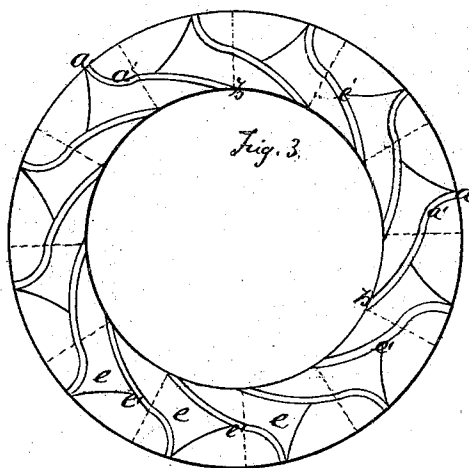
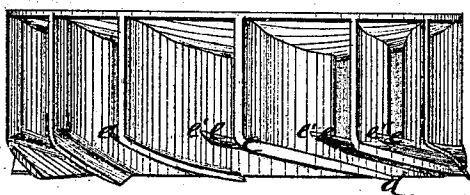
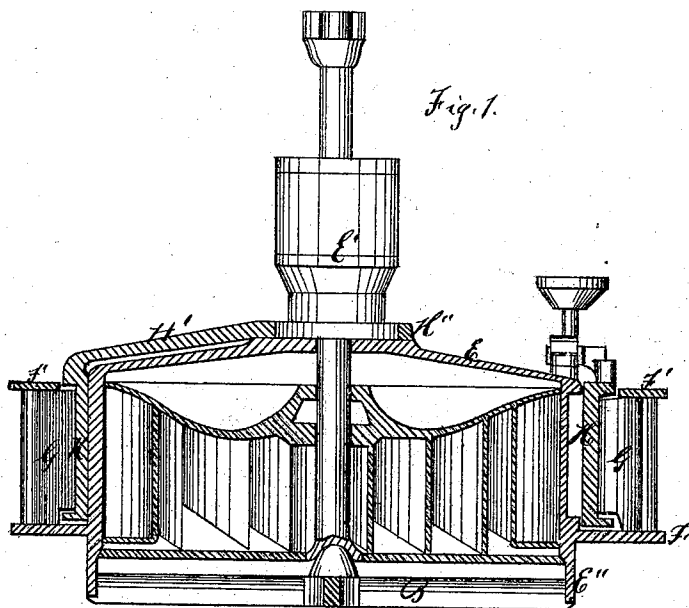


Bryson & Dunlap,

Water Wheel.

No. 98,552.

Patented Jan. 4, 1870.



Witnesses;
C. O. Brown
T. J. Roberts

Inventors;
James D. Bryson
Wm. R. Dunlap, by
Geo. E. Brown,
Att'y.

United States Patent Office.

JAMES D. BRYSON AND WILLIAM R. DUNLAP, OF NEWCASTLE, PENNSYLVANIA.

Letters Patent No. 98,552, dated January 4, 1870.

IMPROVEMENT IN WATER-WHEEL.

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

To all whom it may concern:

Be it known that we, JAMES D. BRYSON and WILLIAM R. DUNLAP, of Newcastle, in the State of Pennsylvania, have invented a new and useful Improvement in Turbine Water-Wheels and Casings; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and letters of reference marked thereon, making a part of this specification, in which—

Figure 1 is a vertical section of the wheel and casing;

Figure 2, a side elevation of the wheel; and

Figure 3 is a horizontal section of the wheel.

To enable those skilled in the art to make and use our invention, we now proceed to describe its construction and operation.

Similar letters in the drawings refer to like parts.

Our invention consists of a turbine water-wheel, with buckets of a peculiar construction, and so arranged that every part of their surface, in contact with moving water, gives power.

The effect of water upon a turbine-wheel depends on the amount of available bucket-surface presented by the latter. To make such surface available, whether it be straight or curved, it must be either transverse or inclined to the direction of the water-column entering the gates. A portion of the bucket, parallel to the direction of the water, cannot receive any of its impelling force, while it obstructs, by friction, the action of the water upon the available surface.

In the drawings is shown a turbine-wheel, constructed in accordance with the foregoing principles, and cast all in one piece with itself and with the crown-plate.

That portion, *a a'*, of the vertical part of each bucket, which the water first strikes, shown in fig. 3, is a true curve, whose radius is equal to one-half the width of the buckets at the discharge end.

The remaining portion, *a' b*, of the vertical part of each bucket, forms an inclined plane, slightly curved inward at its inner end, to facilitate the discharge, and receives the remaining force of the current after its direction has been changed by the curved part *a a'*.

The lower lip of each bucket projects horizontally from the under side of the vertical part, and forms an inclined plane, *c d*, fig. 2, which receives the vertical pressure of the water on its passage toward the lower issues.

A division-plate, *e*, projects horizontally from the under side of the vertical portion of each bucket, forming part of the same inclined plane with said lower

lip, and of equal length therewith, and extending in the opposite direction therefrom to the vertical portion of the next bucket in front, the line of junction of such plate with said front bucket commencing at a point, *e'*, of the latter, midway between its outer and inner ends. The plates *e* divide the spaces between the buckets, so as to form upper passages between the vertical parts, and lower passages between the inclined parts. Said lower passages are of double the size of the upper ones, to the end that the former may discharge all the water when the gate is but half drawn, and thus produce as great an effect on the lower lips as a full gate can do. The plates *e* also serve to brace the curved outer ends *a a'* of the vertical parts of the buckets, which curved ends are subject to greater stress from the water than the remaining portions.

Reverting now to the second part of our invention—

E, fig. 1, is a cast-iron curb, which encloses the top and rim of the wheel, having an orifice in its top for the vertical shaft to pass through.

The bush *E'*, that sustains the upper part of the shaft, may be bolted to the curb, or be cast in one piece with it.

For the passage of water to the wheel, there is the usual series of openings in the curb, and, cast in one piece with the latter, and projecting downward from, forming a continuation of it, is a ring, *E''*, whose office is the support of the bridge *B*, in which the shaft *S* is stepped.

At a suitable distance below the inlet-openings is a flange, *F*, cast in one piece with the curb, and extending horizontally from it, whose office is the support of the chutes *G*.

By casting the lower ring *E''* and the flange *F* in one piece with the curb, greater strength is secured, and the labor of fitting and bolting the flange and ring to the curb is saved.

A ring, *F'*, is secured upon the upper edges of the chutes *G*, which ring surrounds the curb, there being an annular space between the two for the insertion of the gate.

The gate *H* is a hoop, of a diameter sufficient to allow it to slip easily over the curb, and of such height as to reach within about a quarter of an inch of the flange *F*.

The gate, also, has the usual inlet-passages, corresponding with those in the curb, there being, between the gate-passages, solid portions sufficiently large to close the openings in the curb when the gate is turned.

The gate is supported by radial arms, *H'*, extend-

ing from its upper ring to a hub, *H*", placed upon the bush *E*'. The gate, arms, and hub are all cast in one piece.

The lower face of the hub is turned true, and rests on the top of the curb, which is turned true to receive it. The hub *H*" largely sustains all the weight of the gate and radial arms, thus avoiding all friction at the sides of the curb.

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

The combination of buckets, the outer ends *a a'* of the vertical portions of which are curved transversely

of the water-currents, and the remaining portions *a' b* of the vertical portions of which are inclined to the water-currents, with the lower outer lips *c d*, and with division-plates *e*, the two latter forming parts of the same inclined planes, and dividing the passages between the buckets into an upper and a lower series, substantially as described.

WILLIAM R. DUNLAP.
JAS. D. BRYSON.

Witnesses:

A. M. GREENWOOD,
C. O. BROWN.