

United States Patent Office.

P. H. WAIT, OF SANDY HILL, NEW YORK.

Letters Patent No. 93,774, dated August 17, 1869.

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, P. H. WAIT, of Sandy Hill, Washington county, New York, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a face view of a bucket, of my improved construction.

Figure 2 is a plan or top view of the same.

Figure 3 is an edge view of a modification of the same.

Figure 4 is a detail side view of the wheel and chute.

Figure 5 is a side elevation, on a diminished scale, of the wheel-case and chute.

Similar letters of reference indicate corresponding parts.

This invention relates to a new manner of constructing the buckets of that class of water-wheels which operates with a vertical inlet and discharge, the guide-chutes being formed similar to the buckets, but in opposite direction.

The object of the invention is to prevent the difficulties arising hereinbefore in wheels with horizontal inlets, in which the direct-acting point of the bucket moves at a velocity considerably less than the reacting-point.

For example, on a wheel having a diameter of three feet and an annular bucket-space of six inches, the inlet-end of the buckets will move with but two-thirds the velocity of the discharge-end.

To overcome this difficulty, I make the bucket of such shape that the water will make nearly one-fourth of a revolution with the wheel before it is discharged, so that it will, consequently, move nearly at right angles to the direction in which it entered the chute. The water will thus impart uniform power to all parts of the bucket.

The discharge-ends of the buckets are so shaped that the water will settle down on them, to be discharged, at an angle of about forty-five degrees from the lower end of the wheel.

The centrifugal strain usually produced on the outer rim of the vertical discharge is thus brought to bear upon the bucket, to help to propel the wheel.

My invention consists chiefly in producing a peculiar twist of the bucket, by providing it with a horizontal upper edge, and with an inclined lower edge, the latter being higher at the outer than at the inner end, for the purpose of obtaining the requisite twist of the bucket, and also in a new manner of laying out the bucket, as hereinafter more fully described.

The invention also consists in forming the chutes similar to the buckets, but without the twist, and in so placing them upon the wheel that they stand in opposite direction to the buckets.

A, in the drawing, represents the body of the bucket. B represents the axle of the wheel.

The inner and outer edges of the bucket are circular curves, described from the axis of the shaft B, as their centre.

The upper edge *a* of the bucket is horizontal, so that they are all on a common plane, while the lower edge *b* is inclined at an angle of about thirteen or fifteen degrees, drawn on a straight line toward the shaft, the inner end of said edge being thus deeper than the outer, as in fig. 1.

The line *b*, when prolonged toward the shaft, will on the shaft be vertically under the prolongation of the upper line *a*, as in fig. 2, the two lines being thus radii of the circles described around the axis of the shaft. Thereby the inner edge *c* of the wheel is made shorter than the outer edge *d*, although the difference is almost counterbalanced by the inclination of the line *b*.

By means of horizontal lines *e e*, the height of the bucket, at the outer end of the same, is divided into ten equal parts.

The distance between the prolongations of the lines *a b*, on the shaft B, is also divided into ten equal parts, and the divisions on the outer end of the wheel are then, by lines *f f*, connected with those on the shaft, as shown in figs. 1 and 2.

These lines are also radial, when looked at from above, as in fig. 2.

The face of the bucket is between the lower four-tenths, 1, 2, 3, 4, made on a straight inclined line, while the upper six-tenths are curved, as shown in fig. 3.

The division of the outer edge may, if desired, be also formed by vertical lines, as in fig. 3.

In either case the wheel will operate to greater advantage than any of the wheels heretofore used.

The chute or guide-plates C are of a shape similar to that of the buckets, and are placed upon the wheel, as in fig. 4, to discharge the water against the faces of the buckets.

The guide is made of the same size of the wheel, and placed over it, as in fig. 4. The water passes vertically through it.

The curve of the bucket delivers the water into the wheel-buckets at an angle of about fourteen degrees, as indicated by the arrow 1.

If the wheel were held fast, the water would be discharged from its buckets in the direction of the arrow 2, fig. 4, and fall in a line tangent to the wheel's circumference. But provided the wheel were running without labor, the water would pass through in the

direction which the guide-chute gives to it. The wheel moving with the same velocity, would allow it to pass without changing its angle, yet breaking its tangent.

When the wheel is doing its full amount of labor, the water-course is broken, and falls at an angle of about forty-five degrees, as indicated by the arrow 3, forming, below the wheel, a hollow cone, whose sides have an angle of about seventy-six degrees.

The twist of the bucket at its lower edge terminates at right angles to the sides of the cone, so that the water passes out of the issues in a line parallel with their sides, whereby a full reaction is obtained.

Having thus described my invention,

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

1. A water-wheel bucket, provided with a level upper and inclined lower edge, substantially as herein shown and described.

2. A water-wheel bucket, having the upper four-tenths of its face, or thereabout, made nearly straight, while the other parts are curved, substantially as herein shown and described.

3. A water-wheel bucket, whose upper and lower edges, when continued toward the shaft of the wheel, are in a vertical line on the axis of said shaft, while the outer end of the lower edge is forward of that of the upper edge, substantially as herein shown and described.

The above specification of my invention signed by me, this 6th day of March, 1869.

P. H. WAIT.

Witnesses:

D. E. PARKS,
THOMAS FLOOD.