

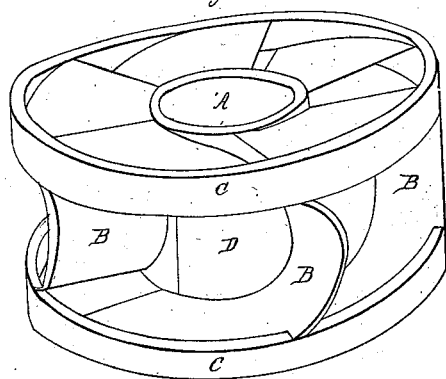
*D. Cushman,*

*Water Wheel,*

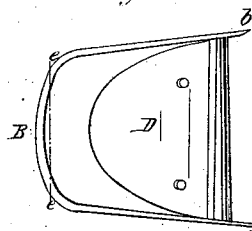
*N<sup>o</sup> 54,123.*

*Patented Apr. 24, 1866.*

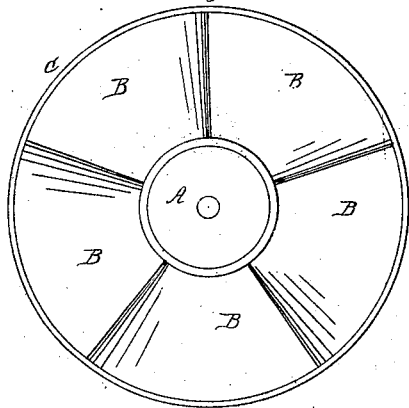
*Fig. 1*



*Fig. 4*

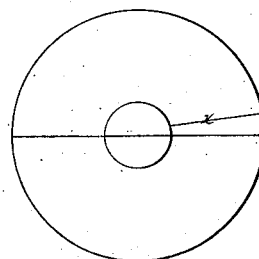


*Fig. 2*

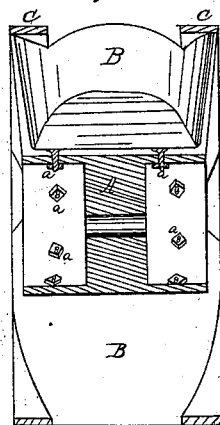


*Witnesses*  
*P. P. Mast*  
*R. T. Dodge.*

*Fig. 5*



*Fig. 3*



*Inventor:*  
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# UNITED STATES PATENT OFFICE.

DWIGHT CUSHMAN, OF HARTFORD, CONNECTICUT.

## IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 54,123, dated April 24, 1866.

*To all whom it may concern:*

Be it known that I, DWIGHT CUSHMAN, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Water-Wheels; and I do hereby declare that the following is a clear, full, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

Figure 1 is a perspective view of my improved wheel complete. Fig. 2 is a top-plan view, and Fig. 3 is a transverse vertical section of the same, similar letters in the various figures indicating like parts wherever they occur.

My invention relates to that class of water-wheels known as "turbine wheel;" and it consists in a novel construction of the buckets, and of the hub or central portion to which the buckets are attached.

To enable those skilled in the art to construct and use my improved wheel, I will proceed to describe it.

A represents a central hub, which may be made of cast-iron. This hub, as shown in section in Fig. 3, is cast solid at its transverse central portion, with the exception of a hole at its center for the reception of the shaft. On each side of this central portion or diaphragm the hub A is made tubular, of proper thickness to secure the buckets by bolts *a*, as shown in Fig. 3.

B represents the buckets, which are preferably made of cast-iron, but may be made of other material. These buckets are constructed of the form shown in the drawings, one of them being shown detached in Fig. 4. They may be represented as a strip of metal bent in the form of the letter U, slightly modified, the bend at the center being quite flat, as shown by the portion extending from *e* to *e* of Fig. 4, from which points to the extremities of the buckets the sides diverge but slightly, as shown. On the inside the space between the two wings is filled by a vertical plate, D, cast solid with the bucket B, and so curved as to fit snugly against the periphery of the hub A, to which it is secured by bolts *a*, thus securing the bucket firmly to the hub A.

It will, of course, be understood that the outer edge of the buckets B are formed on a curve, so that when applied to the hub the periphery of each bucket will form the arc of a circle corresponding with the circumference of the wheel.

The central vertical portion of the buckets project radially from the hub, but at a slightly obtuse angle, as shown by line *x* of Fig. 5, the line drawn through the center of the wheel passing in front of the vertical portion of the bucket.

When the buckets are thus attached to the hub the points *b*, or extreme ends of each bucket, overlap the central or curved portion of the adjoining bucket for a short distance, thus forming vents or passages for the escape of the water at both faces of the wheel.

C represents metallic rings encircling the buckets at both the upper and lower edges of the wheel, as shown in Figs. 1 and 3, for the purpose of holding the buckets firmly in place and strengthening the wheel, the buckets being recessed or cut away to receive the rings C, so as to bring the outer edge of the buckets flush with the outer surface of the rings.

The wheel when used will be inclosed in a scroll or case in the usual manner, the water being delivered between the ring C, exerting its force against the face of the bucket B, and escaping from thence through the vents or openings, both above and below.

The wheel may be run in a horizontal or vertical plane, as may be desired.

Having thus fully described my invention, what I claim is—

A water-wheel consisting of a series of buckets, B, having their faces standing at an obtuse angle from the hub, and having their outer edges forming a vertical line, or nearly so, as shown by the line extending from *e* to *e* of Fig. 4, arranged and operating in combination with the hub A, as herein shown and described.

DWIGHT CUSHMAN.

In presence of—

JOHN T. PETERS, Jr.,  
THOMAS MCMANN.