G. Stover,

Water Wheel.

No. 102,060. Patented Apr. 19. 1870.

Figure 1 —

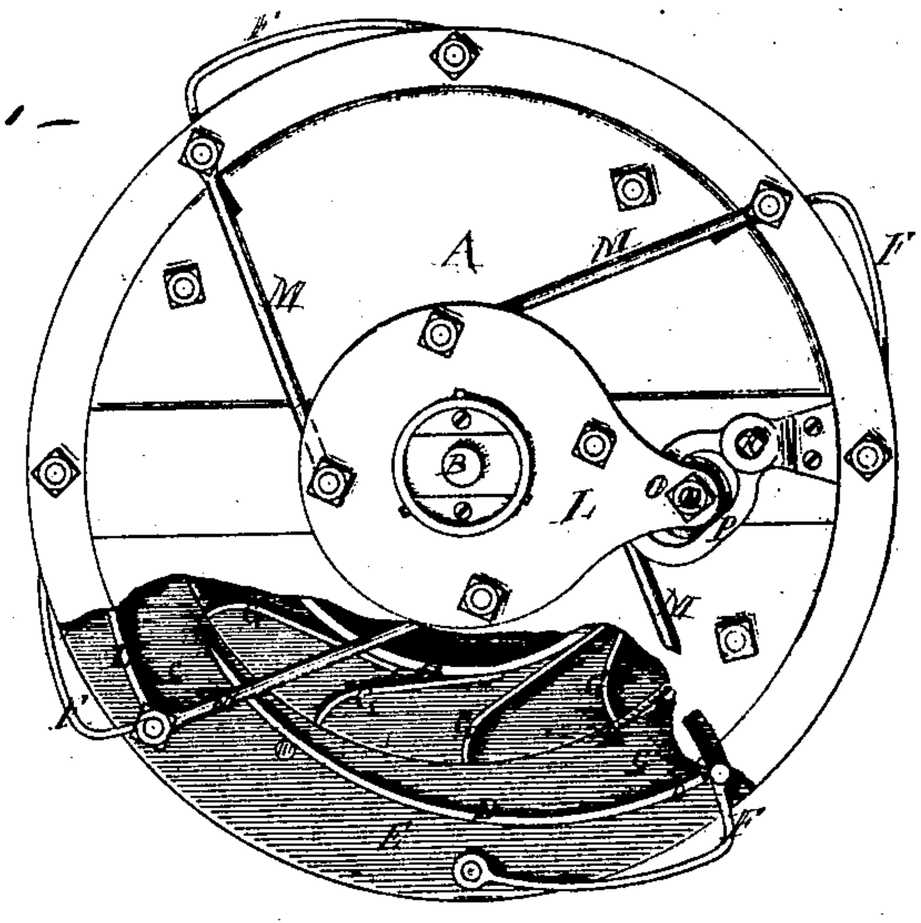



Figure 2 —

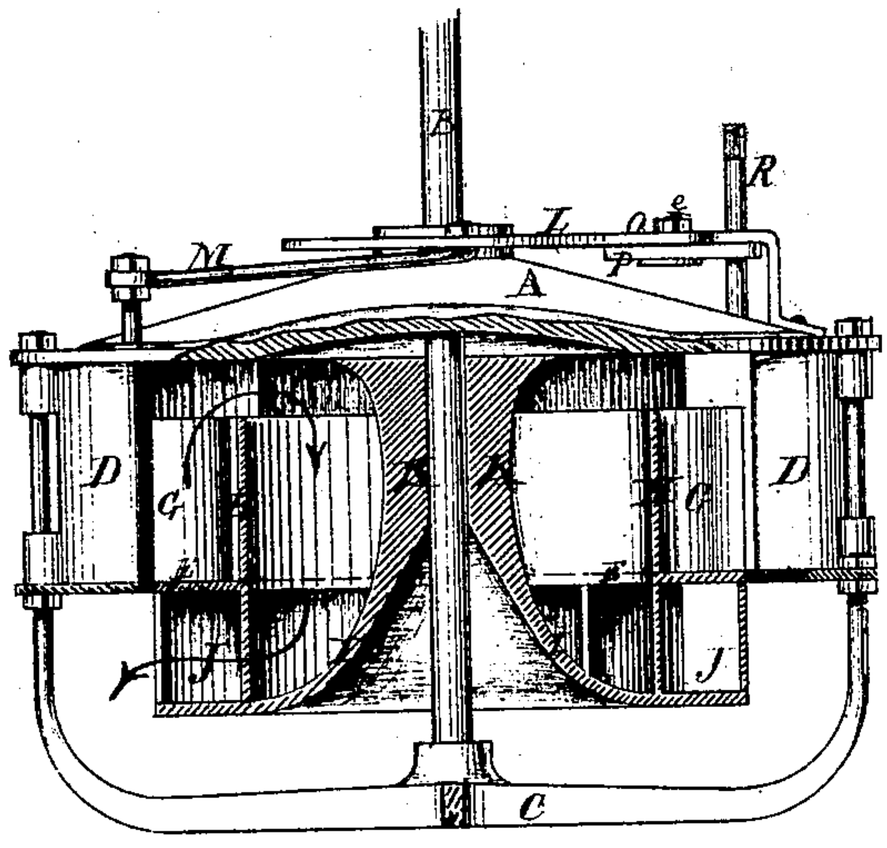
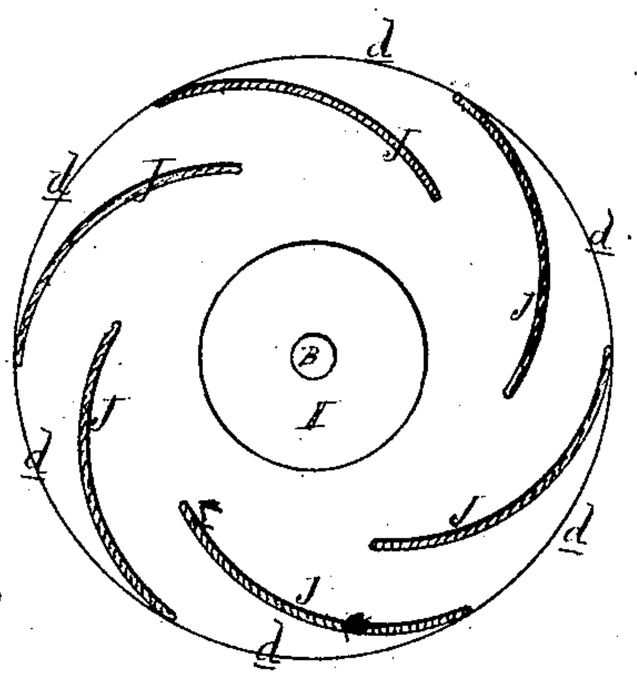



Figure 3 —

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GILBERT STOVER, OF CRYSTAL, MICHIGAN.

*Letters Patent No.* 102,060, *dated April* 19, 1870.

## IMPROVEMENT IN TURBINE WATER-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

*To whom it may concern:*

Be it known that I, GILBERT STOVER, of Crystal, in the county of Montcalm and State of Michigan, have invented a new and useful Improvement in Turbine Wheels; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, and being a part of this specification.

Figure 1 is a plan view of the top of my wheel, with a portion of the cap broken out to show the peculiar shape of the buckets in the upper series.

Figure 2 is a vertical section.

Figure 3 is a transverse section through the lower series of buckets, showing their curved form and the openings for the centrifugal discharge of the water.

Like letters indicate like parts in each figure.

The improvements claimed in this construction of a turbine water-wheel make it, when taken as a whole, a new, distinct, and novel machine, differing as it does from any other water-wheel now in use; and are—

First, its great simplicity of construction as a water-wheel of great power and capacity.

Second, the increase of motion and power by the action of the water on the wheel, from the instant it is forced into the curb, until is discharged.

Third, the construction of a bell-shaped cone, which receives the overflow of water after its action upon the upper series of buckets, and guides it to the lower series of buckets, which are of such shape, and so placed relatively to each other, that the water strikes the latter-named buckets at their inner ends by a direct action, and then reacts on their whole length, and is centrifugally discharged.

Fourth, the construction of the upper series of buckets, in such a manner that, after the water has had a direct action upon them, it will have no discharge, as is usual, through openings in the diaphragm interposed between the two series of buckets, but will overflow over the interior wall of the curb onto the bell-shaped cone, whence it will be guided in its passage to the lower series of buckets.

Fifth, the peculiar arrangement of the gates and their method of operation, so that less than a quarter turn of the stem will fully open or close the gates, simultaneously, thereby securing an equal pressure upon all the buckets, and great steadiness in the operation of the wheel.

Sixth, in the new, novel, and peculiar arrangement of the various parts of the wheel.

In the drawings—

A is a convex deck or cap covering the wheel, and through the center of which passes the shaft B, which is stepped, in the ordinary manner, in the yoke C.

Curbs or water-guides, D, are secured at the top, to the deck, and at the bottom to the fixed and tight diaphragm E, and each guide is curved, as shown, and so secured, that the inner end of each is overlapped by the outer end of the next, as shown at *a b*, the spaces between the overlapping ends being the openings *c*, or throats, through which the water enters, and which are opened and closed by means of the gates F, as more fully hereinafter described.

The water having entered the throats, as above mentioned, is conducted onto and against the points of the buckets G, which do not extend upward but a part of the way to the deck, leaving a space between the upper edges of the buckets and the deck.

These buckets are secured, at their inner ends, to the cylinder H, whose height is equal to that of the buckets G.

When the water has filled the space between the guides or curbs D and the cylinder H, it overflows the latter onto the bell-shaped cone I, whose base terminates upon a plane of the bottom of the lower series of buckets J, whence, after acting as hereinbefore described, it has a centrifugal discharge through the openings *d*.

The two series of buckets, the cylinder, and the bell-shaped cone are all secured to the hub K upon the shaft B, with which they rotate.

L is a collar-lever, sleeved on the shaft B, to which are secured the connecting-rods M, whose opposite ends are pivoted to the gates F, which are hung between the deck A and diaphragm E, the collar-lever being provided with an arm, O, and wrist-pin *e*, which latter engages with the slotted arm P, which is rigidly attached to the stem R, the whole being so arranged that, by semi-rotating the stem, the gates will be opened or closed at pleasure.

What I claim as my invention, and desire to secure by Letters Patent, is—

The arrangement of the buckets G and cylinder H with reference to the curbs or guides D and deck A, that the water will overflow the top of the cylinder H, and operating substantially as herein set forth.

Also, the bell-shaped cone I, in combination with the above-named parts, to guide the water in its descent, to the inner ends of the lower series of curved buckets J, when operating and constructed as herein specified.

Also, the gates F, to open or close the throats *c*, when operated by the connecting-rods M, collar-lever L, arm O, slotted arm P, and stem R, substantially as herein described.

Also, a wheel wherein the water has a direct action upon the upper series of buckets, and thence is discharged by a central overflow, in such a manner as to have direct and reaction upon the lower series of buckets, with a centrifugal discharge, substantially as herein set forth and shown.

GILBERT STOVER.

Witnesses:

JAS. I. DAY,

H. F. EBERTS.