

Water Wheel.

No. 122,275.

Patented Dec. 26, 1871.

Fig. 3.

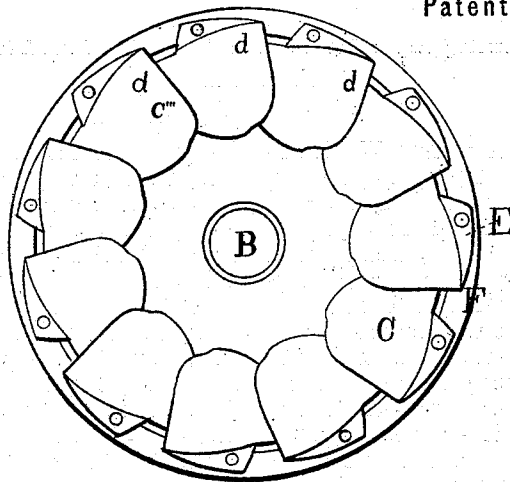


Fig. 1.

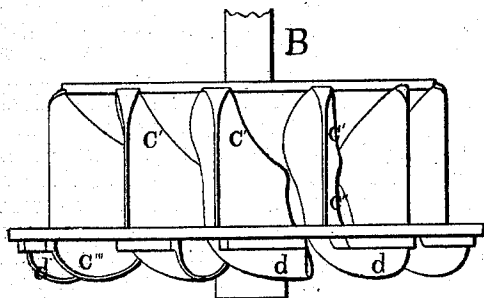
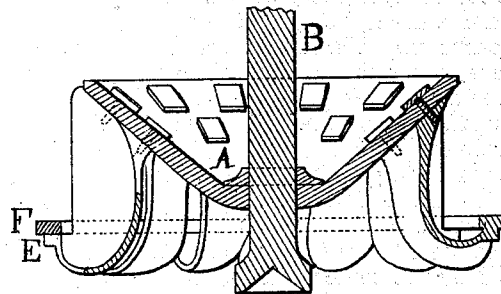


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. 122,275, dated December 26, 1871.

To all whom it may concern:

Be it known that we, MATTHEW W. OBENCHAIN and JOHN T. OBENCHAIN, of Logansport, in the county of Cass and State of Indiana, have invented a new and valuable Improvement in Water-Wheels; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a side elevation of our turbine-wheel. Fig. 2 is a vertical section. Fig. 3 is a bottom view.

This invention has relation to turbines; and it consists in the construction and novel form of the body and buckets, whereby, with economy in the manufacture, a wheel is produced which is designed to offer little or no resistance to the natural outflow of the water in the secondary movement or reaction thereof.

In the accompanying drawing, the letter A designates the body of the turbine, which is an inverted conical basin with a rounded base, its exterior surface being of the geometric form of a hyperboloid. Through the center of the rounded base passes the shaft B of the wheel, and this form is adopted for the body, in order to enable said shaft to be secured to the wheel as nearly as possible opposite the middle of the bucket without obstructing the inward flow, and, at the same time, to afford a suitable means for connecting the buckets with the shaft and with each other. The buckets C are of peculiar form, and are connected by the conical wall of the body A on the upper and inner side, and by the ring F on the outer side, at a point lower down or as nearly as may be in the plane of division between the reactionary face or floor of the bucket and the upper face or wall of impact. The buckets are provided with flanches E, by means of which they are secured to the body A and ring F, which latter is placed sufficiently distant from the upright edge of the bucket to leave a space for the reception of the overhanging flanch of the case. The form of the bucket may be described in general terms to be very nearly that of a portion of an ovoid or ellipsoid, the lines of greatest curvature lying below the plane of the circumferential ring. The curved surface is not strictly geometric however, as will appear. Commencing at

the inlet edge of the bucket the wall, which receives the direct action of the water at first radial, takes an upward, inward, and rearward curve, which is converted gradually into a downward, inward, and rearward curve of greater degree. From this curvature the surface, passing below the plane of the ring, curves downwardly, outwardly, and rearwardly, which gradually merges into a rapid upward and outward curvature, extending under the ring and beyond its inner edge, so that the extreme outlet or centrifugal discharge is beyond the inlet-lip of the bucket. The curvature is therefore scroll-like, or rather resembles the outermost fold of some marine shells of the conch family. The inlet edge of the bucket is nearly vertical, having a slight upward and rearward curve. The outlet or lower edge is a portion of an ellipse or circle, whose plane is vertical and radial, or nearly so, and if produced would intersect the body of the succeeding bucket. The outlet has therefore less area than the inlet-opening.

Water, being an almost incompressible substance of but little cohesive power, is amenable to external forces constantly and to a very great degree. The force with which a current of water strikes the upper or impact wall of my bucket is due to its velocity and volume. The velocity gradually diminishes on account of the slanting curvature of the bucket, and gravity assumes more control of the water as it passes below the ring and discharges it from a portion or the whole of the outlet, according to circumstances, varying with the volume and velocity of the water and the mass of the wheel. The object of the formation of the lower bucket or inverted hood is to obtain the greatest reactionary effect with the least resistance, whatever be the volume and velocity of the water as compared with the mass of the wheel. If the velocity be great with small volume, the tendency of the current is to discharge toward the center, which is freely permitted by the form of the discharge-opening and the rounded core or body. If the volume be great with small velocity the discharge will be chiefly downward, and the velocity of the wheel will depend more upon the reaction. The form of the lower bucket is designed to give the fullest effect under such circumstances. If both the velocity and volume of the current are great the discharge will be over the entire lip of the out-

let, which is designed to present no obstruction to the natural flow to retard the forward rotation of the wheel.

Having thus described my invention, I claim—

The turbine herein described, consisting of the conical body A, the ring E, and the flanged ovoid buckets C, having their centrifugal discharge beyond the vertical plane of the inlet, and surfaces gradually increasing in curvature from the inlet to the junction with the ring, and terminating in full semicircular or elliptical outlet-

lips lying nearly in radial planes, as specified and shown.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

MATTHEW W. OBENCHAIN.
JOHN T. OBENCHAIN.

Witnesses:

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