





# UNITED STATES PATENT OFFICE.

JOHN D. CAMPBELL, OF MAGALIA, CALIFORNIA, ASSIGNOR OF ONE-THIRD  
TO J. E. WEAVER, OF SAME PLACE.

## WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 611,769, dated October 4, 1898.

Application filed November 25, 1895. Serial No. 570,016. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN D. CAMPBELL, a citizen of the United States, residing at Magalia, county of Butte, State of California, have invented an Improvement in Water-Wheels; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a water-wheel having peripheral buckets and means for applying the weight and momentum of a column of water to buckets carried by the wheel, so as to rotate it.

It consists of a wheel having depressions in the face of the rim within which buckets are seated and a stationary inclosing casing within which the rim of the wheel turns and within which the buckets are inclosed during a portion of the revolution of the wheel, an extension of the inclosing-chamber into the line of the nozzle through which water is delivered, and a means whereby the buckets are opened out into this extension, so as to receive the pressure of the water while passing through it, and a means by which they are again retracted into the rim after passing beyond the discharge-opening, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my device with a portion of the side flange and stationary casing broken away, the lowermost bucket being a section on line  $z z$  of Fig. 2. Fig. 2 is a section on line  $x x$  of Fig. 1. Fig. 3 is a section on line  $y y$  of Fig. 1. Fig. 4 is a perspective view of one of the buckets.

The wheel consists of a spider or arms A, having at the outer ends a circular rim B, the outer face of which has depressions or chambers into which the buckets fit when closed, so as to form a smooth continuation of the solid rim-face.

C is a stationary casing inclosing the sides and outer face of the rim and being concentric with the wheel around the upper portion of its circumference.

At the lower portion, where the water-supply nozzle D approaches the rim of the wheel in an essentially tangent line, this casing is extended outwardly, as shown at C', and extends in this manner around a segment of the

wheel equal to the distance through which the water-pressure is applied to the buckets.

During the rotation of the wheel the buckets remain closed within the rim while passing around the upper portion of the wheel and are moved outwardly into the enlarged part of the casing C' while passing through that portion where the pressure of the water is applied to them.

The buckets E are pivoted within the openings in the face of the rim by pins, (shown at F,) so that they may turn about these pins. The buckets consist of a bottom, parallel sides, one substantially closed end, and one open end, and the edges of the sides are beveled at  $e$  toward the closed end, so that the beveled portion may contact with the wall of the bucket-chamber at or about the time of the full opening of the bucket, whereby the strain is largely removed from the pivots about which the buckets swing. Near the open and movable ends of the buckets are pins or trunnions G, which extend through slots or channels H made in the rim B, as shown, and these pins are long enough, so that their outer ends enter slots or channels I made in the sides of the casing. These slots or channels are made concentric with the wheel and the casing at the upper portion and diverge outwardly, so as to follow the curvature of the enlarged portion C' of the casing at the bottom. As the pins G travel in these grooves or channels, it will be manifest that the bucket will be thus caused to lie close within the depressions or pockets of the rim B and inside the casing C while passing around the circular upper portion; but as soon as these pins reach the diverging portion of the channels I they will move outwardly, and thus tilt the bucket about its trunnions or fulcrum-pins F, so that the open end of the bucket will be moved outwardly into contact with the inner periphery of the casing C' and in direct line with the column of water entering through the nozzle D. This column thus exercises its full force and pressure upon each bucket as it arrives in line with it, forcing it through such an arc of a circle as the number of buckets and the distance from the nozzle to the discharge-opening will allow. When each bucket reaches a discharge-opening J, the water which has impelled it to this



point will be discharged, and further supply will be cut off by reason of another bucket being projected into line with the stream. As the empty buckets pass beyond the discharge-opening the pins G, still moving in the grooves or channels I, will be again drawn inwardly, following the outline of the water portion of the casing C', until the buckets are again folded within the rim and inside the circular portion of the casing. Any desired number of buckets, as three, may be passing through the operative part of the casing at one time. By this construction the buckets are temporarily moved outwardly into the line of the stream of water, and, being inclosed within the depressions in the rim and casing, the full force and effect of the water are brought to bear upon each bucket as it passes, the buckets being, as before stated, retracted into the rim as soon as they have passed the discharge-opening.

The casing and the nozzle are suitably supported by standards or lugs K, formed with or secured to them and bolted to a framework or timber, as shown at L.

It will be understood that the terms "top" and "bottom" of the wheel and casing as herein used are merely relative, since the nozzle might be arranged at any suitable point with reference to the periphery; but by placing it at the lower part gravitation assists in operating the buckets. As the buckets close into the depressions or pockets in the rim they form a smooth unbroken continuous surface with it, and in passing through that part of the rim immediately over the nozzle and which fits closely against it they thus prevent any back pressure from the water in passing through the enlarged casing C.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a wheel composed of a central circular chambered rim and an exterior casing having two different diameters whereby a narrow channel is formed for the passage of the buckets around a portion of the periphery, and a wider channel into

which the buckets may be opened between the inlet and discharge nozzles, of buckets each having a bottom, sides and one end, pivot-pins projecting from each side intermediate between the ends of the bucket, curved channels made in the wheel and other pins projecting upon each side of the bucket near the open end thereof, and entering said channels, the sides of the buckets having their edges beveled from the pivot-pins toward the closed ends of said buckets whereby said beveled portions of each bucket contact with the inner surface of the bucket-chamber, when the bucket is opened and the pins at the opposite end have reached the outer ends of the curved channels in which they travel.

2. In a water-wheel, buckets consisting of a bottom, parallel sides and a substantially closed end, the other end being open, the upper edges of the sides of the bucket being beveled for a portion of their length toward the closed end thereof, a wheel having chambers corresponding with and adapted to receive said buckets and having curved channels, pivot-pins projecting from the sides of the bucket between opposite ends thereof and other pins projecting from said sides near the open end of the bucket.

3. In a water-wheel and in combination with the wheel and a casing with internal chambers of different diameters, the buckets pivotally suspended between their ends, said buckets each consisting of a bottom, parallel sides and one substantially closed end, the opposite end being open, each of said buckets having pins projecting from the sides near the open end and having the edges of the sides near the closed end beveled toward said end whereby said beveled portion contacts with the inner wall of the bucket-chamber at or about the time the pins at the opposite end reach the limit of their outward movement.

In witness whereof I have hereunto set my hand.

JOHN D. CAMPBELL.

Witnesses:

L. COHN,  
JOHN G. JAYNES.