

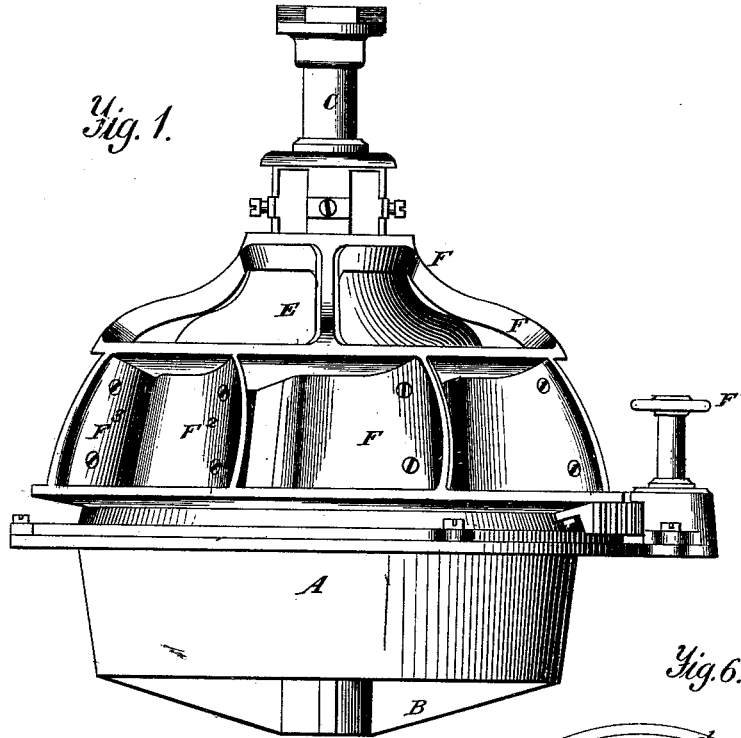
J. W. ROSS.

WATER-WHEEL AND GATE.

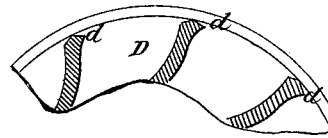
No. 188,960.

Patented March 27, 1877.

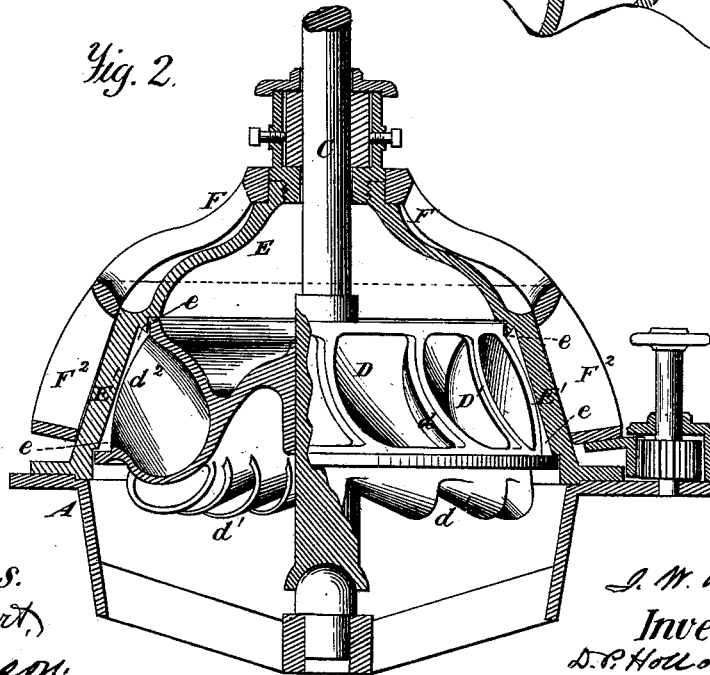
*Fig. 1.*



*Fig. 6.*



*Fig. 2.*



Witnesses:  
*A. Ruppert,*  
*J. S. Mason,*

*J. W. Ross,*  
 Inventor:  
*D. P. Holloway & Co*  
*Atty's.*

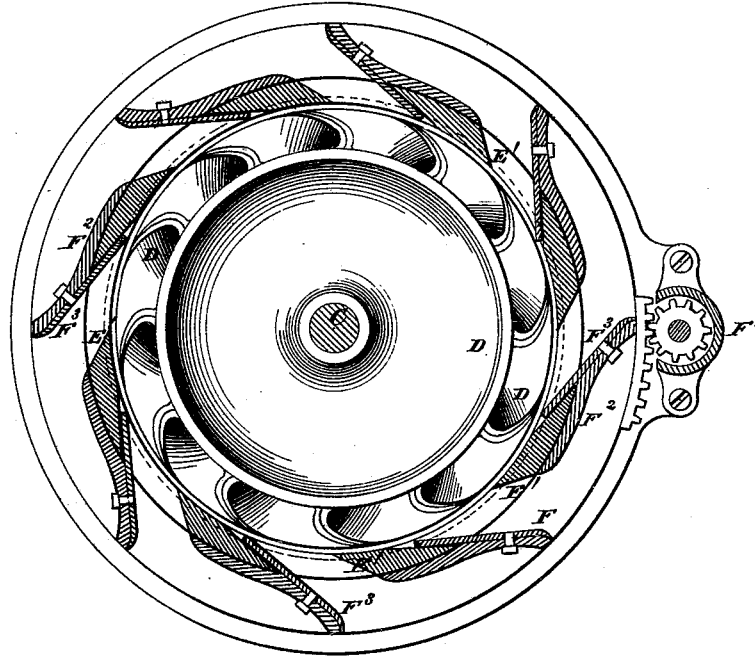
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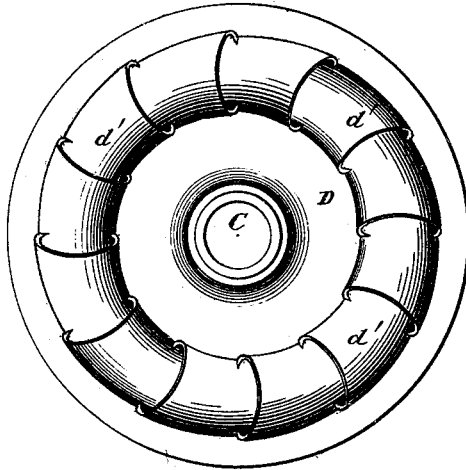
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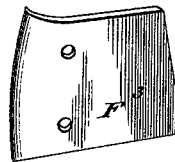
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



Witnesses:  
*A. Ruppert,*  
*J. H. Mason*

*J. W. Ross*  
 Inventor:  
*D. P. Holloway & Co*  
*Atty.*

# UNITED STATES PATENT OFFICE.

JOHN W. ROSS, OF PIQUA, OHIO.

## IMPROVEMENT IN WATER WHEEL AND GATE.

Specification forming part of Letters Patent No. 188,960, dated March 27, 1877; application filed February 17, 1877.

### To all whom it may concern:

Be it known that I, JOHN W. ROSS, of Piqua, in the county of Miami and State of Ohio, have invented a new and useful Improvement in Water-Wheels, of which the following is a specification:

This invention relates to that class of water-wheels commonly denominated "turbines," in which the water is admitted simultaneously to all sides of the wheel through apertures formed in a fixed casing and regulated by a register-gate. My improvements relate to such modifications in the structure of the parts as will maintain more nearly than in the ordinary wheels the percentage of applied power as the amount of water admitted is diminished. The special points of novelty will be hereinafter indicated.

In the annexed drawings, making part of this specification, Figure 1 is an elevation, showing the wheel-casing complete. Fig. 2 is a vertical section of the same. Fig. 3 is a horizontal section. Fig. 4 is a bottom view of the wheel. Fig. 5 is an elevation, showing one of the tangent plates; and Fig. 6 is a detached section of the buckets, showing their form.

The same letters are employed in all the figures in the indication of identical parts.

A is the ordinary tubular case, which lies on the bottom of the flume, hanging by its horizontal flange, carrying the bridge-tree B and step for the vertical shaft C, on which is fastened the wheel D. This wheel is of that class in which the water is received tangentially at the periphery, and the buckets are so formed as to turn it centrally and downwardly, discharging it through a series of overlapping plates,  $d^1$   $d^1$ .

The following are the peculiarities to which alone it is necessary that I should call attention: The discharge-orifices are formed by a series of diaphragms,  $D'$ , commonly styled "buckets." These buckets, on their exterior edges, as seen in section in Fig. 2, are rounded so as to incline from the vertical at an angle thereto of about fifteen degrees. They are beveled in both directions upon their edges. The impact face of the bucket receives the entering water so as to obtain the full force of its pressure. On the other side the bucket is formed with an increased thickness,  $d$ , at

the edge, cut away toward the center of the wheel, as most clearly shown in Fig. 6, forming thus a cutting lip or edge,  $d$ , which shears the expended water, and gives it free passage to the issue, thus preventing the lagging or back pressure of the water at this point, also increasing the strength of the bucket at this exposed part, and enabling it to cut or break sticks of drift-wood which may enter the gates. The bucket is formed so that the back of the bucket, instead of being straight or flat in either section, is convex, both vertically and transversely.

The upper section E of the casing is cast in one piece, having a flange to bolt it to the tube, and openings for the introduction of water to the buckets of the wheel. The parts of the casing forming these passages are indicated at  $E'$ , and have, as seen in vertical section, Fig. 2, also an inclination of fifteen degrees, but not curved, as in the case of the buckets of the wheel, but straight, so as to form water-spaces  $e e$  above and below the center of the portion  $d^2$  of the buckets, thus giving increased clearance at the top and bottom of the issues.

The register-gate F is swung from the top of the casing E, and operated in a familiar manner by segment and pinion  $F^1$ . The water passes between chutes  $F^2$ , corresponding with the chutes  $E'$  of the casing, and extending outward such a distance as will form guides and permit them to conform to the natural tendency of water in passing through an orifice to form what has been styled the "vena contracta." On the inner faces of the fixed parts  $F^2$  of the gate-chutes are bolted plates  $F^3$ , having the proper form, and overlapping the faces of  $E'$ , so as to form tangentially-disposed orifices of influx which maintain in their relation to the fixed chutes  $E'$  opposed to them mouths of uniform shape, whether the opening be more or less, thus maintaining the proper form and direction of the entering streams of water in different openings of gate.

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

1. The buckets  $D'$ , terminating at the outer or impact edge  $d^2$  with a convex edge, inclined from the vertical, and thence curving with a double curvature horizontally and vertically to the aperture at  $d^1$ , substantially as set forth.

2. The buckets having a cutting-lip, *d*, formed on the back face at the outer end of the bucket, substantially as set forth.

3. In combination with the wheel having the outer ends of the buckets curved and inclined, the casing *E*, having chutes *E'*, similarly inclined, but not curved, so as to form the spaces *e* above and below, substantially as set forth.

4. In combination with the casing having chutes *E'*, the register-gate formed with permanent chutes *F<sup>2</sup>* and independent tangent plates *F<sup>3</sup>*, substantially as forth.

5. In combination with the dome-formed casing *E*, the register-gates *F*, suspended from a bearing at *F<sup>1</sup>*, near the top of the casing, and segment and pinion for turning the gates on such bearing, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN W. ROSS.

Witnesses:

JOHN FRAREY,  
JAS. H. HATCH.