V. M. Baker,

Water Wheel.

No. 106,766. Patented Aug. 30. 1870.

Fig. 1.

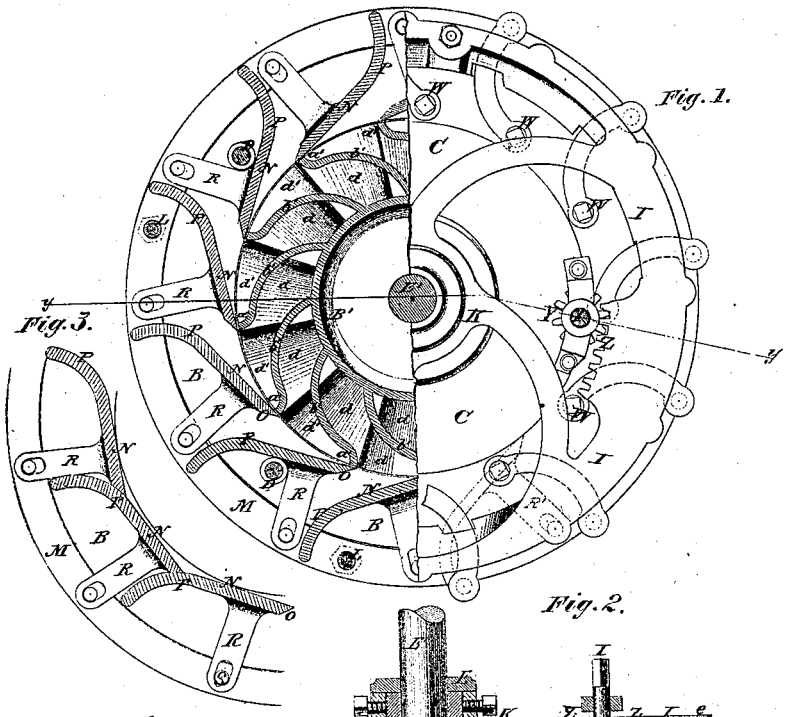
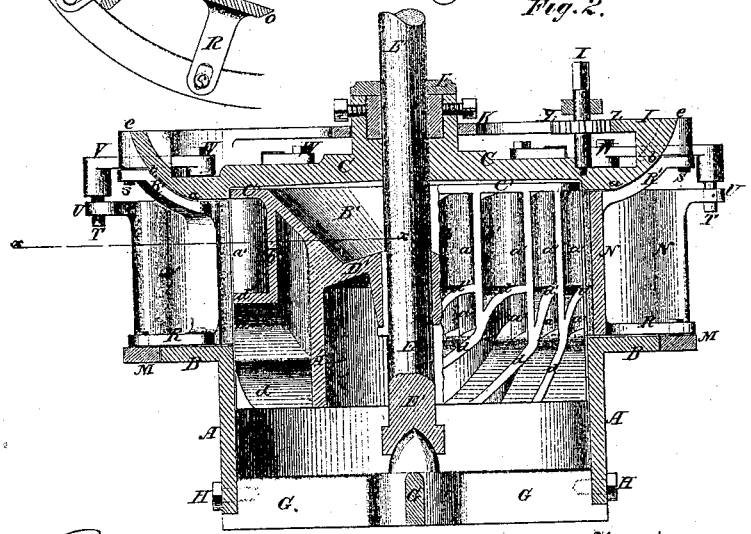


Fig. 3.

Fig. 2.



Witnesses:

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VINCENT M. BAKER, OF PRESTON, MINNESOTA.

Letters Patent No. 106,766, *dated August* 30, 1870.

IMPROVEMENT IN WATER-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, VINCENT M. BAKER, of Preston, in the county of Fillmore and State of Minnesota, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

My invention relates to turbine water-wheels, and consists in certain improvements upon the wheel patented to me October 12, 1869.

The difference between that patent and my present invention is, that the crown-plate of the last and actuating rim is curved, at the outer edge, to prevent the water from being compelled to pass around sharp corners, as is the case with all straight flanged cases. It also increases the space, and gives a larger volume of water to the inner end of the gate. By this means the water is conveyed to the wheel with less friction and greater force than can be obtained in any other way. It also gives greater freedom of movement to the gates than is possible with straight flanges.

Again, in my patented case, the short bucket has a space between its top and the heel of the long bucket, hence the water passing over the top of the short bucket to the long bucket is broken, and forms air-chambers.

In my present invention the heel of the long bucket extends back to the top of the other, whereby the water is received and kept more compact, thus avoiding the air-chambers and breakage that existed in the former arrangement. By a longer curve to the perpendicular part of the long bucket the collateral pressure of water is transferred to the inclined part of the bucket with greater force.

The gates marked J in my former invention have curved inner ends, and are guided in their movements by grooves cut in the upper and lower flanges of the wheel-case, and slide along the chute-plates. In the present application the gates constitute the guides, and are made with beveled inner ends, straight inner faces, and curved outer ends, and with a straight lower arm, and curved upper arm, attached near the inner end of the gate.

By this arrangement, the gate operates with far greater ease than in my former patent, and the water is conducted to the wheel with greater force and less friction.

Figure 1 is a top view of my improved wheel, a part being sectioned horizontally.

Figure 2 is a vertical section of the case on the line *x x*, fig. 1, and of one side of the wheel, the other side being shown in elevation.

Figure 3 is a detail, in horizontal section, showing the position of the buckets when closed.

Similar letters of reference indicate corresponding parts.

A is the cylindrical wheel-case, and

B a horizontal flange on the top thereof, projecting outward a suitable distance at the bottom of the space occupied by the gates.

C is the crown or top plate of the case.

It is connected to the flange B by the posts D, and supported thereby at the top of the space for the admission of the water to the wheel.

This plate supports the upper bearing, E, for the shaft, and the step F, at the bottom, is supported by the cross-bars G, detachably connected to the bottom of the case A by the screw-bolts H.

I is a rim, resting on the top of the crown-plate C, at the skirt, and journaled by a central hub, K, on the hub of the bearing E, so as to turn thereon.

It projects outside of the edge of the plate C, and supports, by means of the posts L, a rim, M, fitted around the periphery of the flange B, so as to turn back and forth on it.

The edge of the crown-plate C is beveled or curved from the bottom, at *a*, upward, to the top *b*, and the edge of the rim I is similarly curved from the bottom upward, beginning at *b*, where the edge of C terminates, and continuing to the top, *e*, as shown, so that the water will be directed from above downward in a smooth, regular, and unobstructed manner, with better results than would be the case if these edges were vertical, and the water was caused to move around or over angular corners.

N represents the gates, which are thin vertical plates of metal, having the plane beveled edges shown at O, where the water leaves them when it arrives at the buckets.

From this point to P the said gates have plane surfaces, and thence to the other edges, Q, they are shaped on the curved rims, shown, so that they terminate in lines nearly radial to the shaft.

This form, it is believed, is best calculated to guide the water (which approaches the wheel toward the center) to the required tangential course for application to the buckets.

These gates have the lateral arms R at the bottom, and R′ at the top, near the inner ends, extending to the rims M and I, and connected to them by the pins S, which pass through holes elongated in the direction of the long axes of the said arms, which are designed to allow the gates to be forced out, in case any sticks or other solid matter crowds in between the buckets and the inner ends of the gate.

The outer ends of these gates are connected, at the top, by pins, T, engaging in vertical holes in ears, U, attached to them, to the curved bars V, passing through notches in the lower face of the rim I, and pivoted to the top of the crown plate C at W.

The rim I is moved back and forth for opening and closing the gates by a vertical shaft, X, having a pinion, *y*, gearing with the cog-teeth *z*.

The rim M moves with the rim I, and these two rims acting upon the gates through the arms R R′, being turned in the direction to open the gates, swing the inner ends backward in the circular course in which they move, while the bars V cause the outer ends to move partly backward and partly outward, whereby the gates, when open, are caused to assume the position represented in fig. 1, in which it will be observed that the inner ends are brought close to the periphery of the wheel.

By the opposite movements of the rims I and M the gates are caused to assume the position shown in the detail sectional, fig. 3, in which it will be observed that the beveled faces O are caused to bear snugly against the inner sides of the next gate about at the point of the curvature P.

The shell of the wheel is composed of the vertical cylinder A′, the inverted conic plate B′, the horizontal rim C′, at the top, and the central web D′, the latter for attaching it to the shaft E′.

The buckets consist of the vertical concave parts a^1 a^2, the vertical convex parts *b′*, and the oblique parts *d d′*, all arranged as shown, the upper ends of the parts a^1 being attached to the flange C, the upper ends of the convex parts to the inverted conic plate B′, the inner vertical edges of the parts a^1 merging in the outer vertical edges of the convex parts *b′*, the inner edges of the latter and of the oblique parts *d* being joined to the cylinder C.

The upper ends, *d′*, of the oblique parts *d* are joined to the concave parts a^1 a^2 some distance above the lower ends thereof, and from their junction with the said parts they are convex to the points where they pass under the lower ends of a^2 of the next bucket behind, and the inner edges of these parts join with the lower ends of the convex parts *b′*.

The vertical measurement of the throats, by which the water is admitted, and that of the concave parts a^1 a^2, are about the same, and the arrangement is such that the water strikes fairly in these parts, which are so shaped and arranged relatively to the periphery of the wheel as to keep the water at the periphery during the action of the impact, and when it begins to move in the direction for discharging it is still kept on the periphery by the convex parts *b′*, until it comes opposite to the periphery of the next bucket behind them; then the parts *b′* recede more abruptly, and the water escapes partly between the two parts *b′* and partly between *b′* of the foremost bucket and a^2 of the one behind to the plane parts of *d* below the parts a^2. The convex parts *d′* between the vertical parts a^1 a^2 of the two buckets prevent the main portion of the water from falling down as rapidly as it otherwise would, and a considerable impelling force is imparted to them by the vertical action of the water thereon.

The outer parts of *d* receive the water discharged from *a*, which unites with the water discharged from *d′* behind the parts a^2.

These arrangements of the buckets, it is believed, will afford the most efficient means for the application of the water to derive the best results therefrom.

Having thus described our invention,

I claim as new and desire to secure by Letters Patent—

1. The crown-plate C, curved from *a* to *b*, and the rim I, curved from *b* to *c*, combined with gates N, having beveled edges O, and outer curved ends, as and for the purpose described.

2. The arrangement of the vertical concave plates a^1 a^2, the vertical convex plates *b′*, and the oblique plates *d d′*, with respect to the flange *c* and plate B′, for the purpose of forming an improved set of buckets for turbine wheels.

VINCENT M. BAKER.

Witnesses:

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