P. BALL & B. FITTS.

Water-Meter.

No. 160,379. Patented March 2, 1875.

FIG. I.

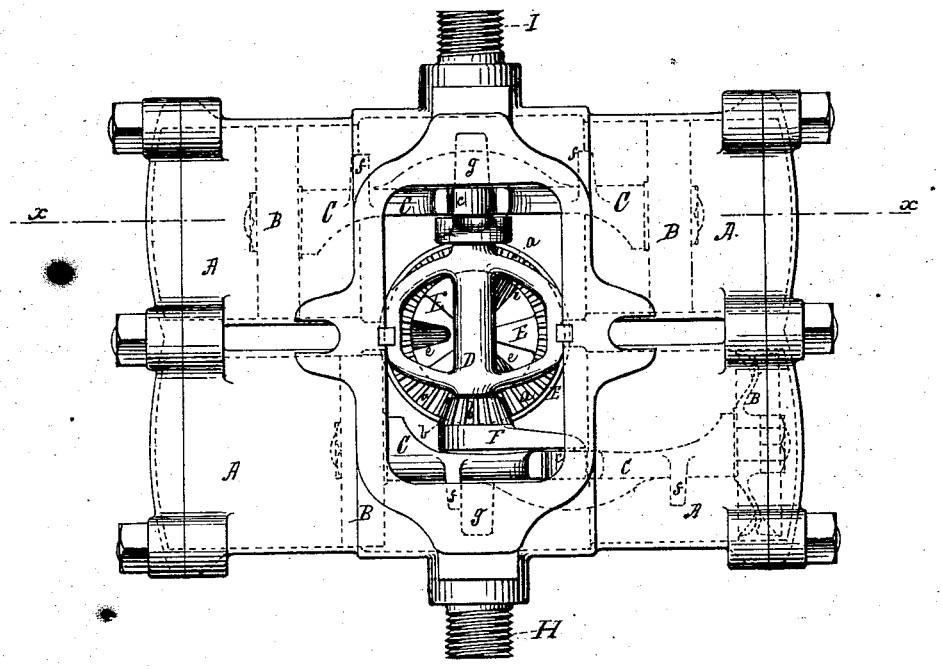


FIG. II.

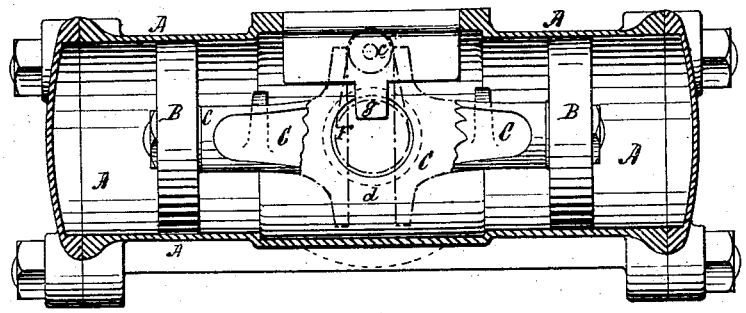
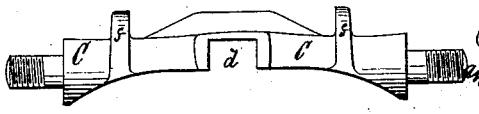


FIG. III.



WITNESSES:

D. G. Stuart

I. N. Knight

INVENTOR:

Phinehas Ball

and Benaiah Fitts,

per R. Hanway

Attorney.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

PHINEHAS BALL AND BENAIAH FITTS, OF WORCESTER, MASS., ASSIGNOR TO UNION WATER-METER COMPANY, OF SAME PLACE.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **160,379**, dated March 2, 1875; application filed August 8, 1874.

To all whom it may concern:

Be it known that we, PHINEHAS BALL and BENAIAH FITTS, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Water-Meters; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification, in which—

Figure 1 represents a plan of a meter having our improvements applied thereto, the registering apparatus being removed therefrom; Fig. 2, a vertical section through the line *x x* of Fig. 1. Fig. 3 represents a plan of one of the piston-rods detached.

Our invention relates to, and consists in, a new and improved combination and arrangement of the stops which regulate the length of stroke of the pistons, by which but one stop is required for each double-acting piston, instead of two, as heretofore.

To enable others skilled in the art to make, construct, and use our invention, we will now proceed to describe its parts in detail.

Our improvements are shown in connection with the meter patented to us November 22, 1870, and numbered 109,372, and subsequently reissued March 24, 1874, and numbered 5,806, in which A A A A represent the measuring-cylinders, and B B B B the pistons, which latter are connected in pairs by a piston-rod, C, so as to form, as it were, a single double-acting piston. D represents the crank-shaft through which motion is imparted to the rotary valve E, which, through inlet H and outlet I, controls the flow of water to and from the cylinders. The valve E, for this purpose, is provided on its face with a bevel-gear wheel, *a*, the teeth of which mesh with the teeth of a corresponding pinion, *b*, keyed fast to a crank-shaft, D. Motion is imparted to shaft D through two cranks, F, and crank-pins *c*, each of the latter carrying a friction-wheel, which moves in a slot, *d*, formed in the sides of one of the connecting-rods C. The sides of the slots *d d* actuate the cranks F as the piston-rods C are made to move back and forth by the pressure of the water on the pistons B, the operation of which will be hereafter described. *e e* are valve-ports, the piston-rods, shaft, and valve being so connected together that the valve-ports will be open when the pistons are in the center, and closed at the end of their stroke. The connecting-rods C on their outer side, and at equal distances apart from slot *d*, are provided with ears or projections *f*, which are so arranged as to be alternately brought in contact with a projection, *g*, cast on or otherwise secured to the under side of the upper portion of the casing G, and midway between the ends of the cylinders, and thus stop the further progress of the pistons, there being one stop, *g*, for each pair of pistons.

Stops *g* and lugs *f* are made of such thickness when first made, that each may be reduced in thickness without materially impairing their strength, in order to allow the length of the stroke of each piston to be increased, if necessary, that it may, at the end of each stroke, discharge a given quantity of water. The pistons once so adjusted remain so afterward.

Each side of the stops *g* is so adjusted with respect to the corresponding lugs *f* of their respective piston-rods C. Slot *d* in each of the piston-rods C is made of such width, in whole or in part, as to allow the crank and crank-pin to pass the center after the piston-rod has been thus arrested.

By this arrangement of the stops *g* but one is required for each pair of pistons, instead of two, as heretofore; and, besides, they are more easily fitted and adjusted, and attended with much less expense.

It is evident that the same effect, without change of principle, will be produced by simply transposing the stops *g* from the under side of the upper portion of the casing G to the outer side of the connecting-rods C, and then, by transposing the lugs *f f* from the latter to the under side of the casing, the two lugs being suitably arranged on the casing for the purpose.

The operation is as follows: As the water

flows in it moves the pistons, until each in turn is arrested by one of the lugs *f* coming in contact with one of the stops *g*. Each pair of pistons is arrested a little before its crank passes the center or its valve-ports close. The opposite pair of pistons then moves the valve over and opens it to the other side of the first pair before the crank-pin of the latter reaches the point at which they would be compelled to move. Thus in no case does the one set of pistons compel the other to move while its valve-ports are closed. The valve-ports being now open to the other side of the first pair, the latter is caused to move backward toward its first position, until again arrested by the other lug *f* of the same piston-rod, which, in turn, is brought in contact with the same stop *g*, and so on continuously and consecutively, the same stop *g* of each pair of pistons arresting both their forward and backward movements.

Having thus described our invention, we claim—

In combination with the double-acting piston B, the stop *g* and lugs *f f*, arranged substantially as and for the purpose described.

In testimony that we claim the foregoing as of our own invention, we hereto affix our signatures in presence of two witnesses.

PHINEHAS BALL.
BENAIAH FITTS.

Witnesses:
ABIEL E. WILSON,
JOHN C. OTIS.