

(No Model.)

B. B. BOWER.  
WATER MOTOR.

No. 403,731.

Patented May 21 1889.

Fig. 2.

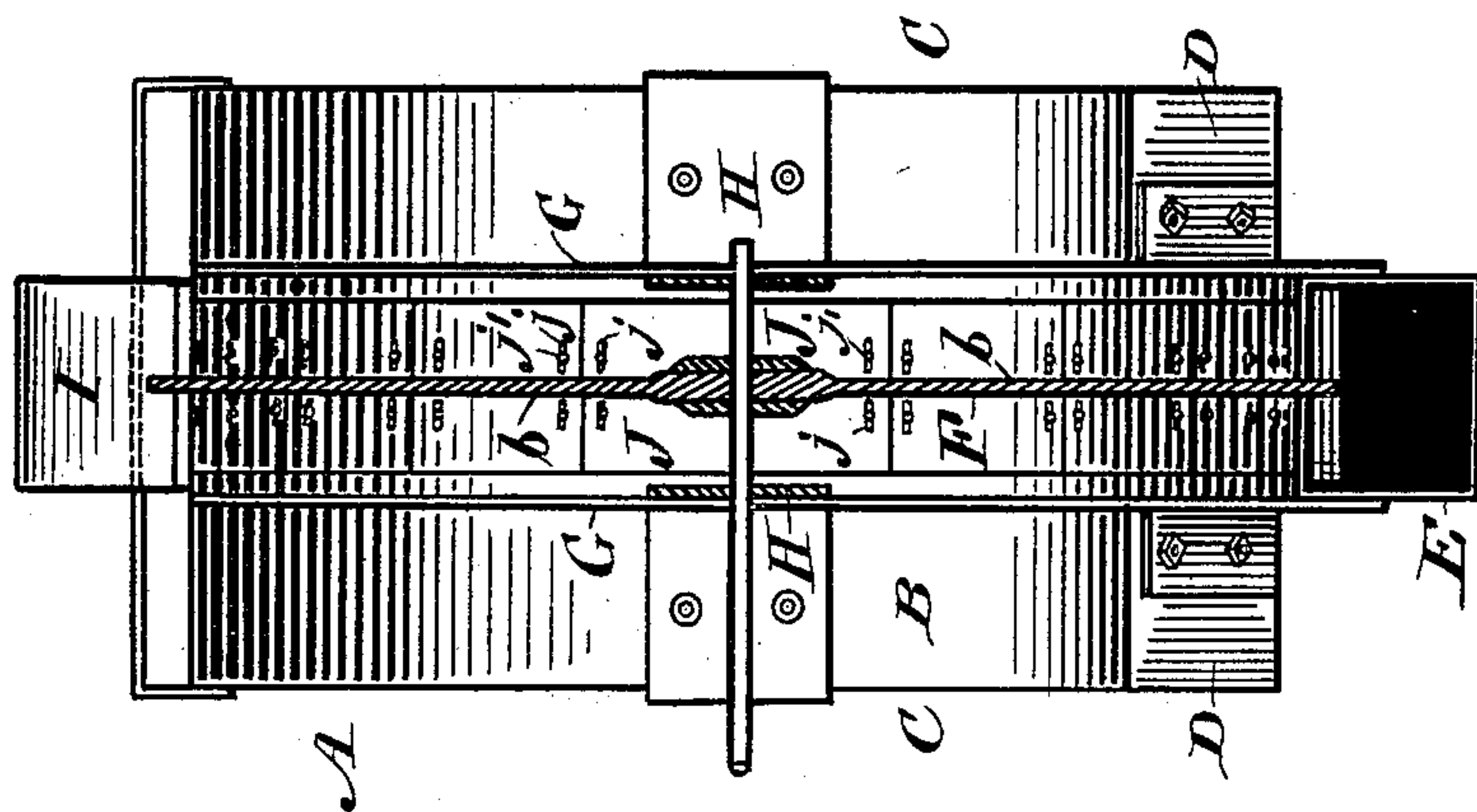


Fig. 1.

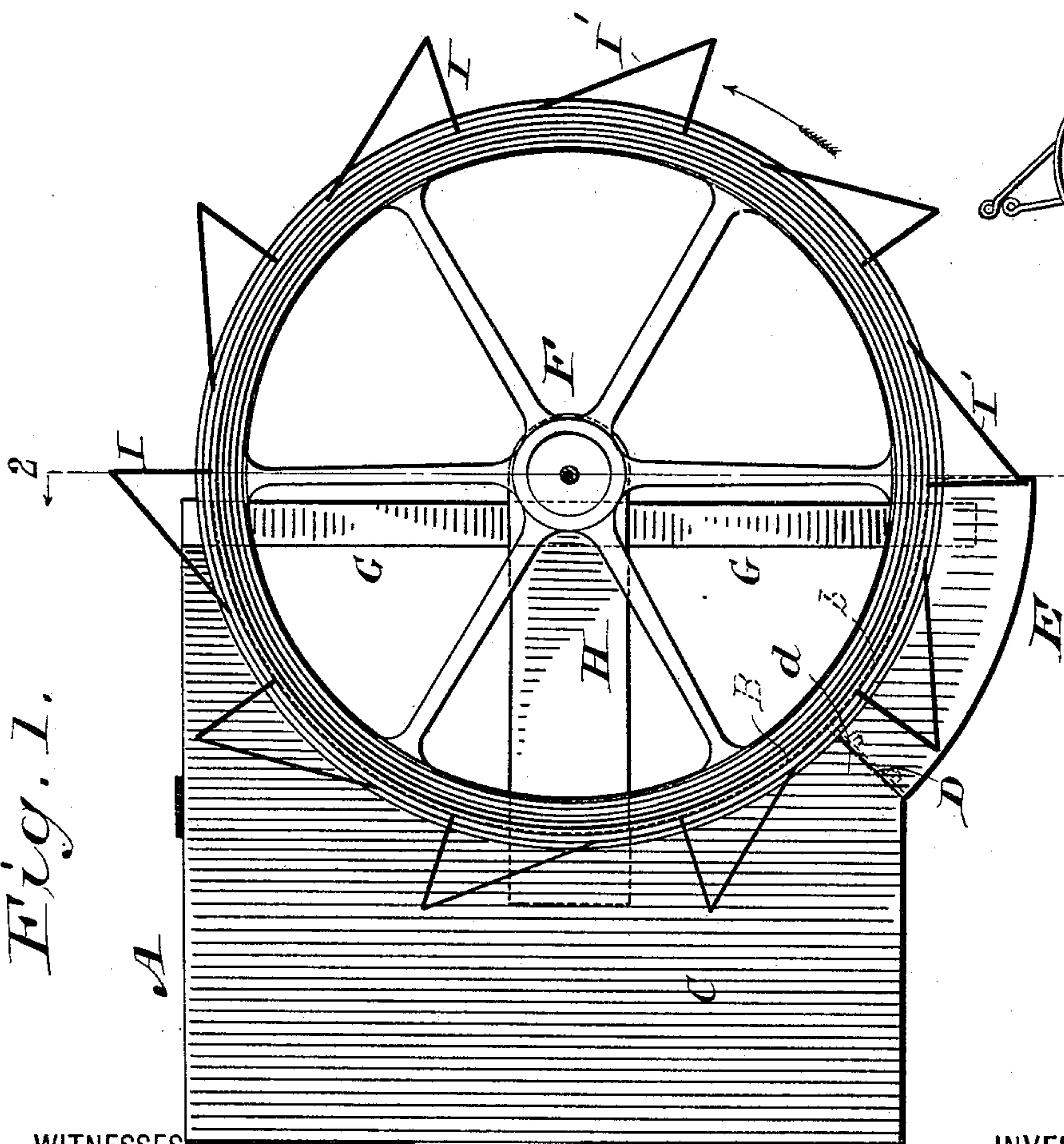
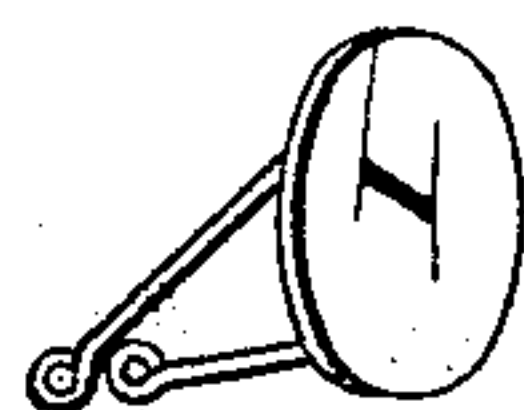


Fig. 3.



WITNESSES

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# UNITED STATES PATENT OFFICE.

BYRON B. BOWER, OF BAINBRIDGE, GEORGIA.

## WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 403,731, dated May 21, 1889.

Application filed May 23, 1888. Serial No. 274,836. (No model.)

### *To all whom it may concern:*

Be it known that I, BYRON B. BOWER, a citizen of the United States, residing at Bainbridge, in the county of Decatur and State of Georgia, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

The object of my invention is to provide an improved apparatus for utilizing water-power to drive machinery. My special object is to make the apparatus as light and strong as possible, reduce friction to the minimum, and utilize the entire force of the water.

With these objects in view my invention consists in providing a water-wheel having a narrow edge or periphery with a series of buckets rigidly secured to the wheel and provided with braces extending from their outer edges to the periphery of the wheel, said wheel being adapted to pass through a penstock, forebay, or reservoir having an open top and a concavo-convex front wall, and also through a closed flume or bucket-way joining the penstock, forebay, or reservoir at its lower front portion, and provided with a slot or opening joining a slot or opening in the front wall of the penstock, the front wall of said penstock, forebay, or reservoir having independently-adjustable plates curved to correspond with the curvature of the front wall of the penstock and the top wall of the flume, and secured thereto by adjusting devices, so that one or more plates may be adjusted relatively to the rim of the wheel to take up the wear and to prevent leakage at any desired point.

In the accompanying drawings, Figure 1 is a side view of my improved water-motor with a part of the casing removed. Fig. 2 is a vertical central section on the line 2 2 of Fig. 1, and Fig. 3 shows a modified form of bucket.

In the drawings I have shown my invention applied to a penstock, and I will hereinafter describe it as so applied; but it may be applied to a forebay or other water-reservoir as well.

The penstock A is open at the top, closed on each side, and provided at the rear with a water-entrance, *a*, near its lower end. The front wall, B, is preferably of a concavo-convex shape, the concave side facing outwardly,

and is joined to each side wall, C, and extends from top to bottom thereof.

As shown in the drawings, the bottom of the pen-stock is closed, and is joined to the front wall by a short inclined wall, D. This inclined wall D is provided with an opening, *d*, at which point the flume E is connected. The flume or bucket-way E consists of a casing constructed to closely fit the buckets, the top and bottom wall being curved from the axis of the bucket-wheel as a center to conform to the arrangement of the buckets on the wheel. The sides fit the buckets closely, so that the opening through the flume is about the size of the buckets. The bottom wall of the flume joins the penstock or reservoir at the edge of its bottom, so that the water passes freely from the penstock into the flume.

The bucket-wheel F is mounted in suitable bearings in standards G. As shown, the standards extend from each side of the flume E to the overhanging end of the front wall of the penstock to which they are attached. Braces H connect the front wall of the penstock to the standards midway between their ends and in line with the axis of the wheel. Any other suitable way of supporting the wheel may be employed. The body of the wheel may be constructed in any suitable way, preferably of a spider-frame, as shown in the drawings; but the outer edge of the periphery of the wheel is made as narrow as possible consistent with strength, and it extends through a slot, *b*, in the front wall of the penstock and the top of the flume. On the periphery of the wheel are arranged buckets I. The buckets I are shown as consisting of rectangular plates extending at right angles from the periphery of the wheel, to which they are rigidly secured, and an equal distance on each side thereof. The outer ends of the buckets are strengthened by braces I', which extend to the periphery of the wheel, to which they are connected. The buckets may be of any desired shape, and the flume suitably varied to correspond therewith. I have shown in Fig. 3 of the drawings a bucket formed of a round plate to illustrate this modification. The buckets are arranged a suitable distance apart on the periphery of



the wheel, preferably so as to have at least one and not more than two in the flume or bucket-way E at the same time.

On the outer face of the front wall of the penstock are arranged a series of plates, J, made to conform to the curvature of the front wall and secured thereto on each side of the slot *b*. Plates J are also arranged on each side of the slot in the flume E. The plates are made adjustable by forming slots *j* in them and passing set-screws *j'* through the slot into the face of the wall and flume. By these means the plates may be adjusted independently to take up wear on the edge of the face of the wheel and also to insure a water-tight packing on each side of the slot *b*. If a leak occurs at any point, it may be stopped by adjusting the nearest plate.

A water-wheel thus constructed is simple in construction and operation and utilizes the maximum force of the water operating upon it. The edge or periphery of the wheel may be made so narrow as to present a very small surface to the water in the penstock, forebay, or reservoir, so that practically the entire force of the head of water is exerted on the buckets and carries them through the flume with great force. By constructing the flume to conform accurately to the shape of the buckets the water cannot escape past them, but must carry the buckets along with it as it passes through the flume. The wheel

may be connected in any suitable way with the machinery to be driven.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

The combination, substantially as hereinbefore set forth, of the water-wheel having a narrow rim or periphery, the buckets rigidly secured to the periphery of the wheel, the braces extending from the outer edges of the buckets to the periphery of the wheel, the penstock, forebay, or reservoir having an open top and a convavo-convex front wall, a flume or bucket-way joining the penstock, forebay, or reservoir at its lower front portion and provided with a slot or opening joining a slot or opening in the front wall of the penstock, and the independently - adjustable plates curved to correspond with the curvature of the front wall of the penstock and the top wall of the flume, and secured thereto by adjusting devices, so that one or more plates may be adjusted relatively to the rim of the wheel to take up wear and to prevent leakage at any desired point.

In testimony whereof I have hereunto subscribed my name.

BYRON B. BOWER.

Witnesses:

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