

United States Patent Office.

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Letters Patent No. 99,548, dated February 8, 1870.

IMPROVEMENT IN TURBINE WATER-WHEELS.

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

To whom it may concern:

Be it known that I, JAMES J. FAULKNER, of McMinnville, Warren county, Tennessee, have invented a new and useful Improvement in Turbine Wheels; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention relates to a "parallel-flow" turbine, which has two wheels, the one immediately beneath the other, and receiving the water therefrom, and turning in an opposite direction thereto.

The water, in passing through the upper wheel, has a circular motion imparted to it, which motion is utilized in turning the lower wheel.

Figure 1 is a side elevation (partially in section) of my improved turbine.

Figure 2 is a plan, showing the arrangement of gate and water-ways.

A is a penstock, to whose frame-work is attached the case B of the turbine, by means of an annular angle-iron, C, and bolts D.

Spanning the bottom of the case B, is the bridge-piece E, which supports the step F, upon which rests the lower end of the vertical shaft G.

The lower wheel or turbine H is attached to the shaft G, the said shaft extending upward, and being journaled at i to the beam I.

The shaft G carries a bevel cog-wheel, J, which engages the top of a similar pinion, K, upon the shaft L, by which power is communicated to any desired machinery, by a belt upon pulley M, or otherwise.

The upper turbine wheel N is attached to a tubular shaft, o, concentric with the shaft G.

This shaft o has a lower journal-bearing in boxes r, secured to cross-beam, R, of the penstock-frame.

The upper end of the tubular shaft o carries a bevel-cog wheel, S, engaging with the lower side of pinion K.

The water-ways or chutes T descend obliquely downward, in such direction as to give a somewhat tangential impulse to the water in its descent, and cause it to impinge nearly at right angles upon the face of the upper part of the buckets U of the upper wheels N, and the water flowing down the said buckets has an opposite circular motion imparted to it, and strikes the buckets X of the lower wheel in a manner similar to that in which it impinges on the buckets of the upper wheel, thus utilizing the circular motion imparted to the water by the upper wheel.

The buckets do not project in lines radial to the wheel, but in lines tangential to a circle within the circumference of the wheel, inclining somewhat backward from a radial direction, so as to direct the water rather inward than outward, which latter would be the case if the buckets were radial in direction.

The gate V, by whose movement the flow of water to the wheel is governed, consists of an annular

plate, which lies upon the top plate of the case, and has apertures W, coinciding with the chutes or water-ways T in the top of the case, so that by the partial revolution of the gate, the chutes may be wholly opened or closed, or may be partially opened, as desired.

The gate is moved by means of a cog-rack, v, with which meshes the cog-wheel y upon a shaft, Y, whose upper end carries a hand-wheel, y', by which the said shaft is turned.

The gate is held in position by cleats or studs, one of which, v', acts as a stop to the movement of the gate, by means of shoulders at the opposite ends of a segmental recess, in the interior circumference of the gate.

It will be seen that the shaft G rests upon the step-bolt F, and may be vertically adjusted thereby, but the tubular shaft O is supported irrespective of the step, and is not intended to come in contact with the shaft G in any part, but is supported, by its upper end, either upon the hub of the wheel S and box r, or upon a collar of the shaft beneath the said wheel, which collar rests upon the box r.

The tubular shaft may, if preferred, be supported by a collar upon it, which would rest upon the raised part b of the top plate of the case B, the said raised part b forming the lower journal-bearing of the shaft o.

The step may, if preferred, be supported on a "spider," in lieu of the single straight bridge-piece described.

The first water-deflectors or chutes are necessarily fixed, but the second deflection of the water is accomplished while passing through the upper wheel, and thus a gain is made of the power which would otherwise be lost in friction of the water against fixed deflecting-plates or chutes.

Still another supplementary and reversely-acting turbine may be introduced below the turbine H, the shaft of the turbine H then being, like that of N, in the form of a sleeve or tube.

I claim herein as new, and of my invention—

The arrangement (by concentric shafts, geared above the water-level in the manner set forth) of oppositely-revolving turbines, one below and receiving water from the other, the said wheels having similar but reversely-directed buckets, which extend outwardly, in lines tangential to a circle within the circumference of the wheel, and inclined somewhat backward toward their outer edge, so as to counteract the centrifugal tendency of the water, as described, in combination with the annular gate V and oblique chutes T, substantially as and for the purpose set forth.

In testimony of which invention, I hereunto set my hand.

JAMES J. FAULKNER.

Witnesses:

ASA FAULKNER,
GEO. H. KNIGHT.