(No Model.) 2 Sheets—Sheet 1.

J. RAAB.

TURBINE WATER WHEEL.

No. 279,981. Patented June 26, 1883.

Fig. 1.

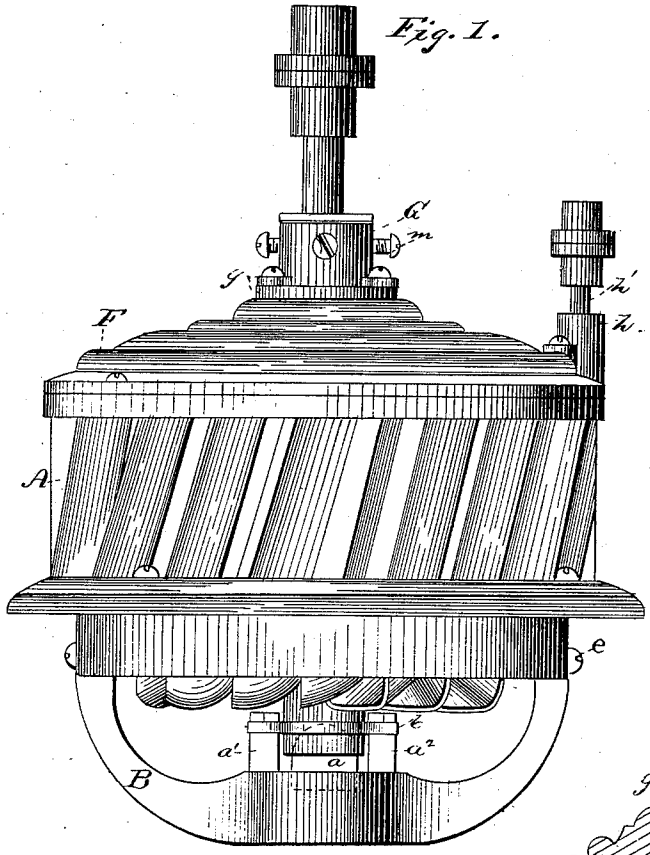


Fig. 2

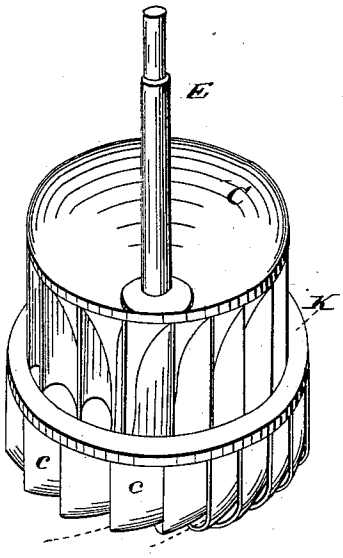


Fig. 4.

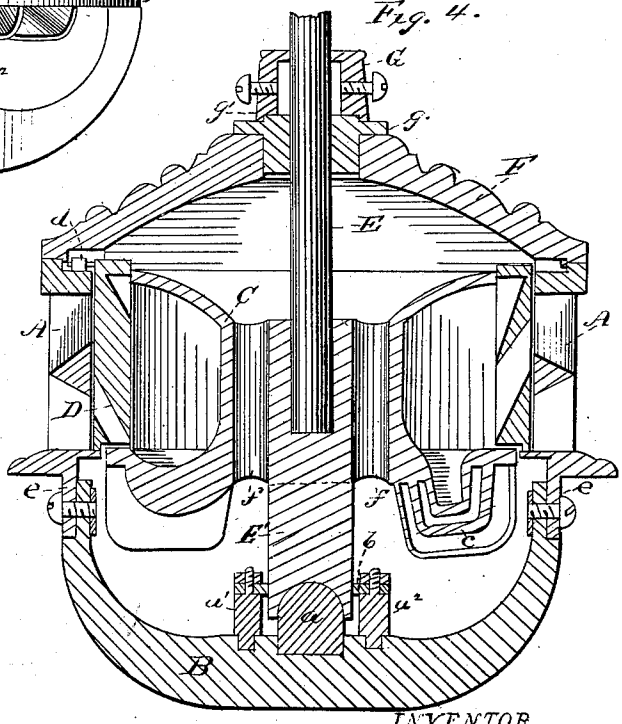
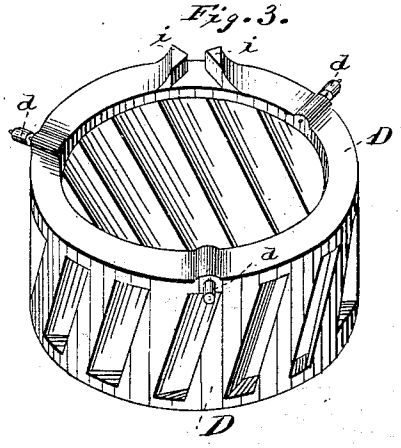


Fig. 3.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

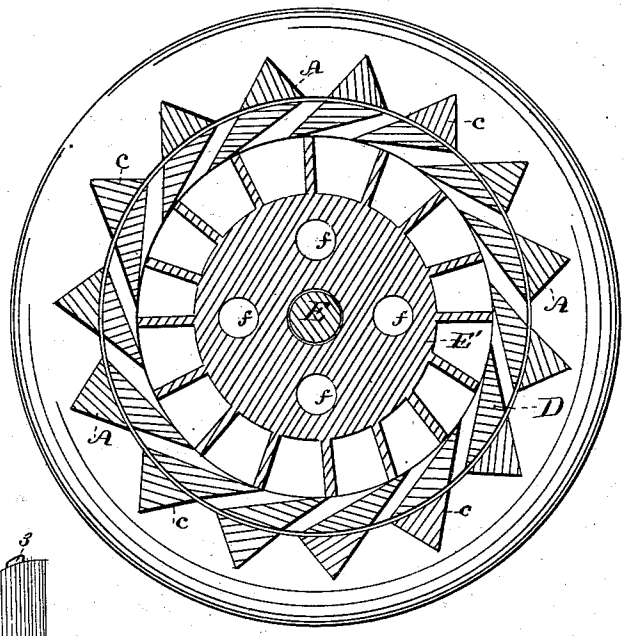


Fig. 7.

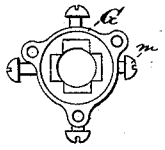


Fig. 8.

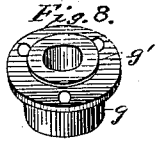


Fig. 9.

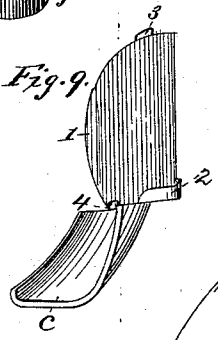


Fig. 10.

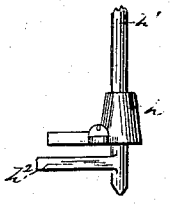


Fig. 11.

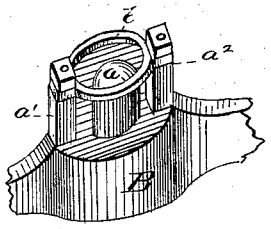
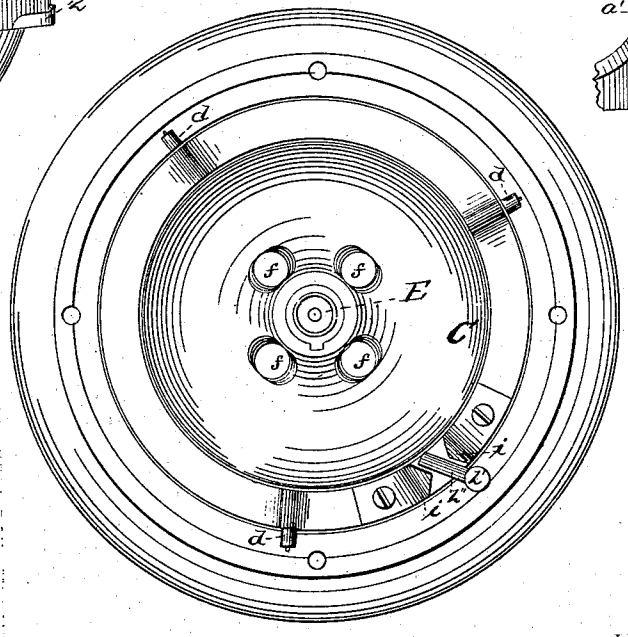


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH RAAB, OF DAYTON, OHIO.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 279,981, dated June 26, 1883.

Application filed July 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH RAAB, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented new and useful Improvements in Turbine Water-Wheels, of which the following is a specification.

My invention is for improvements in that class of inventions known as turbine water-wheels; and it consists in certain details of construction and operation, as will be more particularly hereinafter described.

In the annexed sheets of drawings furnished herewith, Figure 1 is an elevation of the apparatus. Fig. 2 is an elevation of the working-wheel. Fig. 3 is a top perspective view of the gate. Fig. 4 is a vertical sectional elevation of Fig. 1. Fig. 5 is a plan view in cross-section. Fig. 6 is a top view with the crown-plate removed; and Figs. 7 to 11 are views in detail of several elements of the apparatus, all of which will be referred to hereinafter.

Reference now being had to the letters of reference marked thereon, A is the outer case; B, the cross-arm or bridge-tree; *a*, the step upon which the shaft of the wheel turns, to each side of which, on top of the bridge-tree, is an upright standard, having secured thereto a guide ring or plate, *b*. Said guide-plate serves to maintain the shaft in a true vertical position, so that in case of uneven wearing of the parts the wheel is prevented from friction against the case, thus preventing a great waste of water and consequent loss of power.

C is the wheel, or, rather, the spider or hub, the periphery of which is concave, and around which is arranged a single series of buckets, but of different forms in their upper and lower portions. The upper parts are less in diameter than the lower, the lower curving downward and slightly outward. Its construction is shown in detail, (Fig. 9,) wherein the upper portion on the edge (indicated at 1) is rounded to conform to the contour of the periphery of the hub, while at the middle, where it commences to verge into what we will term the "spout" or "gutter" portion, it is provided with a shelf or bracket, 2, and on the top edge of the upper part is a lug, 3, the object of the bracket and lug being that when the buckets are secured to the hub the lug 3 is fitted into a recess in the under face of the top of the concave hub, and the bracket is mortised in the under side of an annular ring, K, the function of which will be described further on. Each bucket is secured to the hub by a bolt passing through a hole, 4, therein.

The gate D has oblique openings throughout its periphery or circumference corresponding to like openings in the outer casing. The gate is situated in the casing between it and the wheel, and is suspended on the upper rim of the casing by small shafts, journaled or otherwise secured on the top rim of the gate, as shown in Figs. 3 and 4, to the ends of which are arranged friction-rollers, *d* thus allowing the gate to turn freely. The rim of the casing on which the gate is suspended is recessed circumferentially, or has an annulus, within which the rollers travel. (See Fig. 4.)

The case A, at its bottom, has an annular flange or rim depending therefrom, as shown at *e e*, Fig. 4, to which the bridge-tree is bolted.

E is the shaft, which fits into or is integral with the hub C, which hub is cast or made with vertical passages *f* in the same, which permits of any water entering below the crown-plate to pass down through the wheel.

F is the crown-plate, which is flanged to fit the top of the casing, which is correspondingly flanged, and to which it is secured by screws, bolts, or otherwise. The crown-plate is made with an opening in its center, in which is adapted to fit, and is secured by screws, a thimble, *g*, provided on its top with a circular projection or flange, *g'*, encircling the shaft, around which is fitted the adjustable packing-box G. This box is of suitable construction, with packing-blocks set in vertical notches, which are adapted to be tightened around the shaft by the screws *m*. This device is shown in detail, Fig. 7.

To one side of the crown-cover, at or near its periphery, working in a stuffing box or guide, *h*, is a shaft or rod, *h'*, which, like a key, is used to open and close the gate. The lower end of this shaft *h'* rests and turns in a socket on the top rim of the casing A, which is recessed circumferentially, as before mentioned, and somewhat above the lower end of the shaft is

a right-angle extension, *h''*, which fits in a recess between two shoulders, *i i*, on top of the upper rim of the gate, thus forming a clutch; and by turning the shaft *h* the gate is controlled, and by its being suspended, as before described, and turning on the friction-rollers this operation is greatly facilitated.

The buckets are somewhat tangential to the oblique openings in the gate—as casing—when they are relatively arranged each to the other. These buckets, instead of being secured to the hub, as above stated, might be cast therewith. The annular ring K serves as a division of the wheel to cause the water to enter against the top portion of the buckets, and thus be discharged properly through the spout or gutter portion.

The operation will be obvious; but, however, it may be mentioned, water entering the ports above the rim K strikes the tangential buckets, and it is discharged from the spout-shaped end of the bucket, as shown by dotted lines in Fig. 2. The buckets are contiguous to the oblique openings, and the object is that water flowing therethrough may instantaneously enter the buckets, thus producing a regular flow through the wheel, thereby gaining a steady velocity and uninterruption of power.

Having thus described my invention, what I claim is—

1. In a turbine water-wheel, the combination of the shaft and hub having the buckets, as described, with the casing, gate, and crown-cover, said gate being suspended on the upper rim of the casing by journals to which are arranged the friction-rollers, substantially as and for the purposes set forth.

2. In a turbine water-wheel, the case provided with the annulus on its top rim, the combination of the gate suspended and held therein on the friction-rollers, as described, with the crown top and guide, said guide having the key turning in the slot in the top rim of the casing, and adapted to engage between the shoulders on the gate, substantially as and for the purpose described.

3. In a turbine water-wheel, the combination of the shaft, having the hub and buckets, as described, the gate and casing, and the crown-top having thereon the means for operating the gate, with the bridge tree and step, said bridge-tree having a standard to each side of the step, on which is secured a guide-plate for the shaft, as set forth.

4. In a turbine water-wheel, the herein-described combination of the gate having the shoulders *i i*, suspended on the upper rim of the casing by the friction-rollers, and adapted to be controlled by the key in the crown-top, with the wheel having the buckets and annular ring K, as set forth, said buckets being contiguous to the openings of the gate and casing, substantially as described.

5. In a water-wheel, the combination, with the wheel and shaft, of the thimble *g*, having flange *g'*, stuffing-box G, fitting on said flange, the bridge-tree step *a*, and guide-plate *b*, said parts being formed and arranged substantially as and for the purpose set forth.

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