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UNITED STATES PATENT OFFICE.

ALONZO WARREN AND ELIJAH DAMON, JR., OF WAREHAM, MASSACHUSETTS.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 20,234, dated May 11, 1858.

To all whom it may concern:

Be it known that we, ALONZO WARREN and ELIJAH DAMON, Jr., both of Wareham, in the county of Plymouth and State of Massachusetts, have invented a new and useful Improvement in Horizontal Water-Wheels; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical central section of a water-wheel and its scroll, showing our improvement. Fig. 2 is a detached inverted plan of the wheel.

Similar letters of reference indicate corresponding parts in the two figures.

The object of this invention is to render available as power the leakage-water—that is, the portion that usually escapes between the rims of the wheel and the scroll and has hitherto been wholly lost, diminishing to a considerable degree the maximum power of the wheel.

The invention consists in the employment or use of auxiliary buckets attached to the under side of the wheel and arranged relatively with the space or leakage between the lower rim of the wheel and the scroll, whereby the water or leakage-water as it escapes is made to impinge on auxiliary buckets and thereby assist in propelling the wheel.

The invention also consists in using, in connection with the auxiliary buckets, certain means for preventing the upward escape of water between the upper disk of the wheel and the scroll, so that all or nearly all the waste water will be rendered available for the purpose specified.

To enable those skilled in the art to fully understand and construct our invention, we will proceed to describe it.

A represents a scroll, and B is a wheel fitted therein, B' being the shaft of the wheel. The scroll and wheel are of usual construction, and any known form of buckets *a* may be used. On the upper disk *b* of the wheel B and near its periphery an annular ledge *c* is formed. This ledge may be cast with the disk *b*, or made separate and bolted to it. To the edge of the upper opening *d* of the scroll a metal L-shaped plate C is secured by screws or bolts *e*. This plate extends entirely around

the edge of said opening, and it may be formed of one or more pieces.

In the drawings, Fig. 1, the plate C is represented as being made in sections, which probably would be the preferable way. To the horizontal part *f* of the plate C an annular plate D is bolted or secured by screws *g*. The plate D may be cast in one piece, and it is formed with two annular recesses *h i* in its under side. The recess *h* corresponds inversely with the ledge *c*, and the recess *i* forms a shoulder which abuts against the edge of the disk *b* of the wheel. The recess *h* receives the ledge *c*. (See Fig. 1.)

By means of the plates C D and ledge *c*, arranged as shown, the water is prevented to a great extent from escaping upward, as usual, between the disk *b* and the scroll. The amount that will find its way through will be comparatively small, as five angles require to be turned in its passage through or between the disk and scroll, as will be seen by referring to Fig. 1.

To the bottom of the scroll A, and encompassing the opening G, an annular plate *k* is attached, the inner edge of said plate projecting a trifle beyond the edge of the opening *j*.

To the under side of the rim *m*, at the bottom of wheel B, a series of buckets *l* are attached, said buckets being at the periphery of the rim *m* of the wheel. These buckets are curved vertically, and they project a short distance beyond the edge of the rim *m* and underneath the annular plate *k*.

The operation is as follows: The water being prevented pretty effectually from escaping upward between the disk *b* and the scroll, the principal part of the leakage-water will pass between the edge of the rim *m* and plate *k* and into the buckets *l*, and in escaping therefrom will exert a power against the wheel, serving to assist in the propulsion of the wheel, the main body of water acting, as usual, against the buckets *a*.

In all horizontal water-wheels there is more or less leakage and waste of water between the wheel and the scroll. It is impossible to prevent entirely this leak without creating too much friction. Hence the value of our improvement, in which the escape of leakage-water is rendered available as power, the improvement being applicable to all horizontal wheels which are fitted within scrolls.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The supplementary or auxiliary buckets *l*, attached to the under side of the lower rim *m* of the wheel and arranged relatively with the edge of the rim and plate *k*, as shown, for the purpose set forth.

2. In combination with the auxiliary buckets *l*, the annular L-shaped plate C and D at-

tached to the scroll A, in connection with the ledge *c* on the upper surface of the disk *b* of the wheel, the whole being arranged to operate as and for the purpose set forth.

ALONZO WARREN.
ELIJAH DAMON, JR.

Witnesses:

JAMES R. SPROAT,
JAMES G. SPROAT.