W. R. CALKINS.
Water-Wheel Curb.

No. 215,262. Patented May 13, 1879.

Fig. 1.

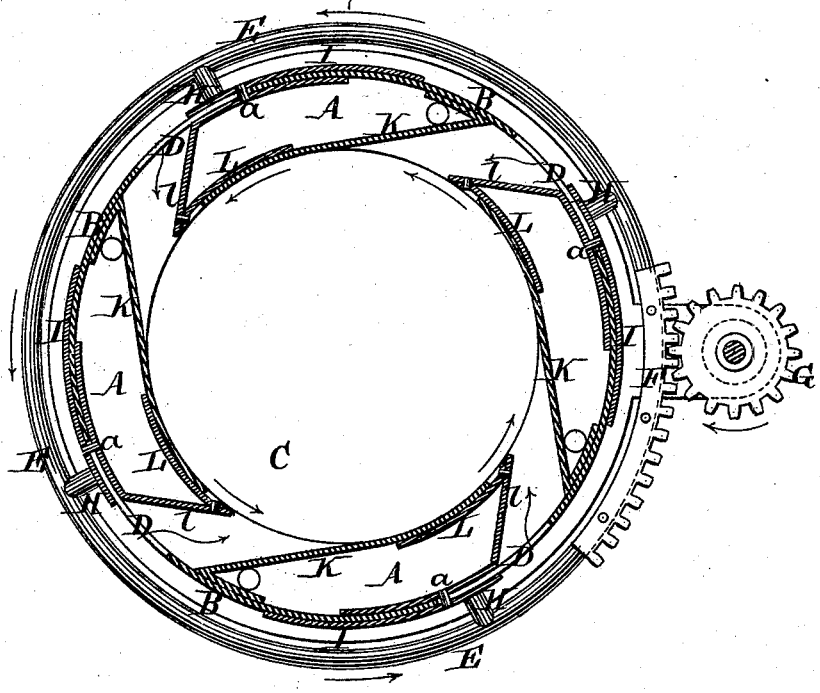
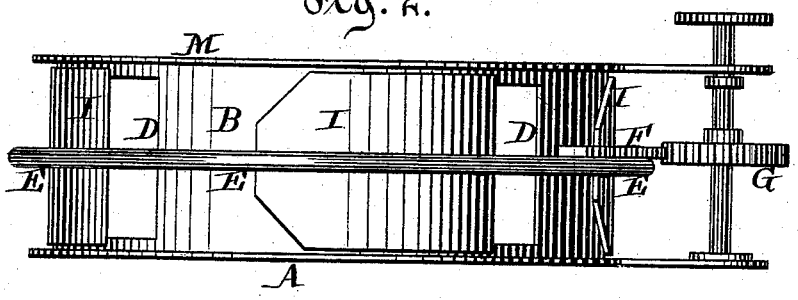


Fig. 2.



Witnesses.
Joseph M. Alexander.
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UNITED STATES PATENT OFFICE.

WILLIAM R. CALKINS, OF GREAT BARRINGTON, MASSACHUSETTS.

IMPROVEMENT IN WATER-WHEEL CURBS.

Specification forming part of Letters Patent No. **215,262**, dated May 13, 1879; application filed February 14, 1879.

To all whom it may concern:

Be it known that I, WILLIAM R. CALKINS, of Great Barrington, in the county of Berkshire and State of Massachusetts, have invented a new and useful Improvement in Water-Wheel Curbs, of which the following is a specification, reference being had to the accompanying drawings.

My invention is for the purpose of regulating the consumption of water by turbine water-wheels, so that the quantity of water used may at any time be proportioned to the amount of work then in process.

In many instances, when the whole power developed by the wheel was required, the water-gate was left wide open, and when a portion of the machinery was stopped, then the gate was partially closed, and thus waste of water was sought to be prevented; but in this method, owing to eddies and other causes, the power developed is much less than the theoretical efficiency of the water consumed. This difference is a loss of importance in localities where at times the water-supply is scanty.

To reduce this is the object of my invention.

Figure 1 is a plan, and Fig. 2 an elevation, of my invention.

It consists of an annular plate of metal, A, upon which circular sides B are erected, forming a circular box, with an opening, C, in the bottom equal in size to the wheel to be used, and closed at the top with a cover secured by bolts provided with a hole for the passage of the shaft of the wheel. At equal distances the sides B are pierced with rectangular openings D, Fig. 2. The area of these openings should be about equal to the area of the water-gate when wide open. Their height—*i. e.*, in the direction perpendicular to the bottom A—should equal the buckets of wheel measured in the same direction. Their number will vary with the wheel used; but the number of buckets in the wheel should be somewhat in excess of the number of openings D—say, two or three more buckets than openings; for if they were equal in number, at one moment each bucket would receive the full impulse, the next moment none would. Thus unsteadiness of motion would result; whereas, by having the buckets in excess, the impulse to the wheel is uniform, since the aggregate number of buckets receiving the full impulse is virtually constant.

A ring, E, surrounds the sides. A portion of the ring is formed by a rack, F, with which a pinion, G, engages, so that upon turning the pinion the entire ring is moved through a portion of a revolution.

Struts H, Fig. 1, project inward from the ring and are attached to the gates I. These gates are formed as shown, and so as to cover and lap over, at will, the openings D, as shown. Thus the motion of the ring is imparted to the gates I, and they are thus opened or closed, or left at any intermediate point, as may be desired.

Within the curb B, and at or near that edge of the openings D farthest from the gate I, fixed guides K are placed and firmly attached to the sides B and the bottom plate, A. They equal in height the buckets of the wheel, and should be so placed, according to the shape of the buckets of the wheel used, as to direct the water upon them as near as may be at a right angle.

Each of the gates I is provided with a pin on its inner surface, which projects through a slot in the sides, as shown at *a*, Fig. 1. The pins *a*, after passing through said slots, are firmly fixed in the movable guides L, Fig. 1. These movable guides are formed of a flat face opposite each of the fixed guides K, one curved side conforming to and bearing against the sides B, and a third side parallel with and conforming to the inner surface of the fixed guide K, all of which will more clearly appear upon reference to the drawings forming part of this specification.

The straight face *l* of the movable guides L forms one side of the water-way, while the fixed guides K form the other. It should be set at such an angle to K as to slightly wedge the water in its passage.

When the gates I are moved, as heretofore set forth, the movable guides, being connected therewith, as aforesaid, partake of the motion, and, being directed by the inner surface of B and of K, advance or recede from the neighboring fixed guide, increasing or diminishing the water-way to the wheel, but always slightly wedging the passing water and directing it, be the quantity more or less, to the periphery

of the wheel—the point where the impulse is most advantageously given.

The length of the guide, and consequently the amount that the curb will exceed the wheel in diameter, will vary somewhat with different forms of wheel. Economy of space and material require it should be as small as possible; otherwise, it makes no very great difference; but sufficient room must be given that the guides may be so placed as to deliver the current as near as may be at a right angle to the buckets of the wheel.

My device is operated as follows: When full power is required the pinion is turned in the proper direction, and the ring E is moved contrary to the arrows shown in Fig. 1. The gates I and the movable guides L are drawn back to their greatest extent. When less power is requisite the pinion and ring are moved in the opposite direction. The gates I are thus partially closed, and the movable guides, partaking of its motion, also partially closed, directing the water at all widths of opening in a solid and unbroken mass on the wheel to the place of greatest efficiency.

What I claim as new, and desire to patent, is—

In combination with the annular casing, and the induction and eduction openings thereof, the gates I, connected to a ring, E, to which is secured a rack, F, and the pinion G, engaging said rack, whereby the gates may be operated to regulate the flow of water through the annular casing, substantially as specified.

In testimony that I claim the foregoing improvement in water-wheel curbs, as above described, I have hereunto set my hand this 10th day of February, 1879.

WILLIAM ROBERT CALKINS.

Witnesses:

H. VAN DEUSEN,

R. R. BISSELL.