J. KINCAID.

IMPACT AND REACTION WATER WHEEL.

APPLICATION FILED MAY 17, 1919.

1,361,467. Patented Dec. 7, 1920.

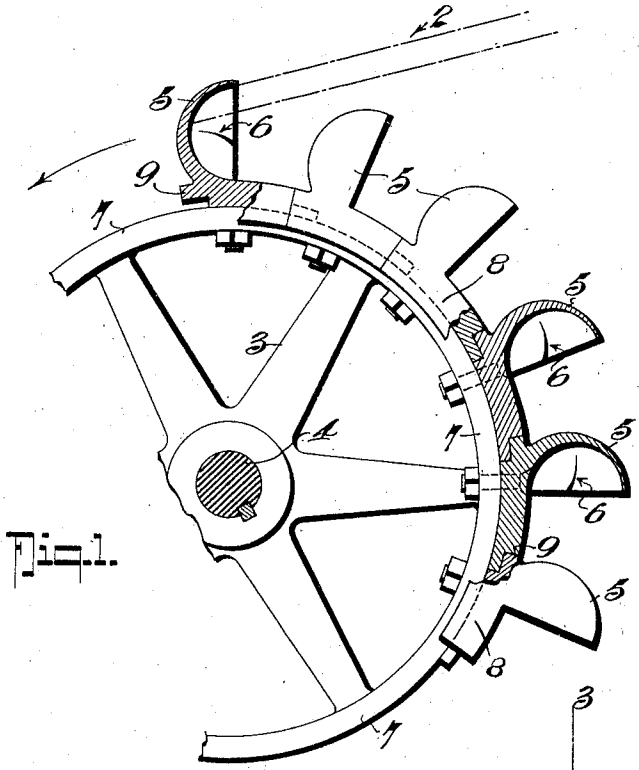

Fig. 1.

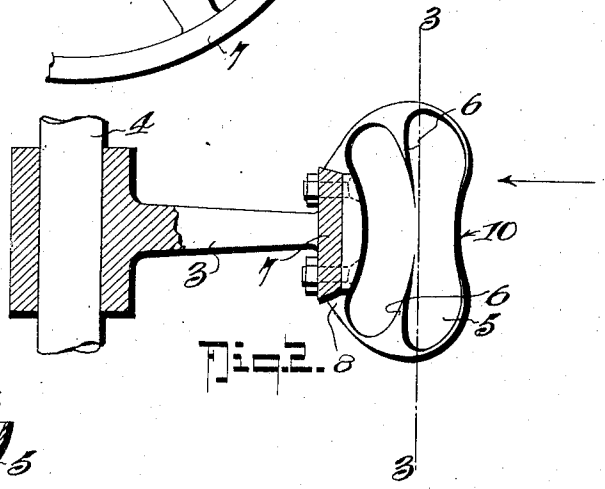

Fig. 2.

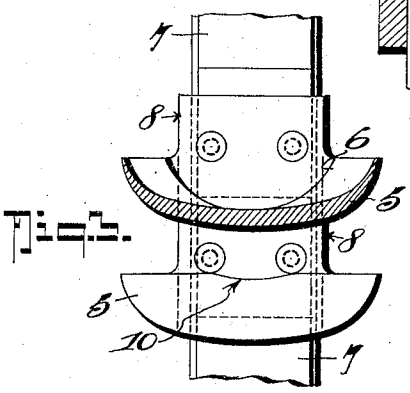

Fig. 3.

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IMPACT AND REACTION WATER-WHEEL.

1,361,467. Specification of Letters Patent. **Patented Dec. 7, 1920.**

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To all whom it may concern:

Be it known that I, JOHN KINCAID, a citizen of the Dominion of Canada, residing at Vancouver, in the Province of British Columbia, Canada, have invented certain new and useful Improvements in Impact and Reaction Water-Wheels, of which the following is a specification.

This invention relates to a water turbine of that class wherein the water jet is directed on a series of buckets secured on the periphery of a rotatable wheel, the buckets being so formed and the jet so delivered that the wheel is rotated by the impact of the jet and by the reaction of the water on the inner surfaces of the buckets as it leaves the wheel.

The invention is particularly described in the following specification, reference being made to the drawings by which it is accompanied, in which:

Figure 1 is a side elevation and part section of a part of the wheel showing the buckets and the manner of their attachment.

Fig. 2 is a plan of one of the buckets as attached to the rim, and

Fig. 3 is a section on the line 3—3 in Fig. 2, and a front elevation of the adjacent bucket.

In these drawings 2 represents the water jet and 3 the wheel secured on a shaft 4 rotatably mounted in suitable bearings formed in the inclosing casing. The inner surfaces of the buckets 5 are substantially semi-circular in cross section in the plane of rotation, and in plan are laterally elongated on each side of the middle line in a line approximately struck from the intersection of the mid-plane with the axis of rotation. The length of the bucket cavity across the wheel is, in practice, greater than twice the width in the plane of the wheel.

The inside curvature of the bucket in the middle line of the wheel is, as stated, substantially semi-circular, but along the backwardly curved middle line of the bucket toward each side, it merges gradually into a ridge rising from the bottom of the bucket. The wheel 3 to which the buckets 5 are secured is turned with a T-shaped flanged rim, the side edges of which are conically tapered smaller to the periphery. The base of each bucket is adapted to fit and tighten on the taper of the flange and is secured by bolts as shown.

The buckets 5 are formed with flanges 8 which fit upon the tapered edges of the rim flanges 7 and are secured thereto by short bolts with heads countersunk in the inner side of the bucket. The forwardly projecting end of the bucket flange 8 projects, as at 9, over the backwardly projecting end of the flange of the bucket in advance, which end is half-checked to receive it.

By securing the buckets in this manner, each bucket is held not only by its own bolts but by the overlapping end of the flange of the bucket behind, and this offers an uninterrupted rim surface adjacent the buckets.

The form of the bucket is designed to receive the impact of the water jet in the medial line and permit it to flow outward to each side, the medial ridges 6 providing, with the inner sides of the buckets, surfaces against which the outflowing water reacts to rotate the wheel. The outer edges of the buckets are reduced to a fine edge and in the path of the jet are slightly hollowed as at 10. The form of the bucket with the smooth bottom at the center and the ribbed delivery to each side, is favorable to the efficiency of the wheel as a motor providing an effective surface for impact of the jet, a free delivery on each side and reaction surfaces during such delivery.

The manner of fitting the buckets with a taper on the rim of the wheel relieves the securing bolts of the shearing strain and enables the buckets to be tightly fitted without excessive strain on the bolts and without necessity for any extreme accuracy of workmanship, and as previously stated, the overlap of the bucket flanges affords them mutual support.

Having now particularly described my invention, I hereby declare that what I claim as new and desire to be protected in by Letters Patent, is:

1. A water wheel comprising the combination with a wheel rotatably mounted, a series of buckets secured to the rim of the wheel, the rim of the wheel being outwardly flanged to each side and the edges of the rim conically tapered, each bucket having a flange adapted to fit and tighten on the taper of the flange of the wheel, and bolts by which the bucket flange is secured to the wheel flange, the adjacent ends of the bucket flange being step jointed together, substan-

tially as shown and for the purposes described.

2. A water wheel comprising the combination with a wheel rotatably mounted, a series of buckets secured to the rim of the wheel, the length of the bucket cavity across the wheel being greater than twice the width in the plane of the wheel, and the depth shallowing gradually toward each end, the bottom of the bucket adjacent to the mid-plane being an uninterrupted curve and on each side of this divided by a medial ridge increasing from nothing adjacent to the mid-plane to a maximum at the rim of the bucket, said bucket being substantially semi-circular in the mid-plane of rotation, substantially as shown and described.

3. A water wheel comprising the combination with a wheel rotatably mounted, a series of buckets secured to the rim of the wheel, the length of the bucket cavity across the wheel being greater than twice the width in the plane of the wheel, and the depth shallowing gradually toward each end, the bottom of the bucket adjacent to the mid-plane being an uninterrupted curve and on each side of this divided by a medial ridge increasing from nothing adjacent to the mid-plane to a maximum at the rim of the bucket, said bucket being substantially semi-circular in the mid-plane of rotation, said ridge dividing the bucket into transverse grooves, the axis of each groove and that of the dividing ridge separating the grooves being angularly directed backward toward the axis of rotation, substantially as shown and described.

In testimony whereof I affix my signature.

JOHN KINCAID.