O. J. BOLLINGER.

Water-Wheel.

No. 163,914. Patented June 1, 1875.

Fig. 1

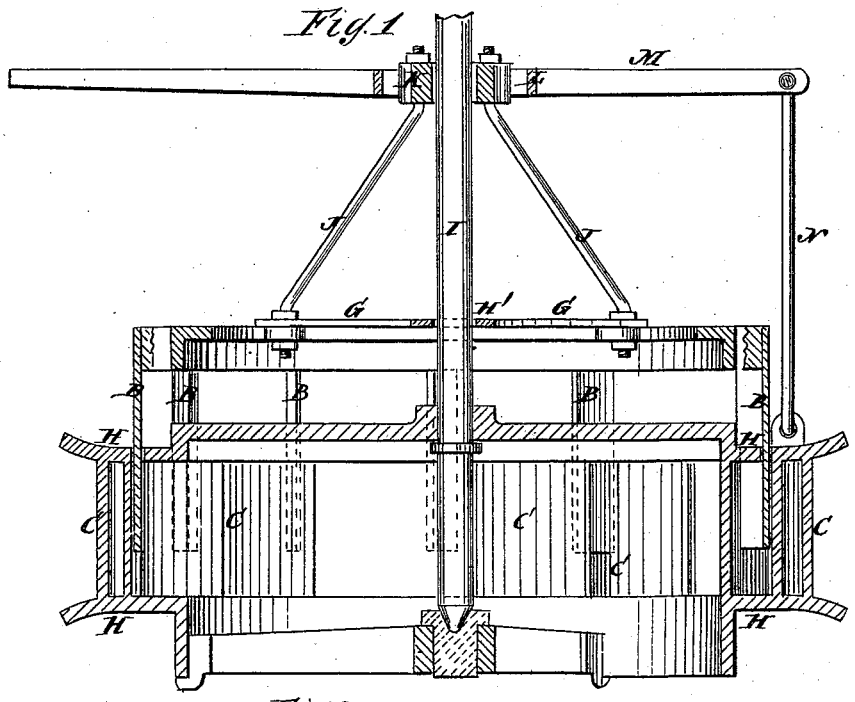
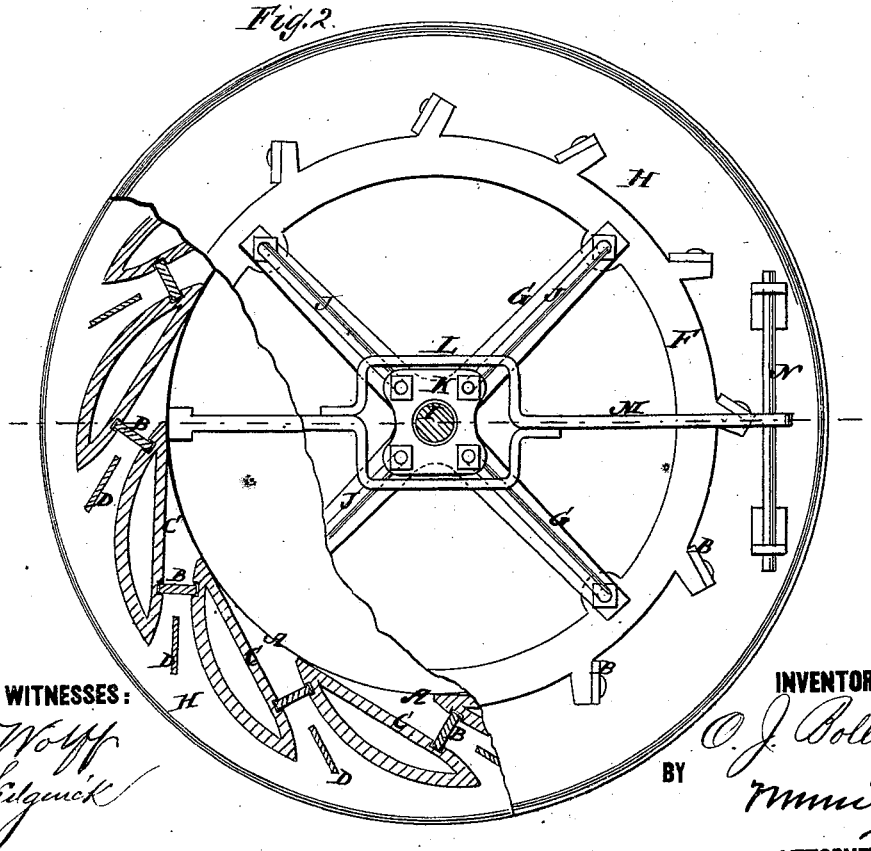


Fig. 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

OLIVER J. BOLLINGER, OF YORK, PENNSYLVANIA.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **163,914**, dated June 1, 1875; application filed March 13, 1875.

To all whom it may concern:

Be it known that I, OLIVER J. BOLLINGER, of York, York county, Pennsylvania, have invented a new and Improved Water-Wheel, of which the following is a specification:

The invention will first be fully described, and then pointed out in the claims.

Figure 1 is a transverse section of my improved wheel-case, taken on the line *x x*, Fig. 2; and Fig. 2 is partly a horizontal section and partly a plan view.

Similar letters of reference indicate corresponding parts.

C represents a series of fixed guides to guide the water to the wheel, which is to be placed inside, as other wheels of this character are.

These guides may be made separately from the top and bottom flanges H and bolted to them, or they may be cast together with them. They are nearly straight on the outside of the throat A, and convex on the inside, and they are made with a large hollow space in the interior portion to economize the metal.

D D represent secondary guides, which are arranged in the outer ends of the water-passages to divide them into two channels narrower than the throat A, so that any objects floating in the water too large for passing through the throats will be arrested at the outside of the case, where they can be easily reached for removal, while any small enough to pass them will pass freely through the wheel. B represents the gates to let in and shut off the water. They are placed at or near the inner end and narrowest part of the chutes, by which they are subject to the least pressure on account of the smallest area being opposed to the water, so that they offer the least resistance to the moving of them in opening and closing; at the same time they are at the point of impact or focus of the water with the wheel, which gives the best results when the gates are partly open.

The gates are attached to a ring, F, which has radial arms G and a hub, H′, surrounding the shaft I, to strengthen it against lateral strains, and it is connected by the rods J, which incline toward the shaft with the running block K on the shaft, and connected to the yoke L of the lever M, for opening and closing the gates, and which is pivoted to the oscillating fulcrum-standard N, contrived to vibrate so as to allow the guide K freedom to work up and down the shaft without binding or cramping on it.

I also propose to extend the upper and lower flanges H of the case beyond the guides C, and flare them out, as represented in Fig. 1, to gather the water into the chutes to better advantage than those will which terminate at the guides and in the plane of the middle portions.

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

1. The gates B, arranged in the inner and narrowest position of the throats, substantially as specified.

2. The combination of the secondary guides D with the main guides C, substantially as specified.

3. The combination of the gates B, ring F, radial arms G, hub H′, inclined rods J, guide-runner K, yoked lever M, and oscillating fulcrum-stand N, with the wheel and case of a turbine, as and for the purpose set forth.

OLIVER J. BOLLINGER.

Witnesses:

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