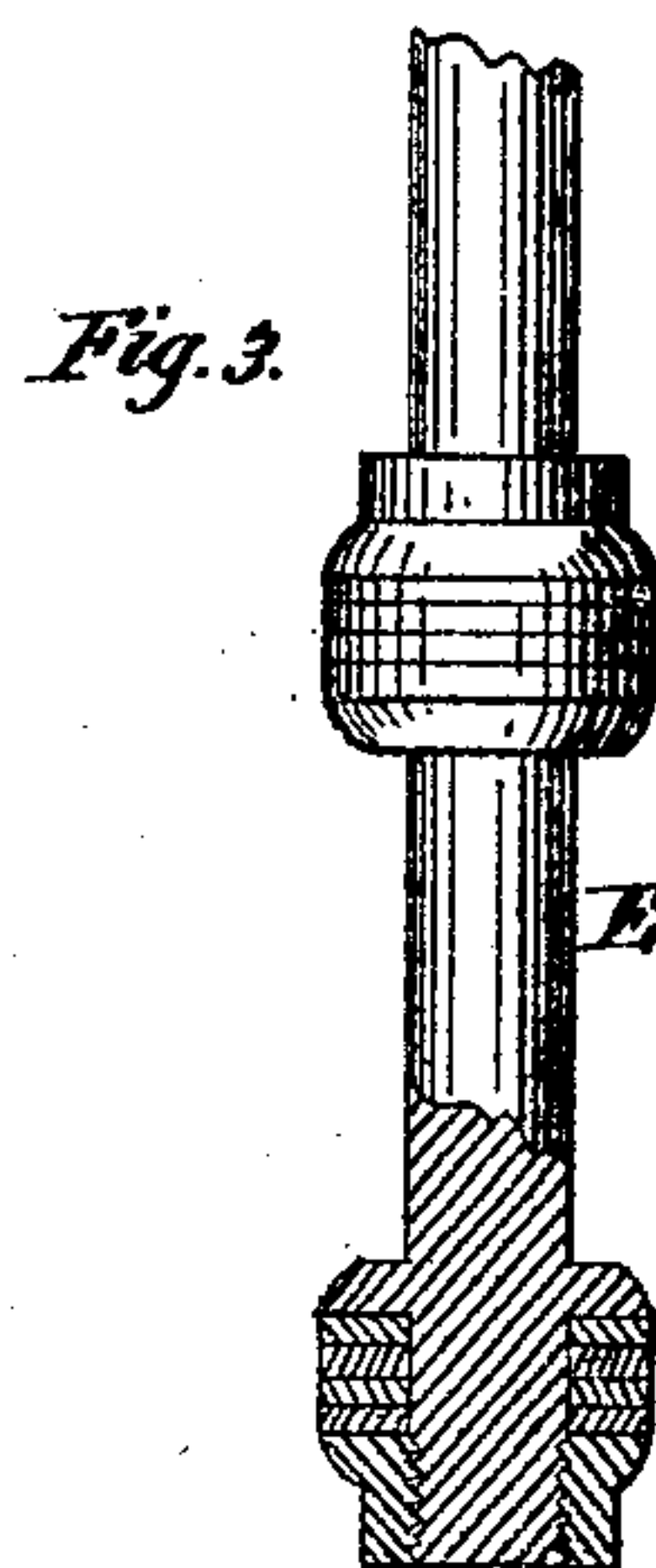
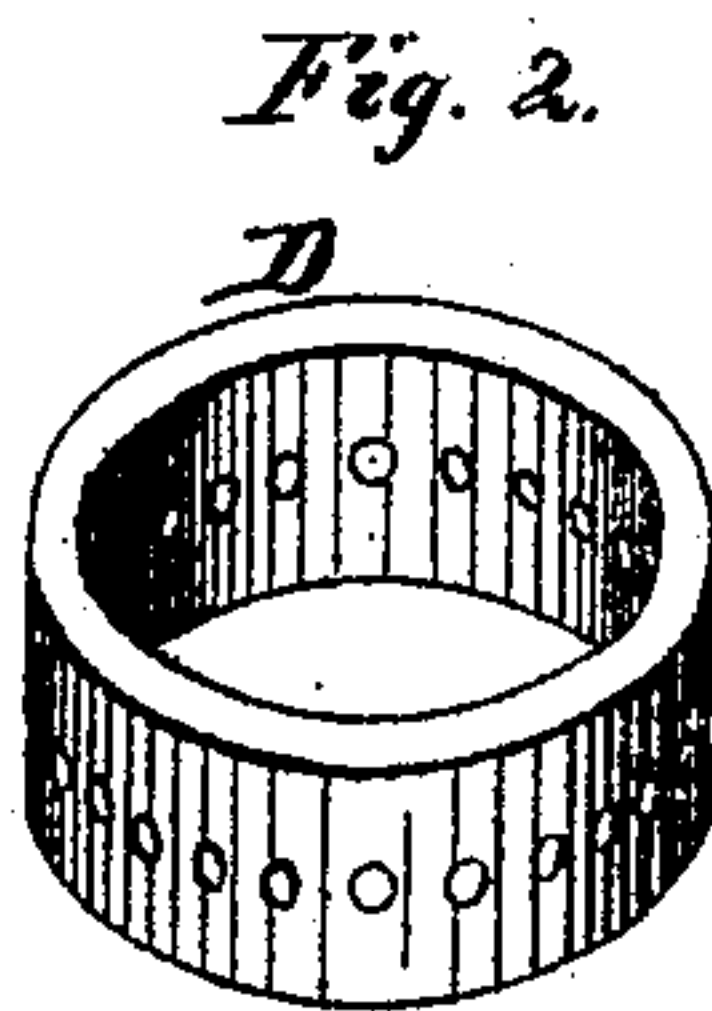
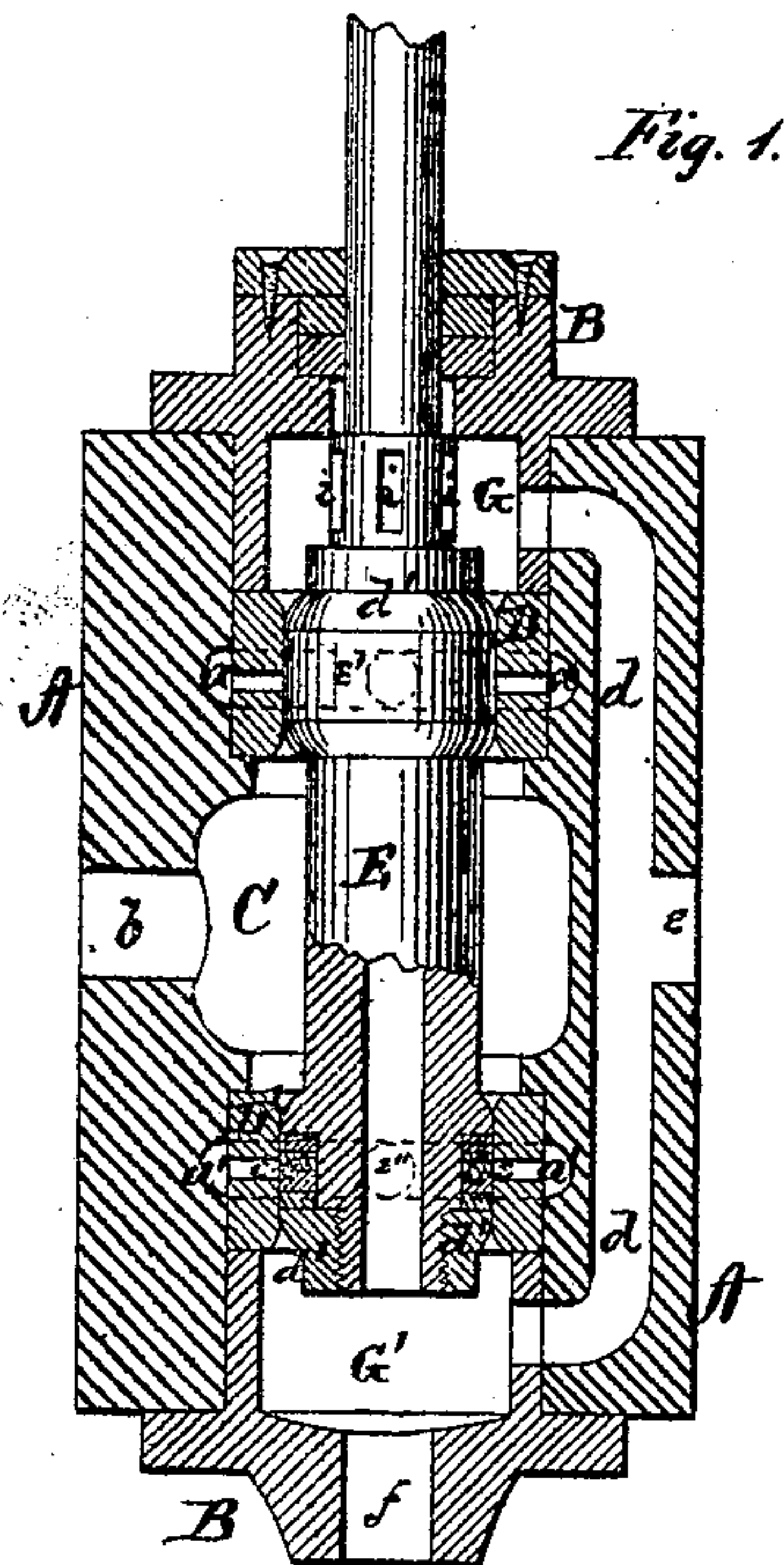


T. CRITCHLOW.

Improvement in Balanced Valves.

No. 132,446.

Patented Oct. 22, 1872.



Witnesses:

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UNITED STATES PATENT OFFICE.

THOMAS CRITCHLOW, OF BALDWIN, PENNSYLVANIA.

IMPROVEMENT IN BALANCED VALVES.

Specification forming part of Letters Patent No. **132,446**, dated October 22, 1872.

To all whom it may concern:

Be it known that I, THOMAS CRITCHLOW, of Baldwin, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing and to the letters of reference marked thereon which form a part of this specification.

In Bessemer steel-works or other works where much of the machinery is worked by hydraulic power there is attached to each separate machine a valve by which it is controlled, said valve being worked by hand. One of the above machines, known as a converting-vessel, is constructed so that it can be revolved half a revolution around its own axis, having trunnions cast on its sides and carried in suitable bearings. One of these trunnions is of a suitable length to receive a toothed wheel, which is keyed fast onto it. Geared into said wheel is a toothed rack, held in gear by suitable guides; and attached to one end of the same is a piston-rod, having its piston-head secured at the opposite end of the rod and working in a cylinder having suitable covers. Through one of these covers the piston-rod works in a water-tight stuffing-box. Near each end of the cylinder is a pipe attached, through which is conveyed water in just such quantities as are necessary to move the piston and thereby rotate the converting-vessel to the position and point required. The space on both sides of the piston is always filled with water; but, as the pressure can only be applied to one side of the piston at a time, the water is forced out of the cylinder on the side of the piston opposite to that receiving the pressure. The water so forced out always goes back through the pipe by which it came in.

The nature of my invention consists in the construction and arrangement of the equilibrium pressure-valve controlling the water-pressure leading to said cylinders, and any other machinery where the application of such valve would be suitable, either as a double or

single acting valve for water, fluid, air, or steam.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal section of my entire valve, showing the double-headed piston hollow; Fig. 2 is a perspective view of an annular perforated bushing used in my valve; and Fig. 3 represents a solid double-headed piston.

A represents a hollow cylinder of any suitable size and dimensions, having a cover, B, at each end. In the center of this cylinder is the receiving-compartment C, above and below which are, respectively, an annular space, *a* and *a'*, having outlets and pipes leading to the ends of the cylinder of the converting-vessel. In the annular spaces *a a'* are placed, respectively, annular bushings D D', which may be cast separate and inserted in said spaces, cast together with a central depression, or cast solid either with the cylinder or with the cylinder-covers. They are perforated with any suitable kind of perforations around their entire circumference. Through the cylinder A and the bushings D D' passes a double-headed piston, E, the heads of which fit in said bushings. *b* is the inlet from the pressure-pump to the cylinder A.

The operation of this valve is as follows: The piston E is placed in a central position, the packing-rings *e' e'* on the same, of metal or other suitable material, being held in place by nuts *d' d'*. In this position the piston closes the perforations in the bushings D D', retaining the water in the receiving-compartment C. By moving the piston upward the water passes through the perforated bushing D and out through the annular space and outlet *a*, and through the pipe E' leading to the upper end of the cylinder of the converting-vessel, where the water overpowers the resistance to the piston and thereby rotates the vessel to the position required, and holding it in said position by returning the piston E back to its central position. To reverse the movement of the converting-vessel the piston E is moved downward, opening the passage-way through

the perforated bushing D', annular space and outlet *a'*, and *via* the pipe E'' leading to the lower end of the cylinder of the converting-vessel, so that the water can pass into the same and rotate the vessel in the opposite direction. It will be observed that as the pressure is passing through the perforated bushing at one end, the return-water is also passing out into the chambers G G', and, if the piston be solid, through the passages *d d* and outlet *e*; but if the piston be hollow, then the water passes from the chamber *g'* through the outlet *f*, and from the chamber G through the slots *i* in the piston, through the same, the chamber G', and outlet *f*.

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

1. The combination of the cylinder A with receiving-chamber C, inlet *b*, and annular

spaces and outlets *a a'*, the annular perforated bushings D D', and covers B B, all substantially as and for the purposes herein set forth.

2. The combination of one or more annular perforated bushings, D, solid piston E, annular spaces *a a'*, and outlet-passages *d d*, constructed and arranged substantially as and for the purposes herein set forth.

3. The combination of the annular perforated bushings D D', hollow piston E with slots *i i*, and the outlet *f*, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of June, 1872.

THOS. CRITCHLOW.

Witnesses:

C. L. EVERT,
A. N. MARR.

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