the position shown in Fig. 2, which consequently secures the greatest speed of the valve in the vicinity of the horizontal position of the crank-arm and the greatest pressure on the pin d^4, and hence on the pin d, when the valve is secured to its seat, which meet the requirements of the problem.

Having described my invention, I desire to secure by United States Letters Patent, and claim—

1. A mechanism to actuate the movements of a valve, comprising a worm and a worm-wheel, a crank-shaft supporting said worm-wheel, a crank-arm extending from the shaft, a connecting-rod pinned to the crank-arm, the crank-arm containing a cavity for the connecting-rod, the said connecting-rod preventing a complete revolution of the crank, in combination with a valve suspended from the connecting-rod.

2. A valve mechanism, comprising a valve, a connecting-rod pinned to the valve, a crank-shaft pinned to the connecting-rod, a worm-wheel secured to the shaft, a worm actuating the worm-wheel, in combination with an adjustable bracket supported on the hub of the worm-wheel, and supports for securing the hand-wheel in different operative positions.

3. A valve mechanism, comprising a valve A, an adjustable connecting-rod D, pinned to the valve by the pin d, a crank-shaft E with its arm pinned to the connecting-rod, a worm-wheel H secured to the shaft, a worm I actuating the worm-wheel, a hand-wheel M secured to worm-shaft, in combination with an adjustable bracket L, a valve-box B, a bonnet C secured to valve-box, and supports c', and c^2, c^2 for the swinging bracket.

Signed at New York, in the county of New York and State of New York, this 1st day of October, A. D. 1900.

GASTON A. BRONDER.

Witnesses:
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