(No Model.)

H. RICHARDS & W. J. RICHARDS, Jr.

WATER WHEEL BUCKET.

No. 361,719. Patented Apr. 26, 1887.

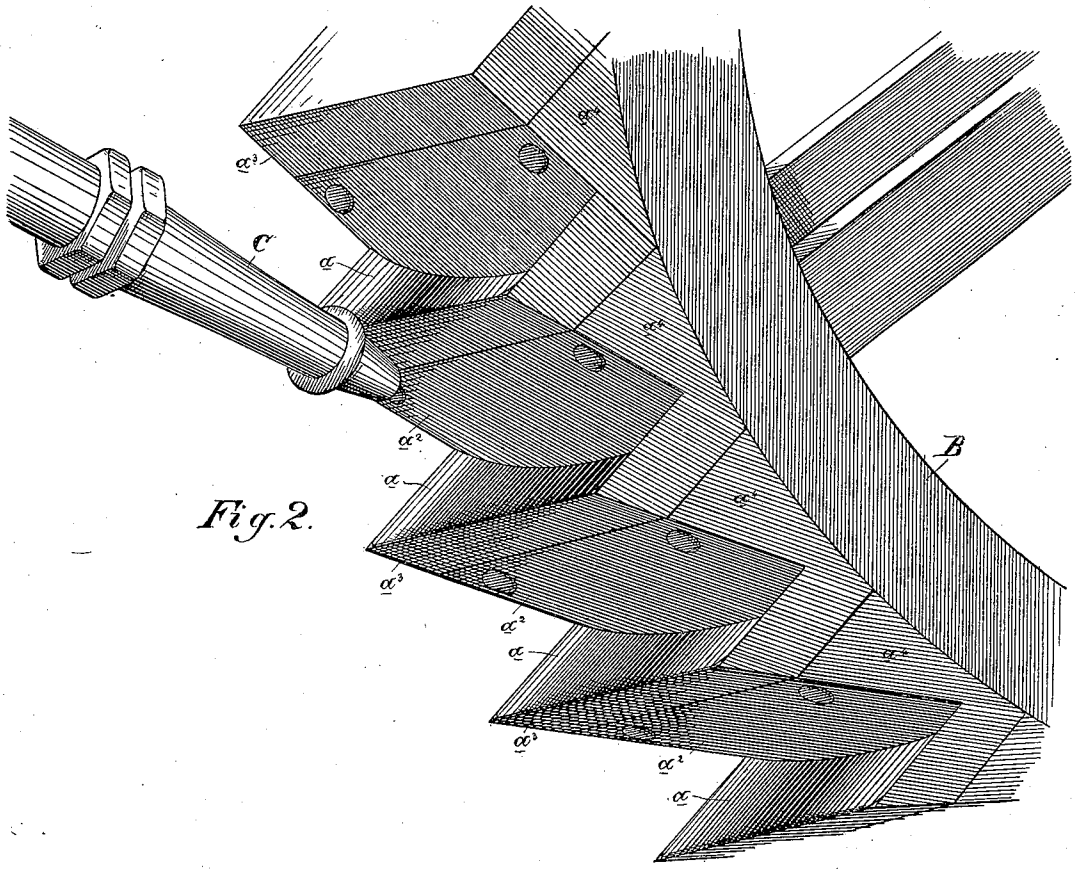

Fig. 2.

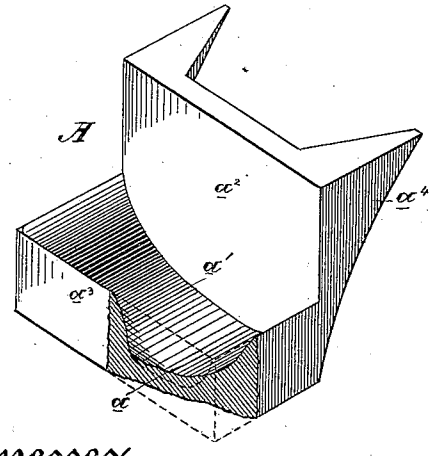

Fig. 1.

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UNITED STATES PATENT OFFICE.

HENRY RICHARDS AND WILLIAM J. RICHARDS, JR., OF NEVADA CITY, CAL.

WATER-WHEEL BUCKET.

SPECIFICATION forming part of Letters Patent No. 361,719, dated April 26, 1887.

Application filed September 9, 1886. Serial No. 213,186. (No model.)

To all whom it may concern:

Be it known that we, HENRY RICHARDS and WILLIAM J. RICHARDS, Jr., of Nevada City, Nevada county, State of California, have invented an Improvement in Water-Wheel Buckets; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to that class of water-wheels in which a series of buckets upon the rim or periphery of the wheel receive the impact of a stream of water issuing under head or pressure from a nozzle in close proximity, said wheels being commonly known under the name of "hurdy gurdy."

Our invention consists in the improved and novel bucket hereinafter fully described, by means of which the construction of the wheel is simplified, and the most effective reception, discharge, and reaction of the stream is obtained.

Referring to the accompanying drawings for a more complete explanation of our invention, Figure 1 is a perspective view of one of our buckets. Fig. 2 is a perspective view of a portion of the wheel, showing the buckets thereon and the nozzle from which the stream issues.

The bucket as a whole is designated by A. Its stream-receiving portion *a* is laterally concaved—that is to say, in a plane parallel to the wheel's axis. Its concavity is not a perfect curve throughout, but an approximately flattened portion, *a'*, is left on each side of the vertical center line. This concave receiving portion *a* is bounded on one end (here shown as above) by a straight flat portion, a^2, forming a wall which meets the portion *a* at right angles approximately, and on the other end (here shown as below) the portion *a* is bounded by a straight flat portion, a^3, approximately at right angles to *a* and parallel with the portion a^2.

As shown in Fig. 2, when two buckets are placed together, the outer end of the portion or upper boundary wall, a^2, of one bucket meets the back of the receiving portion *a* of the other, and the back of the lower boundary wall, a^3, of said last-named bucket continues exactly the plane or flat surface of the upper boundary wall, a^2, of the first-named bucket. A more perfect idea of the relative position of the buckets may be gained by regarding them, when turned to one position, as forming stairs, the portions a^2 being the risers and the portions a^3 continuing their surface and representing the thickness of the steps or treads, the upper surface of which would be the laterally-hollowed-out portion *a*. The buckets, thus placed with regard to each other, are secured to the rim or periphery of the wheel B by any suitable fastenings, though we prefer to make them with the side flanges, a^4, along the edges of the portion a^2, said flanges having the shape of right-angle triangles, their hypotenuses being concaved to fit the corresponding convex surface of the rim or periphery of the wheel. These flanges close in the sides of the spaces between the buckets and receive bolts through them for securing the buckets to the wheel.

In Fig. 2 the nozzle C, through which the water under head or pressure passes, is placed, as usual, below the horizontal center plane of the wheel, and is especially located in such position that the stream issuing from it shall be perfectly parallel with the upper boundary wall, a^2, of that bucket, the concave portion *a* of which receives its impact about its center. In this way as each bucket comes in line, the stream strikes the center of its concave portion *a* squarely, and enters between the two boundary walls on a line parallel with each.

The lower boundary wall, a^3, is beveled down to a thin edge, so as to offer the least resistance in passing through the stream. This edge is the only one the stream encounters, for it will be seen that there is no resisting edge to the upper boundary wall, for its surface is continued by the lower boundary wall of the adjacent bucket.

In the development of the hurdy-gurdy wheel, the first and best impact bucket—namely, one with a perfectly flat surface—gave way to a modification in the shape of an approximately semi-spherical bucket, which, while inferior in the matter of receiving the impact of the stream, more than made up by its better discharge capacity and its reaction qualities. Afterward a bucket appeared in which the impact surface of the semi-spherical bucket was flattened from side to side, but left curved in the direction of the height of the

bucket, and consequently in this last-named bucket the discharge of the water was, as in the preceding ones, toward all sides.

It is the intention in our bucket to receive the impact of the stream upon an approximately flattened surface, and to direct its discharge wholly sidewise, as in that case we have found that we obtain perfect impact, reaction, and discharge. It is to this end that we flatten the center a' of the receiving portion a, curve said portion laterally, and bound its ends with plane flat surfaces forming angles with it, whereby the reacting water cannot follow any but the curved sides. The entering stream being parallel with the boundary walls finds no impediment, and the least resistance is offered by the thin edge of the wall a^3 as it passes through the stream. There is therefore no back to the buckets which can offer resistance, and the full force of the stream is utilized to the best advantage.

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

1. In a water-wheel, a bucket secured to the rim or periphery of the wheel, said bucket having a stream receiving and discharging surface concaved laterally only—that is to say, in a plane parallel to the axis of the wheel—and bounded by straight walls above and below, forming angles with said concaved surface, whereby the water is discharged sidewise only, substantially as herein described.

2. The bucket A of a water-wheel, formed with the laterally-concaved stream receiving and discharging portion a in a plane parallel to the axis of the wheel, the straight portion a^2 above and the straight portion a^3 below, forming the boundary walls for the ends of the bucket and meeting the concaved surface at an angle, whereby the discharge of the water is effected to each side over the concaved portion, substantially as herein described.

3. The bucket A of a water-wheel, formed with the laterally-concaved stream receiving and discharging portion, a, having a flattened center, a', to receive the impact of the stream, the straight portion a^2 above and the straight portion a^3 below forming the boundary walls for the ends of the bucket, and meeting the concaved surface at an angle, whereby the discharge of the water is effected to each side over the concaved portion, substantially as herein described.

4. In a water-wheel, the series of buckets A, secured to the rim or periphery of the wheel, each bucket being formed with a laterally-concaved stream receiving and discharging portion, a, a straight upper portion, a^2, and a straight lower portion, a^3, the back of which meets the forward end of the upper portion, a^2, of the adjacent bucket and continues its plane surface, substantially as herein described.

5. In a water-wheel, a series of buckets, A, secured to the rim or periphery of the wheel, each bucket being formed with a laterally-concaved stream receiving and discharging portion, a, a straight upper portion, a^2, and a straight lower portion, a^3, the front of which has a thin edge and the back of which meets the forward end of the upper portion, a^2, of the adjacent bucket and continues its plane surface, substantially as herein described.

6. In a water-wheel, a series of buckets, A, secured to the rim or periphery of the wheel, each bucket being formed with a laterally-concaved stream receiving and discharging portion, a, a straight upper portion, a^2, a straight lower portion, a^3, meeting and continuing the plane surface of the upper portion of the adjacent bucket, and side flanges, a^4, on the upper portion, having a curved edge to fit the rim of the wheel, and closing in the sides of the space between the buckets, substantially as herein described.

7. The bucket A, having the laterally-concaved stream receiving and discharging portion a, with a flattened center, a', the lower straight portion, a^3, the upper straight portion, a^2, and the side flanges, a^4, on the portion a^2, having edges curved to fit the rim of the wheel to which they are attached, substantially as herein described.

In witness whereof we have hereunto set our hands.

HENRY RICHARDS.
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Witnesses:
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