2 Sheets—Sheet 1.

T. TRIPP.

Turbine Water-Wheel.

No. 201,133. Patented March 12, 1878.

Fig. 1.

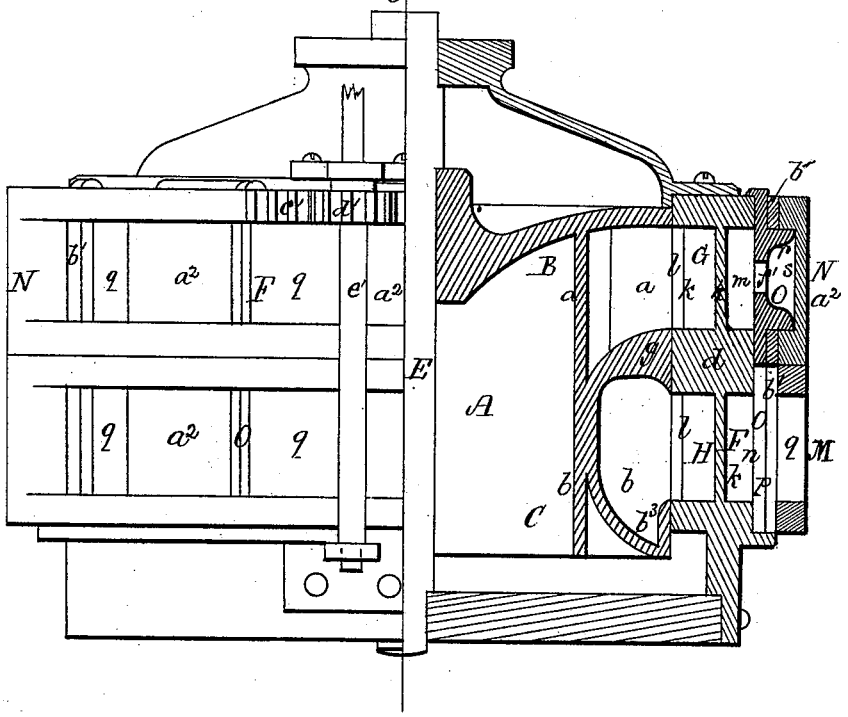
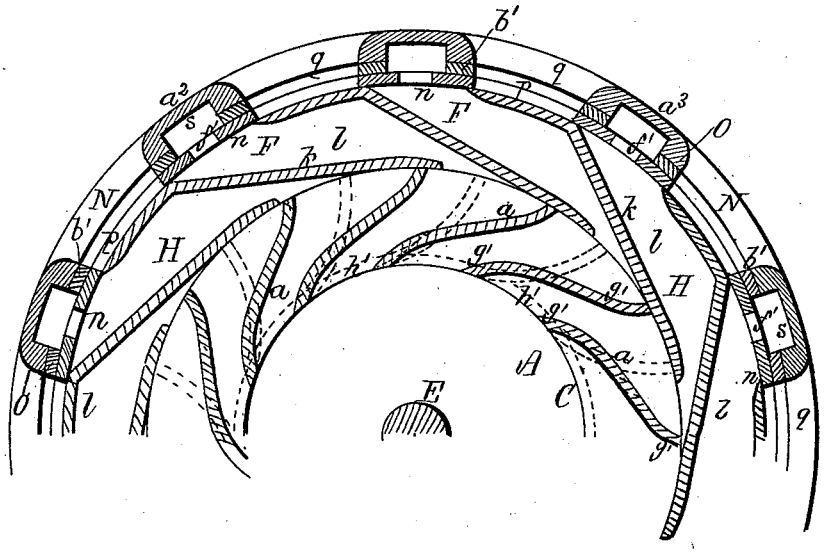


Fig. 2.



Witnesses.
L. A. Curtis
Joseph E. Watts

Inventor.
Thomas Tripp.
L. Curtis. Atty.

2 Sheets—Sheet 2.

T. TRIPP.

Turbine Water-Wheel.

No. 201,133. Patented March 12, 1878.

Fig. 3.

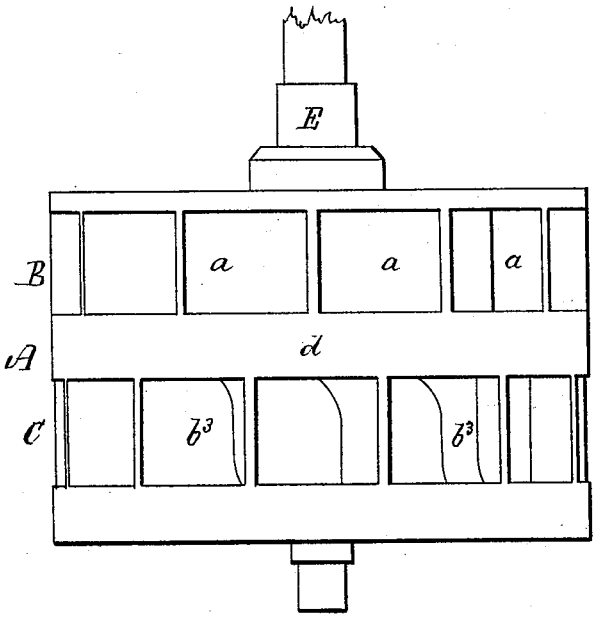


Fig. 4.

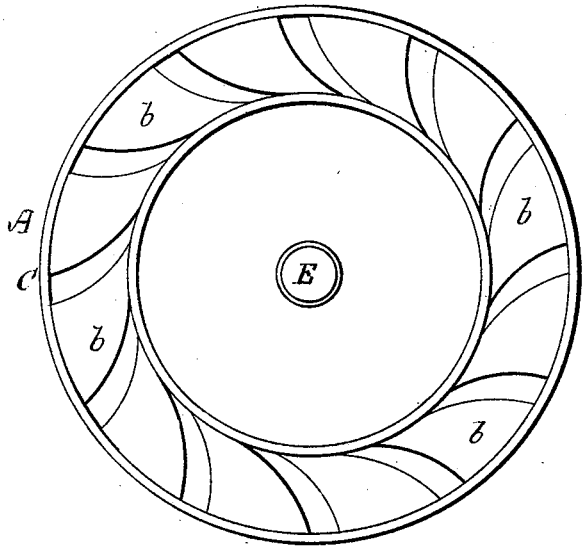


Fig. 5.
Reduced.

Witnesses.
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UNITED STATES PATENT OFFICE.

THOMAS TRIPP, OF EAST STOUGHTON, MASSACHUSETTS.

IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **201,133**, dated March 12, 1878; application filed August 18, 1877.

To all whom it may concern:

Be it known that I, THOMAS TRIPP, of East Stoughton, Norfolk county, Massachusetts, have invented new and useful Improvements in Water-Wheels, of which the following is a specification:

These improvements are based, in part, upon a water-wheel and case shown and described in Letters Patent of the United States, issued to me on the 24th day of April, 1877, in which one or more annular or register gates operate in connection with the corresponding openings in a cylindrical wheel-case, and the openings or ports of such gate are supplied with independent pads, which operate with the openings of the case.

In this patented wheel the water has access to the outer side of each pad through openings in the ring which supports them, and the joint between the inside face of the pad and the adjacent face of the wheel-case or wheel is a loose one.

Under some conditions of service I have found it desirable to exclude water from pressure against the outside of the pads; and to this end one portion of my present improvement consists in closing these openings in the ring, and thus interposing a solid body between the outside of the pad and the water, which effectually shuts out contact of the two.

A second portion of these improvements consists in interposing between the outer face of each pad and the adjacent face of the annular-gate frame a sheet of vulcanized rubber, or other elastic or semi-elastic medium, which shall maintain a close joint between the parts, and prevent leakage of water when the gates are closed, thus enabling me to produce a perfectly-tight register-gate.

A third portion of these improvements consists, as hereinafter explained, in a peculiar form of the buckets of the wheel and of the rim which divides the series of buckets, when a sectional wheel is employed; while, fourthly, my present improvement consists in several details of construction, to be duly explained.

The drawings accompanying this specification represent, in Figure 1, a sectional elevation, and in Fig. 2 a longitudinal section, of a turbine wheel and case containing my improvements. Fig. 3 is a side elevation, and Fig. 4 an under-side view, of the wheel. Fig. 5 is a view of one of the pads to be explained.

I have represented in these drawings a wheel and case containing several sets of buckets and water-guideways and gates, by which, when one or more of such gates are closed, the water may act upon a reduced surface of wheel, and vice versa, for while my invention is applicable alike to a wheel containing a single or plural set of buckets and approaches, it is especially valuable to the latter.

Reference being had to the drawings above named, it will be seen that A represents a wheel of two divisions or sections, B C, each division having its own bucket *a a*, &c., *b b*, &c., with interposed annular or steadying rims *d*, &c., the upper series of buckets discharging the water centrally or inwardly downward through the interior of the wheel and about its upright shaft E, while the lower buckets discharge outwardly and downwardly.

I do not confine myself to this method of discharge, but prefer it for the reason that it permits of free escape of water.

The case which surrounds the wheel, and contains the water guideways or chutes for imparting direction to the current of water as it reaches the buckets of the wheel, is shown at F, and though the extreme diameter of this case may vary with each set of chutes and wheel-buckets, I prefer it should be of practically uniform diameter, for convenience in manufacture and operation.

The case F is divided longitudinally into chambers G H by a series of annular plates or shelves, *g*, &c., which coincide with the divisions *d* of the wheel, and each of such chambers contains a series of tangentially-arranged partitions or plates, *k k*, &c., to provide chutes or guideways *l l*, &c., to impart the necessary direction to the water as it approaches the wheel.

The ports or sluices in the circumference of the case F, for admitting water to the various chambers, are shown at *m m n n*, &c., while surrounding these respective ports, and encircling with a small intervening space, *p*, the two divisions or sections of such case F, are two annular or register gates, M N. As each gate is of like make and operation, a description of one will suffice for all.

Said gate is composed of a flat ring or annular frame, N, having ports or sluices *q q*, &c., created in it at regular intervals, and in such number and of size as to coincide with the corresponding ports in the case F.

O O, &c., in the accompanying drawings,

represent a series of "pads," each pad being practically a plate of a segment of a circle struck from the center of the wheel, and being interposed between the ring-frame N and case F in the intermediate space *p*, which it partly fills, each pad being retained in place, and caused to move with the register-gate frame N, by a stud, *r*, on its outer side, which enters a corresponding socket, *s*, in the inner face of said frame N, the size of each pad being such as to slightly overlap the boundaries of the adjacent water-inlet port of the case F.

In my patented wheel before alluded to it will be seen that the outer face of each section of the wheel-case F, between the ports *m n*, &c., is of less diameter than the remainder, in order that water may have access to the inside of the pad as it does to the outside, as in the latter case the pads project through the gate-frame N.

In my present wheel I prevent, as far as possible, any flow of water between the pad and case, and I cover the outside of each pad, as will be seen in the drawings, by a solid substance—that is, the bar a^2, intervening between each port *q*, is solid in lieu of being open, as in my patent, and to exclude water from between the pad and gate-frame N, I employ, preferably, a sheet, b^1, of vulcanized rubber, which I press into place between the two with such a degree of force that the ensuing expansion shall maintain a tight joint between the parts.

The water is thus excluded, when the gate is closed, from both sides of the pad, and as the water has access to all sides of the wheel-case, it is apparent that each gate is balanced to the pressure of water, and the only friction to be overcome in opening or closing such gate is that caused by the stress of the rubber packing b^1, which is comparatively slight; therefore the gates are operated easily and smoothly, a governor can act with certainty and regularity, and consumption of water is utilized to an eminent degree.

Each gate is or may be opened and closed independently of its fellow, and consequently any one section of the wheel may be used independently of the others.

Each gate is provided with a segmental rack, *c'*, while a pinion, *d'*, engages such rack, and is affixed to an upright shaft, *e'*, suitably supported within the flume or curb of the wheel-case, and connected at top to the governor, if one is employed, or, if not, provided with a hand wheel or crank. In this manner the gate is operated with little expenditure of power.

It may happen, from inopportune causes, (though under all ordinary circumstances it cannot occur,) that a slight quantity of water will at times escape through the joint between the rear side of each pad and the annular frame N, and, by standing there under pressure, force the pad against the wheel-case with undue pressure, and otherwise produce objectionable results. To avoid any possibility of this, I create in each pad and its rubber packing a hole, *f'*, which will permit of escape of this water, and allow it to pass to the wheel.

In laying out the buckets of the two sections of the wheel A, I proceed as follows: The general curvature of each bucket is a segment of a circle struck from the center of the wheel-shaft with the circumference intersecting a point midway of the inner and outer rims of the wheel, each extremity of the bucket being of a slightly reverse curve, as shown at *g'*.

The general directions of the two sets of buckets are at the same tangent with respect to the wheel, but the curvatures are opposite—that is to say, one is convex with respect to incoming water, and the other concave, as shown in Fig. 2 of the accompanying drawings, in which the upper buckets are represented in full lines, and the lower in dotted lines.

The upper buckets in elevation are straight, while the lower ones, *b b*, &c., are curved, and advance in the direction of the incoming water, as shown at b^3.

The openings for escape of water from the upper buckets are internal, as shown at *h'*, while the lower ones are at the bottom, as shown in Fig. 4 of the drawings. I have found this form and respective disposition of the buckets to operate to great advantage.

To enable the current of water to aid still further in impelling the wheel by acting upon an additional or increased inclined surface, I cut away the upper inner side of the band or shelf *g*, which divides the two sets of buckets, as shown in Fig. 1 of the drawings, and by this means I greatly increase the effective capacity of my wheel.

By this cutting away of the shelf *g* the outlet of each bucket is considerably larger than its inlet, thus permitting of a free discharge of water.

I claim—

1. The elastic or semi-elastic packing b^1 between the pads O and ring-frame N, substantially as and for purposes stated.

2. The ring-frame N and pads O O, &c., in combination with the wheel-case F, substantially as described, whereby water is shut out from contact with the outer face of each pad, essentially as and for purposes stated.

3. The pad O and packing b^1, as formed with the opening *f'*, substantially as and for purposes stated.

4. The wheel combining the buckets *a a*, &c., *b b*, &c., of the curvature and disposition as stated, and with the upper inner face of the band or shelf *d* cut away as explained, the whole being and operating as hereinbefore set forth.

THOMAS TRIPP.

Witnesses:
LOUIS A. CURTIS,
FRED. CURTIS.