

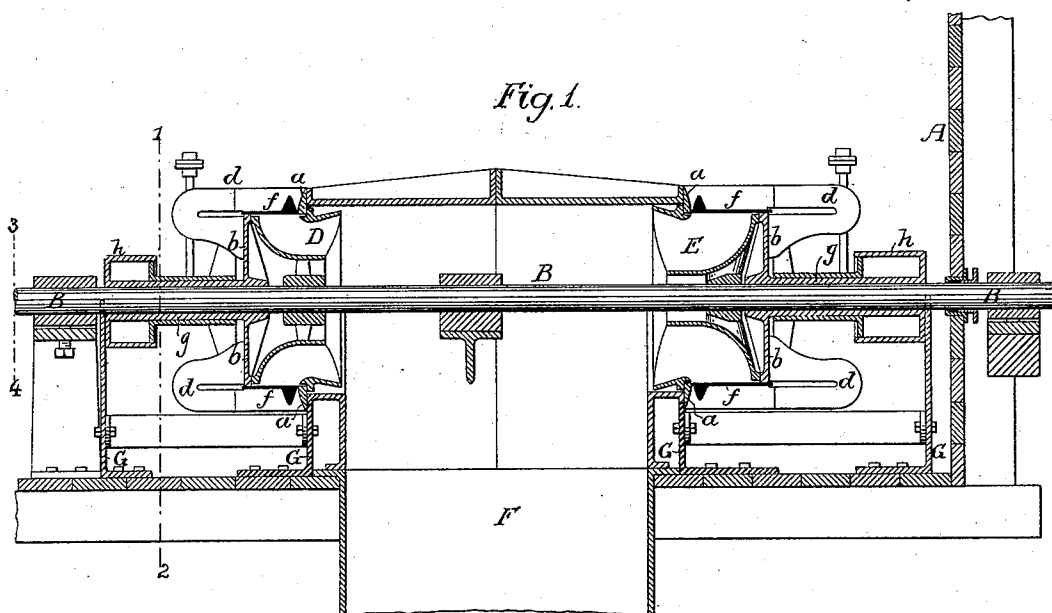
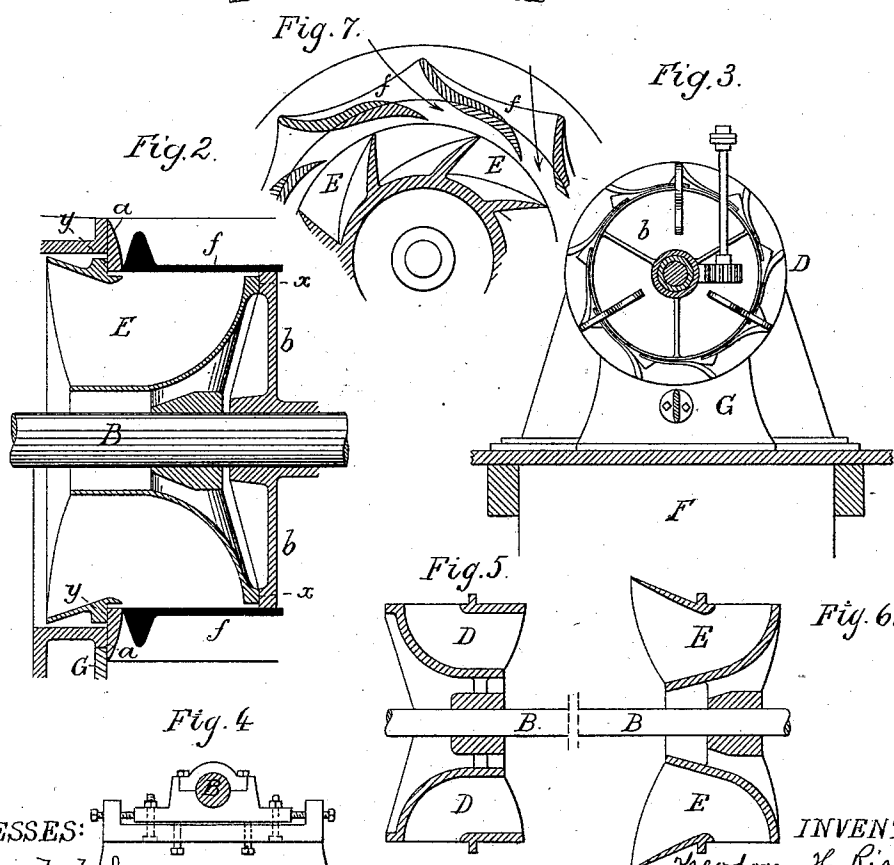
(No Model.)

T. H. RISDON & W. W. TYLER.

TURBINE WATER WHEEL.

No. 268,287.

Patented Nov. 28, 1882.



WITNESSES:

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UNITED STATES PATENT OFFICE.

THEODORE H. RISDON AND WILLIAM W. TYLER, OF MOUNT HOLLY, N. J.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 268,287, dated November 28, 1882.

Application filed July 24, 1882. (No model.)

To all whom it may concern:

Be it known that we, THEODORE H. RISDON and WILLIAM W. TYLER, citizens of the United States, residing in Mount Holly, Burlington county, New Jersey, have invented certain Improvements in Turbine Water-Wheels, of which the following is a specification.

The objects of our invention are to prevent binding of the wheel in its casing, to obtain the maximum of power at all stages of water, and to render the wheel-casing independent of any defects in the flume or chest of the draft-tube.

In the accompanying drawings, Figure 1 is a longitudinal section of part of a flume or penstock, showing our method of constructing and mounting water-wheels; Fig. 2, an enlarged section of the wheel, its casing, and gates; Fig. 3, a transverse section on the line 1 2, Fig. 1; Fig. 4, a transverse section on the line 3 4, Fig. 1; and Figs. 5 and 6, diagrams illustrating one of the features of our invention.

A represents part of a flume or penstock; B, a horizontal shaft having two wheels, D and E, and F a draft-tube common to both wheels. The wheels D and E are, so far as regards their general construction, similar to the wheel described in our Patent No. 193,283, dated July 17, 1877, *a* being a guide-rim, and *b* a crown-plate supported by goose-necks *d*, which serve as guides for the gates *f*, the latter being connected to a sleeve which is guided on the tubular projection *g* of the crown-plate and in a box *h* at the end of the same, and is operated by means of a rack and pinion, so as to open or close the gates simultaneously. The guide-rim and crown-plate thus form practically, with the gates, the casing of the wheel; and one of the features of our invention consists in providing the wheel with a vertical bearing only against the guide-rim and crown-plate. Thus, as will be observed on reference to Fig. 2, the wheel has a vertical bearing against the crown-plate at *x* and a vertical bearing against the guide-rim at *y*, and these are the only points of contact between the wheel and casing. By this means slight vertical displacement of the wheel in the casing, due to wear or sagging of the shaft B, does not cause the wheel to bind, nor does it interfere with the free running of the wheel. This mode of constructing the wheel also permits us to control the shaft-bearings

by set-screws, so that said bearings can be set up to compensate for wear, and keep the shaft properly lined. (See Fig. 4.)

The casings of the wheels are supported by frames G G, connected to the guide-rim and to the box *h* of the crown-plate, so that said wheel-casings are entirely independent of the sides of the flume and of the draft-tube chest. By this means the said chest and the sides of the flume may be made of sheet-iron or wood and comparatively light, as there can be no distortion of the wheel-casings and binding of the wheels in the event of the chest or side of the flume yielding to the pressure of the water.

It will be seen on reference to Fig. 1 that the capacity of the wheel E is greater than that of the wheel D—that is to say, the former wheel has a greater area of discharge, and is consequently more powerful than the other—both wheels, however, running at the same speed, owing to the fact that they are of the same diameter at the gate. The object of this arrangement is to obtain the maximum effect of the water at all stages of water by working as near full gate as possible. For instance, when the water is high both wheels may be run at full gate, and as the supply diminishes the gates may be gradually closed until economy suggests the shutting off of the small wheel and the running of the large wheel at full gate. If further restriction becomes necessary, the gate of the large wheel may be gradually closed until it reaches a point where it becomes economical to run the small wheel at full gate, and the gate of the small wheel may then be adjusted as circumstances suggest until it is necessary to shut down altogether. In order, however, to obtain the full effect of this arrangement—that is to say, to obtain any desired amount of power between the maximum of both wheels and the minimum of the small wheel—it becomes necessary to so construct the wheels that they will give a high percentage of power in working from full to about three-quarters or half gate; and with this end in view we construct the gates of the wheels so that they will present a smooth regular surface instead of a sharp edge to feed and direct the current of water upon the wheel at part gate.

In the drawings we have shown a flange or garniture upon the edge of the gate as a means

of accomplishing this result; but the same end may be attained by other means—as, for instance, with a gate of a form similar to that shown in Fig. 7.

5 In the wheels shown in Fig. 1 the difference in capacity is due to a difference throughout in the area of the buckets or water-passages. Variations in the capacity of the wheel may be effected, however, by simply varying the area
 10 of discharge, the form of the inlets remaining practically the same. Thus in Figs. 5 and 6 we have shown two wheels having the same inlet form; but the wheel D has a discharge in line with the shaft only, while the wheel E has,
 15 in addition to this, a circumferential discharge, due to the flaring of the rim of the wheel. The same circumferential discharge might be effected by cutting away the wheel at and near the discharge ends of the buckets, and the discharge may be inward or toward the shaft, if
 20 desired, instead of outward or away from the shaft.

Although we have shown a continuous horizontal shaft, B, carrying both wheels, it will be
 25 evident that two shafts coupled together between the wheels are the equivalent of the single continuous shaft; and where we have alluded or may allude to the “shaft” we wish to be understood as meaning either a continuous
 30 or a coupled shaft.

We claim as our invention—

1. The combination of the crown-plate, guide-rim, and gates with the wheel carried

by a horizontal shaft and having vertical bearings xy against the said crown-plate and guide-rim, as set forth. 35

2. The combination of the crown-plate, guide-rim, and gates, the wheel having vertical bearings xy against the crown-plate and guide-rim, and the horizontal shaft B, adapted
 40 to adjustable bearings, as set forth.

3. The combination of the horizontal wheel, the flume, the draft-tube chest, the crown-plate, and guide-rim, and a structure, G, whereby
 45 said crown-plate and guide-rim are supported independently of the said chest on the sides of the flume, as set forth.

4. The combination of a horizontal shaft with two wheels of different capacities having gates which present a smooth regular surface to feed
 50 and direct the water upon the wheel at part gate, as set forth.

5. The combination of a horizontal shaft with two water-wheels, one constructed with a longitudinal discharge only and the other having
 55 both a longitudinal and a lateral discharge, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THEODORE H. RISDON.
 WILLIAM W. TYLER.

Witnesses:

ELSWORTH HOLEMAN,
 EDWARD V. HOLEMAN.