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John Broughton Impts in Water Meters

PATENTED AUG 15 1871

Fig. 2

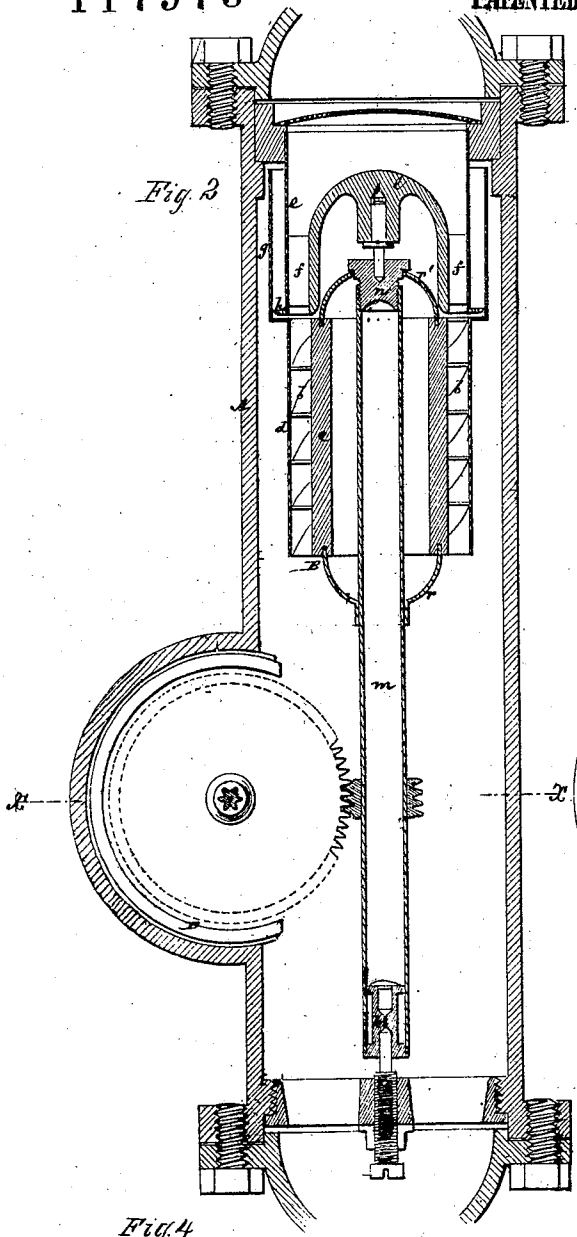


Fig. 1

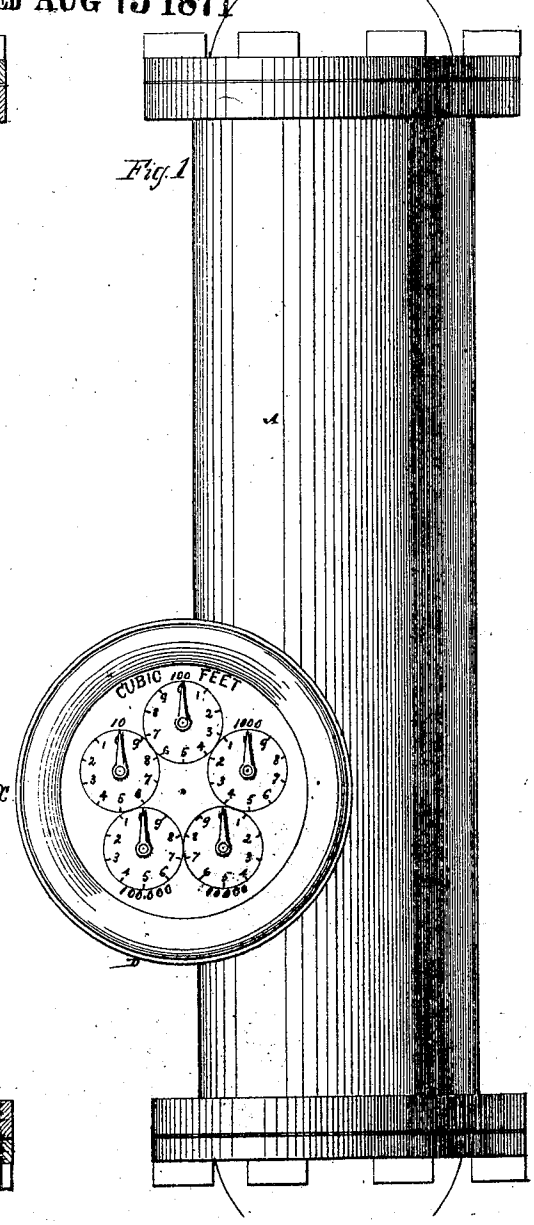


Fig. 4

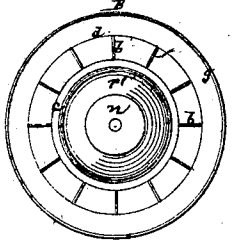


Fig. 3

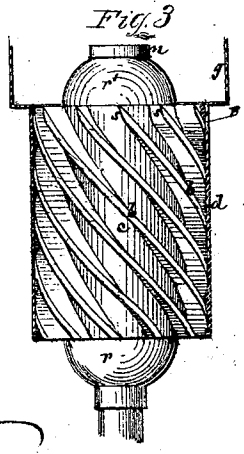
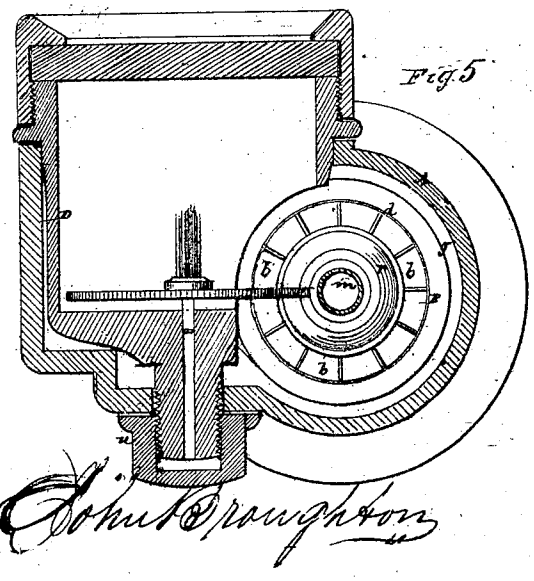


Fig. 5



Witnesses

R. Hoffman

R. Rabeau

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UNITED STATES PATENT OFFICE.

JOHN BROUGHTON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. 117,975, dated August 15, 1871.

To all whom it may concern:

Be it known that I, JOHN BROUGHTON, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Water-Meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents an outside vertical view or elevation of a meter constructed in accordance with my improvement; Fig. 2, a vertical section of the same; Fig. 3, a longitudinal view of the main body or portion of the wheel detached; and Fig. 4, a plan of the same. Fig. 5 is a horizontal section through the line *x x* in Fig. 2, looking upward, in illustration of an independent case for the registering mechanism, showing its connection with and arrangement relatively to the main case of the meter.

Similar letters of reference indicate corresponding parts throughout the several figures.

My invention relates to meters in which a revolving wheel, operated by the water in passing through it, is used; and the invention consists in a novel construction of the wheel and its adjuncts, whereby, while close-fitting joints and packing between the stationary and rotating parts are dispensed with and the wheel is relieved by friction, all the water is compelled to pass directly through the wheel and made to contribute, by its gravity, to the rotation thereof, without the possibility of escaping by or between the periphery of the wheel and its stationary case.

In the accompanying drawing, A represents a vertical hollow cylinder or main metallic case, provided at its ends with flanges for the inlet and outlet-connections. B is a vertical wheel, pivoted to rotate in a central position within the case A. At the upper end of the wheel are spiral blades or vanes, *b*, arranged around and extending downward over an annular body, *c*, so as to form a screw-wheel. These blades are surrounded and inclosed by a body-tube, *d*, also made to form a part of the wheel, and through the annular space established, by which the water passes in acting on the inclined surfaces of the vanes. Attached to the upper end of the case A, and extending downward within it, is a thin metal tube, *e*, corresponding in diameter with the tube *d*, which surrounds the screw-blades of the wheel. C is a dome-shaped casting, attached by wings *f* or otherwise to and within the lower end of the stationary tube *e*, for the purpose of forming an annular space between the two, corresponding to that through the wheel, and to carry the pivot-bearing or central bush in which the upper end of the wheel rotates. Attached to the upper end of the body-tube *d* of the wheel, for rotation with it, is an enlarged tubular portion, *g*, arranged to extend upward in the annular space formed between the interior surface of the case A and the exterior of the tube *e*. This rotating tube *g*, in connection with the stationary tube *e* and the case A, forms a cut-off, or what is equivalent to a tight or packed joint between the lower end of the stationary tube *e* and the upper end of the rotating wheel, the operation being as follows: The water entering the upper end of the case A passes downward through the annular space at the lower end of the fixed tube *e* and through the corresponding opening of the wheel B, and by its action on the blades *b* rotates the wheel. When the water, in filling the case A, rises to the level of the opening joint between the upper end of the wheel and the lower end of the stationary tube *e*, all the air in the case A above that point is caught and prevented from escaping, and, being compressed within the annular space between the exterior of the fixed tube *e* and the interior of the case A to an extent corresponding with the pressure of the water, it prevents the water rising within and flowing over the top of the rotating tube *g*, thus forming an air packing to the joint at the junction of the rotating wheel and stationary inlet-tube, and, in connection with the body-tube *d* of the wheel, compelling every particle of water to pass through and contribute to the rotation of the wheel. A horizontal rib or flange, *h*, is attached to the bottom end of the fixed tube *e*. This, in connection with the tendency of the water resting on the horizontal ledge formed by the junction of the tubes *d* and *g* to press outward by centrifugal force, prevents the water outside of the tube *e* from being drawn down or sucked by the downward rush of the water when passing the open joint at a high velocity, and so tends to maintain the balance in the air-space between the inside and outside of the revolving tube *g*. The bush or bearing *k*, at the lower end of the wheel, into which the vertical step or spindle enters, is provided with a

central passage up through it in communication with an air-space or chamber within said bush closed at its upper end above the bearing-point of the pivot. This allows the water to rise within the bush, and by forcing the air up into the chamber above the water is made to cover and lubricate the upper end of the pivot or bearing-point of said bush. The spiral blades *b* of the wheel are made somewhat thicker than is required for strength, and are beveled off in about a vertical direction at top on their under or advance sides, as at *s*. This causes said portions to impinge against the water as it passes through or enters the wheel at right angles to the motion of the latter, and makes said portions act as a break or check to retard the motion of the wheel. The velocity of the wheel under these conditions is not in exact ratio with the velocity and pressure of the water passing through it, but is checked or retarded in a greater ratio as the pressure and velocity of the water increase. By this means, in conjunction with the other features as hereinbefore referred to, the revolving wheel of the meter may be made to indicate and register under a very low head or pressure, and with a very small stream issuing at the outlet, as correctly as when working under a high pressure and running a full stream.

The general construction of the wheel is, preferably, as follows, the same being both cheap and efficient: First, a central hollow metal shaft, *m*, provided at its upper and lower ends with solid brass bushes, the upper one, *n*, of which is in the form of a screw-plug or bearing-block for the upper pivot. Around this shaft is the annular body *c* of the wheel, made of hard rubber, wood, or other suitable material, and having the spiral blades *b* molded, cast on, or otherwise secured to its outer surface. A hollow metal end cap or hemispherical flange, *r*, is soldered or otherwise secured to the shaft *m*, and fitted so as to enter in concentric relation a groove in the lower end of the body *c* and a similar end cap, *r'*, applied, in a loose but like-fitting manner, to the upper end of the body *c*, so that by screwing down the plug or bearing-block *n*, which has a flange or head bearing on the end cap *r'*, the whole is firmly connected or braced together. A wheel may thus be made which, while combining cheapness with strength, may be of a specific gravity, about equal to the body of water which it displaces. The entire registering mechanism, the main wheel of which gears into a worm on the hub or shaft of the wheel B, is fitted or contained within an independent cylindrical case, D, which is arranged to slip in and out of the meter-case or a pocket-like projection, *r*, thereof, and detachable from said main case by, for instance, simply unscrewing a nut, *u*, at the back of the pocket. This arrangement allows of the meter being quickly taken to pieces and the parts put together again without disturbing the wheels or mechanism of the indicator.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination and arrangement of the upper stationary tube *e* and outer case A with the enlarged upper tubular portion *g* of the wheel and body-tube *d* thereof, substantially as and for the purpose herein set forth.

2. The flange *h* at the lower end of the stationary tube *e*, in combination with the enlarged upper tubular portion *g* of the wheel, body-tube *d* thereof, and outer case A, essentially as described.

3. The spiral blades or vanes *b* of the wheel beveled off at top on their under or advance sides so as to retard the volume of water entering by contracting the orifice and presenting an impinging surface to the water at right angles or thereabout to it course, substantially as and for the purpose specified.

4. The wheel, constructed of a central hollow metal shaft, *m*, an annular body, *c*, of rubber, wood, or other suitable material, hollow metal end caps *r r'*, a screw-plug or bearing-block, *n*, and spiral vanes *b*, essentially as described.

5. The bearing-bush *k* for the lower pivot, constructed with a passage up through it in communication with a chamber or space above the bearing-point of the pivot and within the bush, substantially as shown and described.

JOHN BROUGHTON.

Witnesses:
FRED HAYNES,
R. E. RABEAU.