N. F. BURNHAM.

Improvement in Water-Wheels.

No. 114,525. Patented May 9, 1871.

Fig. 1

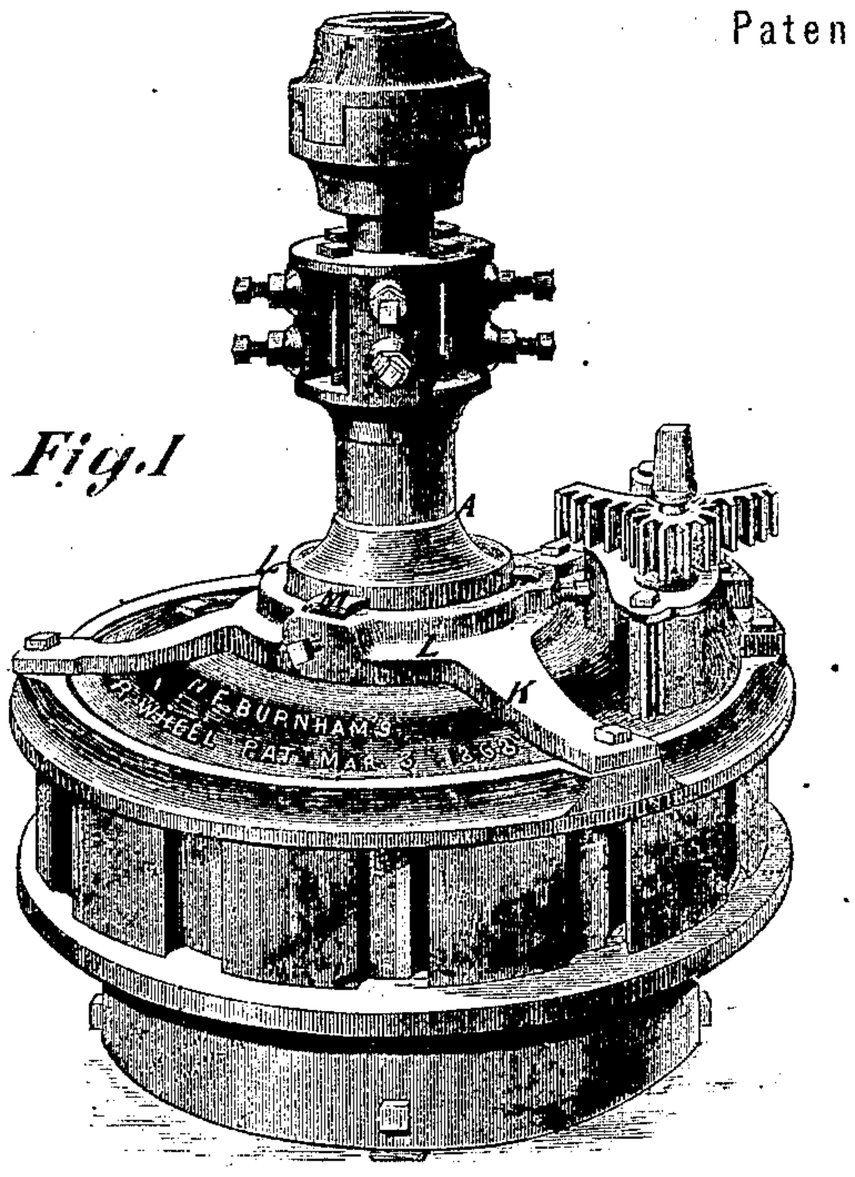


Fig. 2

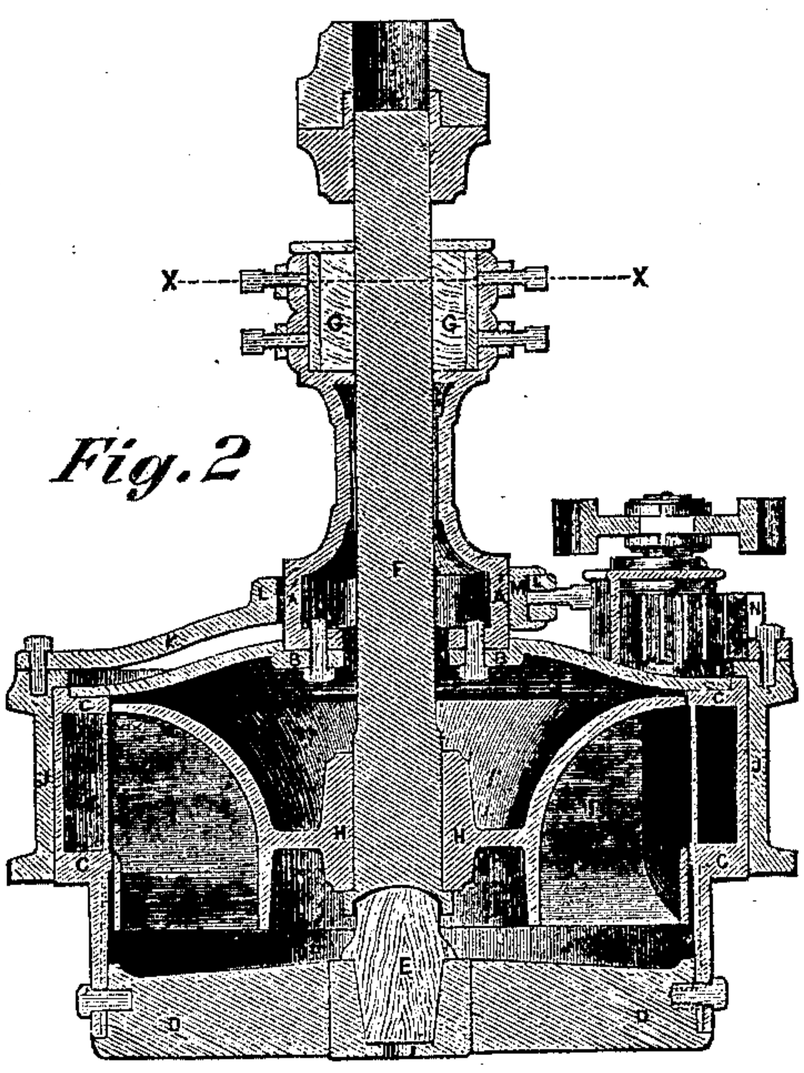


Fig. 3

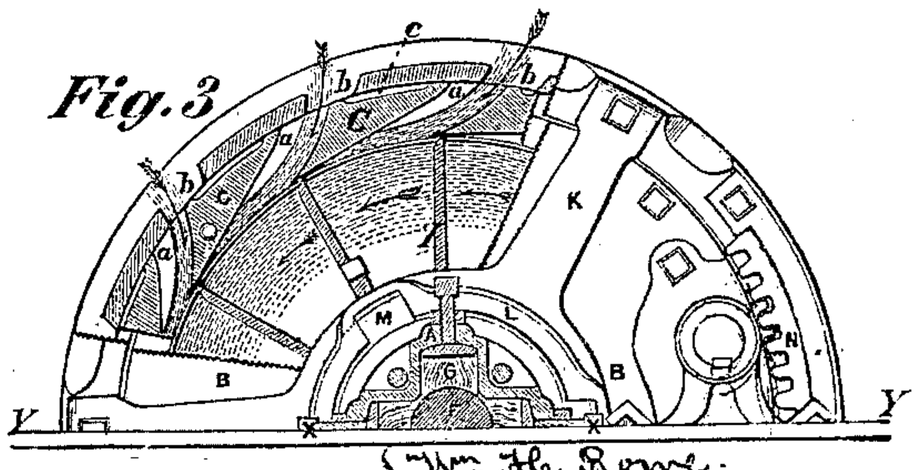
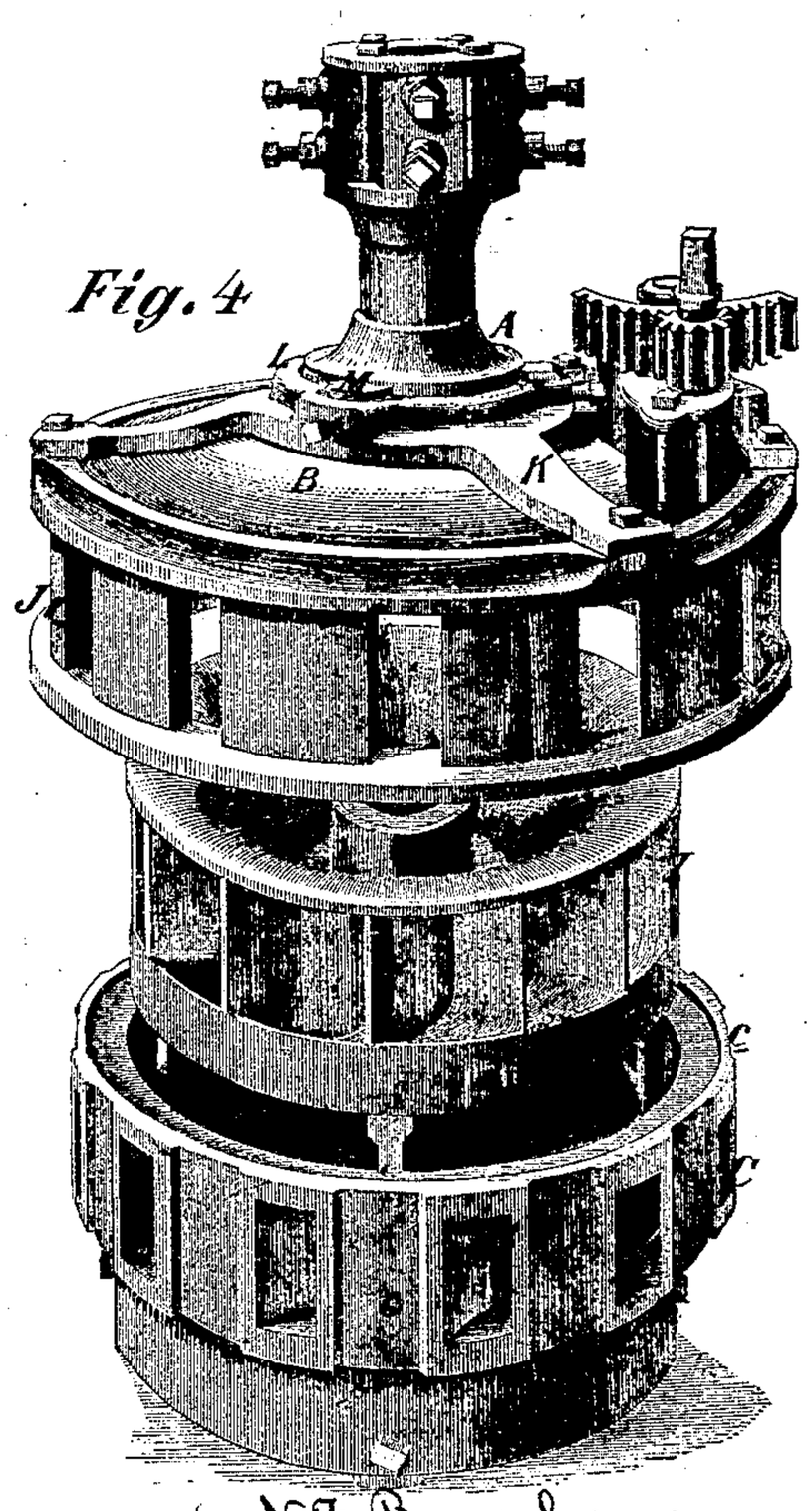


Fig. 4



Witnesses { Wm. H. Rome. Joel A. Peyton.

Inventor. { N F Burnham by his atty Wm W. Baldwin

UNITED STATES PATENT OFFICE.

NATHAN F. BURNHAM, OF YORK, PENNSYLVANIA.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **114,525**, dated May 9, 1871.

To all whom it may concern:

Be it known that I, NATHAN F. BURNHAM, of the borough and county of York, in the State of Pennsylvania, have invented certain new and useful Improvements in Turbine Water-Wheels, of which the following is a specification:

My invention relates to a water-wheel of the class in which a circular oscillating register-gate is used to regulate the admission of the water to the wheel.

The object of the first part of my invention is to secure a more perfect connection between the register-gate and the casing of the wheel than heretofore has been attained, so that the gate may be more easily operated; and the invention consists in combining the casing with a central dome and an encircling-ring, having brasses and set-screws, and provided with arms that are secured at their outer ends to the register-gate, as hereinafter more fully set forth.

The object of the next part of my invention is to prevent the accumulation of sand or other substances between the surfaces of the casing and the gate; and the invention consists in forming recesses in the casing, between the chutes, to allow the sand and other substances to escape.

The object of the next part of my invention is to admit the water through the register-gate to the chutes in a more perfect manner than has heretofore been done; and the invention consists in forming the vertical edges of the openings in the register-gate to correspond with the curvature of the adjacent sides of the chutes, as will hereinafter more fully appear.

In the accompanying drawing, Figure 1 is a perspective view of my improved wheel, having its several parts fitted together and ready for use; Fig. 2, a vertical central section of the same in the line *y y* of Fig. 3; Fig. 3, a horizontal section in the line *x x* of Fig. 2, with a portion of the casing broken away, to show some of the features of my invention more clearly; and Fig. 4, a perspective view of the wheel, having its several parts disconnected, to show more clearly the construction and relative arrangement.

The wheel and shaft are incased by the parts A, B, and C, which hereafter will be separately and more particularly described. The dome A is a casting which surrounds the wheel-shaft, and has its upper end formed in a well-known manner to receive and adjust the bearings for the upper end of the shaft, and its lower end formed into a hub or journal for the register-gate, as will hereinafter more fully appear. A circular cover, B, is cast with an opening in the center for the wheel-shaft, and a concentric recess to receive the end of the hub of the dome, and the dome and cover are securely bolted together. The outer edge of the cover rests upon the top of the case C, and fits snugly within a flange that projects from the outer circumference of the case, and the case and cover are held together by a suitable number of bolts, as shown in Figs. 1 and 3 of the drawing. This case C encompasses the wheel and is cored out, opposite the mouths of the buckets of the wheel, to form chutes *a* for directing the water upon the buckets in a suitable manner. The case C below the chutes forms a cylinder, and is braced and strengthened by the bridge D, which consists of a three or four armed casting, which also forms a support at the intersection of the arms for a wooden step, E. The lower end of the wheel-shaft F rests upon this step and extends through the dome of the casing, and is supported at its upper end by wooden bearings G, which are adjustable by set-screws, as clearly shown.

Instead of using the bearings G, I sometimes remove them, together with the upper part of the dome, and substitute an ordinary stuffing-box, placed just above the followers M.

The wheel H is of the form described and claimed in the patent granted to me February 22, 1859, and reissued September 1, 1863, and does not require a description here.

The register-gate J consists of a circular casting that fits nicely around the upper part of the case C opposite the chutes, and is provided with a flange around the inner circumference of its upper end, that rests upon and is supported by a corresponding flange on the case C.

To the upper rim of the register-gate I secure the outer ends of the arms K K K, which are united together at their inner ends by a ring, L, that encircles the hub of the dome A.

The center ring L is provided with a suita-

ble recess for holding brasses, M, and also with set-screws that pass through it for adjusting the brasses around the hub of the dome A. The hub of the dome forms the journal around which the gate oscillates, and as it is of much less diameter than the case the gate can be more easily operated than if it had its bearing only on the case.

By means of the adjusting mechanism I am enabled to adjust the gate and case so that their sides will be very close together without being in contact with each other, and I thus secure a more perfect arrangement than in devices where such adjusting mechanism is not employed.

The register-gate is oscillated by means of a circular cast rack, N, which is attached to the gate, and suitable gearing which is attached to the cover B of the case.

The outside of the case C is recessed between the chutes to form openings, between the register-gate and the case, for the escape of sand or other abrasive substance that might be carried along with the water and would get between the two and obstruct the working of the gate.

The chutes in the case C are constructed with curved walls near their outer extremities, (the one concave and the other convex and straight,) slightly converging walls near their inner extremities, and formed so that the water shall be thrown from them upon the wheel in a line nearly tangential to its circumference, as more fully described and claimed in the patent granted to me March 3, 1868.

The register-gate J has a series of openings, B, corresponding in number and equal in area to those of the outer mouths of the chutes. One of the vertical edges of each of these openings in the register-gate is convex and the other concave, to correspond with the vertical walls of the openings or chutes in the case C, so that the water is guided in the proper channel while passing through the gate and before it reaches the chutes, and by this means the water is properly directed to the chutes, whether the gate is entirely opened or not, and a greater percentage of power obtained.

I claim as my invention—

1. The combination of the hub of the dome secured to the casing, the register-gate inclosing the casing, and the devices for adjusting the register-gate on the hub of the dome, all these parts being constructed and operating in combination, substantially as set forth, to allow the register-gate to move freely around the casing without actual contact on its vertical face.

2. The casing, constructed substantially as set forth, with recesses in its outer surface between the chutes, to leave room for the escape of obstructions between the casing and register-gate.

3. The combination of the casing, having chutes constructed as described, with the register-gate, having one of the vertical edges of each of its openings concave and the other convex, to conform to the construction of the chutes, as set forth.

In testimony whereof I have hereunto subscribed my name.

NATHAN F. BURNHAM.

Witnesses:
JOE I. PEYTON,
BALTIS DE LONG.