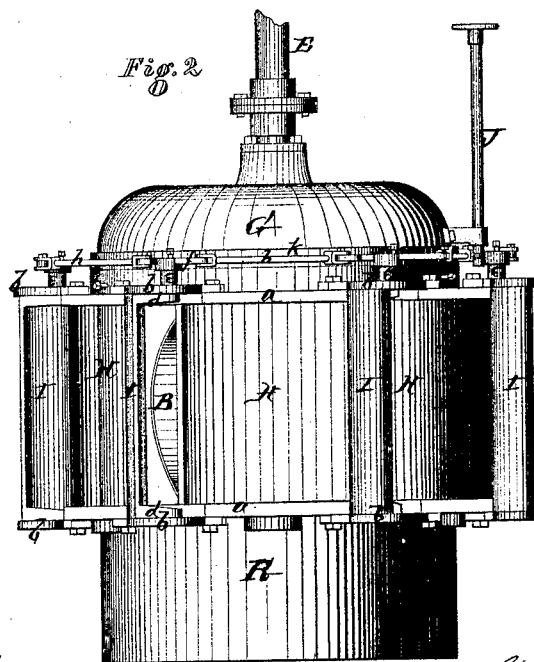
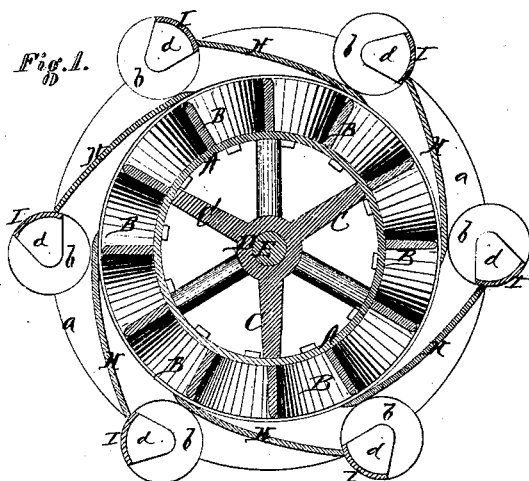


S. O. Holman,

Water Wheel.

No. 108482.

Patented Oct. 18. 1870.



Witnesses

D. D. Kane,
Chas. K. Lyon.

Inventor

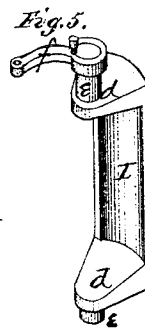
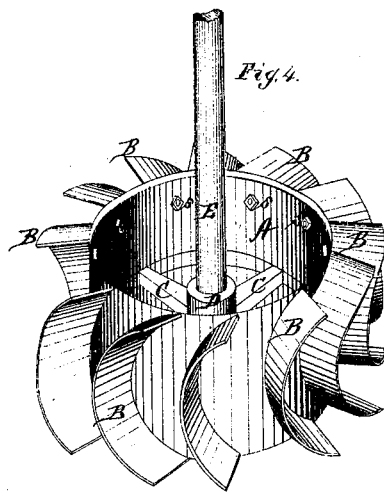
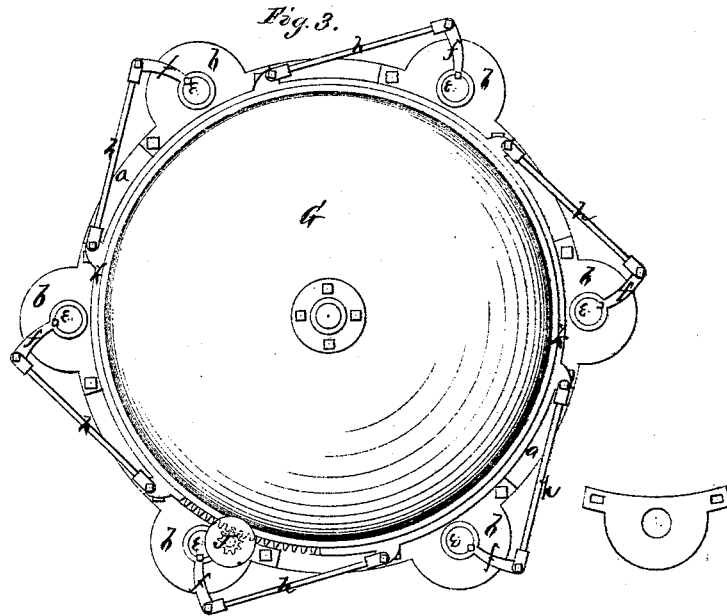
S. O. Holman,
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3. Sheets, Sheet 2.
D. O. Holman,

Water Wheel.

No. 108482.

Patented Oct. 18. 1870.



Witnesses
D. D. Xaner
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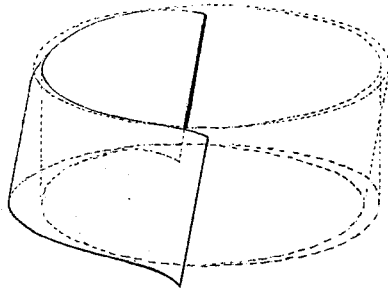
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3. Sheets, Sheet 3.
D. O. Holman,

Water Wheel.

No. 108,182.

Patented Oct. 13. 1870.



Witnesses.

*W. H. Kane
& Kenyon.*

Inventor:

*D. O. Holman,
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United States Patent Office.

DAVID O. HOLMAN, OF ADAMS, NEW YORK.

Letters Patent No. 108,482, dated October 18, 1870.

IMPROVEMENT IN WATER-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, DAVID O. HOLMAN, of Adams, in the county of Jefferson and State of New York, have invented a new and valuable Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of my water-wheel in horizontal section;

Figure 2 is a side elevation; and

Figure 3 is a plan view of the same.

Figure 4 is a perspective view of the wheel itself, and

Figure 5 is a perspective view of one of the gates.

My invention relates to turbines; and

It consists in the novel construction and arrangement of buckets, casing-gates, and method of operating the same.

The wheel is composed of a ring or cylinder, A, of the same height as the buckets B B, and is, on its inner side, provided with arm C C, meeting in a central sleeve, D, within which the shaft or spindle E is secured by any suitable means.

B B represent the buckets, so formed that the inner and outer sides are bounded by cylindrical surfaces, the axes of the cylinders upon which they are constructed being oblique to each other.

The right line of the center of the inside of each bucket coincides with the prolongation of the diameter of the wheel at this point.

The formation of the bucket is illustrated by diagram on sheet 3 of the drawing.

The cylinder A is perforated with two holes for each bucket, and the bucket is secured to the cylinder by means of screw-bolts rigidly attached to or formed on the bucket itself, and passing through said holes, and fastened by nuts from the inside of the cylinder A.

The ends of each bucket are flush with the edges of the cylinder A, and somewhat inclined to the direction of the radius, slanting outward and away from the wall of the succeeding bucket.

The curved outer edges of the buckets are designed to fit the cylinder of the casing neatly.

By the construction of the buckets, and their position with respect to each other and the cylinder A, it is designed to utilize all the direct force of the water admitted to the wheel, as well as its reacting power, in a superior manner, the tendency of the water being to the outer edge of the bucket or toward the end of the lever-arm.

This wheel is placed in a casing, G, the spindle or shaft E having suitable bearings at its lower end, and where it passes through the top of the casing.

This casing is provided with a suitable number of chutes or guides H H, which are slightly curved inward, as shown at fig. 1, to guide the water into the wheel.

Above and below the chutes H H are projecting flanches *a a* around the casing, having sufficient width to be exactly even with the outer ends of the chutes.

In these flanches are formed semicircular recesses, *m*, each recess commencing at the outer edge of a chute, and curving inward to the inner edge of the adjoining chute, and then out again, to complete the semicircle. These recesses are covered on the upper side of the upper flanch and on the lower side of the lower flanch by the plates *b b*, secured by bolts, and extending in semicircular form beyond the flanches.

The plates *b* are provided with slots *z*, for the fastening bolts to pass through.

In this manner they are made adjustable, and their position can be changed to correspond with the wear of the gate or the edges of the chutes against which it closes.

In the plates *b b*, and in the centers of the circles formed by the outer edge of the plates, and the semicircular recesses *m*, are the bearings of the adjustable rotating gates I.

Each gate consists of a horizontally-curved plate, whose outer surface is a portion of a true cylinder, and whose inner surface is correspondingly concave or hollowed out, this plate being connected with the journals *e* of the gate by sector-shaped lugs or ears *d d* projecting from the concave side.

When the gate is shut it closes the outer opening of the water-way or space between the outer end of one chute and the inner end of the next. In this position its convex side is turned toward the wheel.

When open, the gates form a flaring continuation of the water-way, their concavities serving to guide the water to the chutes. The form of the gate is such that the action of the head of water can have no effect upon it, as regards changing its position. In whatever position the gate is placed it will remain, and there is, therefore, no necessity of a locking device.

The gates I I are operated simultaneously by the following means:

To each of the upper journals *e* is firmly keyed an arm, *f*, which, by a rod, *h*, is connected with a ring, *k*, placed around the upper part of the casing G at the base of the top L. This ring is on one side provided with a rack, through which it is operated by means of a pinion on the upright shaft J. By turn-

ing this shaft, all the gates are simultaneously adjusted to any required position.

R represents a circular extension of the case below the wheel, designed to support the turbine on the floor of the pen stock.

The top L of the case is dome-like, but depressed immediately around the center.

Having described my invention,

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

1. The removable bucket B, bounded by two cylindrical walls, of which the axes are oblique to each other, in combination with the cylindrical body A, having the perforations s, substantially as specified.

2. The cylinder-shaped concavo-convex gate I, having its bearings in the projecting ears upon the axial line of the cylinder of formation, substantially as specified.

3. In combination, the cylinder-shaped rotating gates I I, and the adjustable slotted bearing-plates b b, substantially as specified.

4. The casing G, having the centrally-depressed top L, supporting cylinder R, and flanches a, provided with the semicircular recesses m, substantially as specified.

5. In combination with the gates I, ears d, and pivots e, the arms f, rods h, ring k, and a rack and pinion mechanism for operating the same, substantially as specified.

6. The combination of the wheel A B, casing G, cylinder-shaped rotating gates I, and the ring k, with the mechanism for regulating the adjustment of the gates, as specified.

In testimony that I claim the above, I have hereunto subscribed my name in the presence of two witnesses.

DAVID O. HOLMAN.

Witnesses:

D. D. KANE,
EDM. P. MASI.