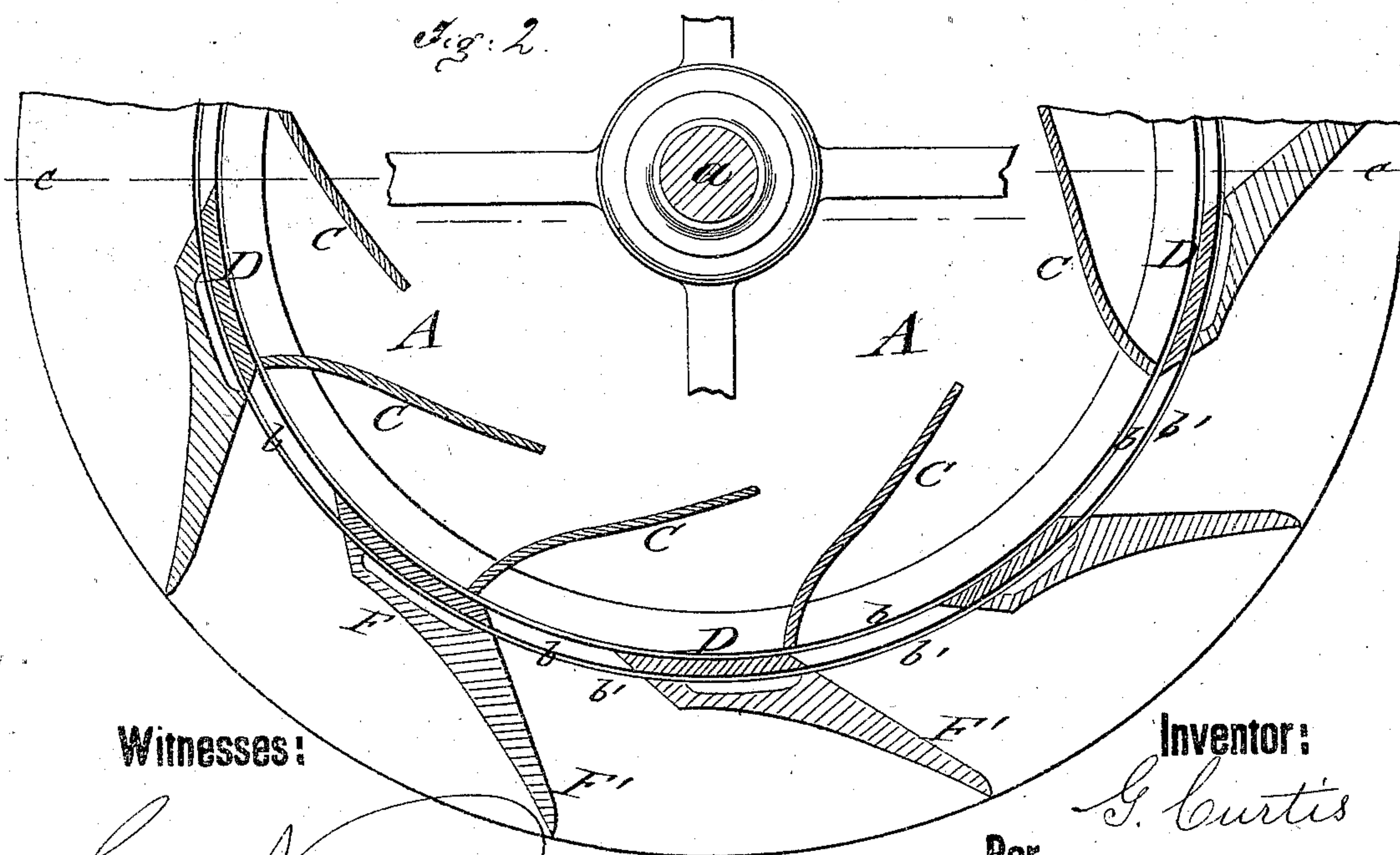
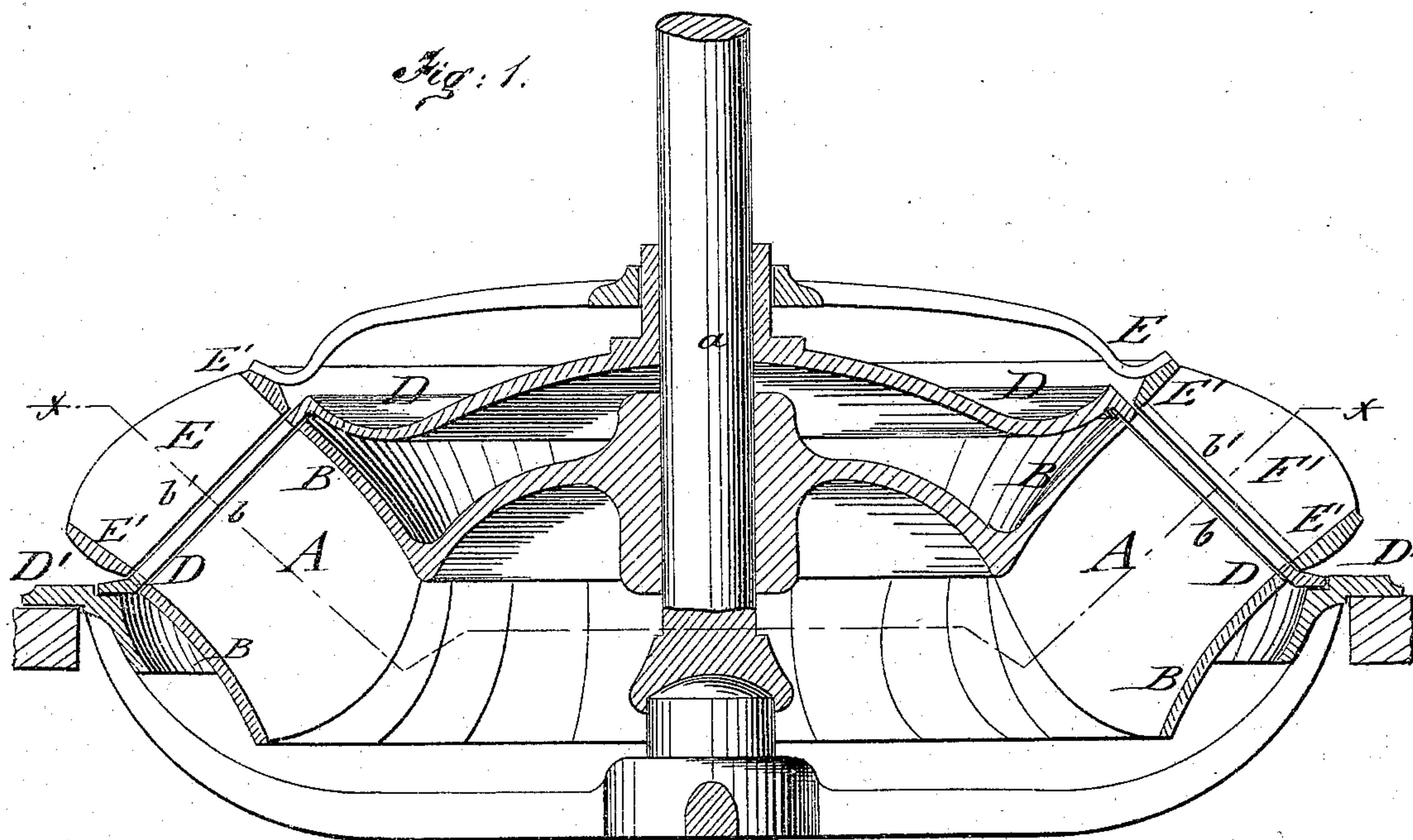


G. CURTIS.
Water-Wheels.

No. 144,261.

Patented Nov. 4, 1873.



Witnesses:

Chas. Nida
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UNITED STATES PATENT OFFICE.

GATES CURTIS, OF OGDENSBURG, NEW YORK.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **144,261**, dated November 4, 1873; application filed October 4, 1873.

To all whom it may concern:

Be it known that I, GATES CURTIS, of Ogdensburg, in the county of St. Lawrence and State of New York, have invented a new and Improved Water-Wheel, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a vertical central section on the line *c c*, Fig. 2, of my improved water-wheel, with chutes and casing; and Fig. 2, a horizontal section of the same on the line *x x*, Fig. 1.

Similar letters of reference indicate corresponding parts.

My invention is an improvement in turbines; and relates chiefly to the construction and arrangement of a bonnet gate-ring, as herewith described.

In the drawing, A represents a bevel or cone shaped water-wheel or turbine, whose shaft *a* turns in bearings in the usual manner. The conical shape is obtained by connecting the circumferences of the inclined upper and lower rims B B of the wheels toward the shaft *a* under a suitable angle, by preference one of about forty-seven degrees. The inclined crown and bottom rims B B are produced with a slight inward curvature of suitable radius, for discharging the water to a level immediately below the bridge-tree of the wheel. The buckets C are set between rims B under a lateral curve or circle, extending continuously to the lower end of buckets C, but diminishing toward the upper rim. The upper part of the buckets C is curved to be about on right angles with the bonnet D, and descends then downward to the right or left in almost a straight line, so that the water is allowed to fall nearly in perpendicular direction when the wheel is in motion. Thus cup or trough shaped buckets are formed, which take up the water with

great force at the upper part, and deliver it easily and smoothly on the downward inclined part to the outer edge. The radius of the lateral curvature of the buckets may be equal to the diameter of the lower circumference of the bottom rim, but may be varied according as experience suggests. The solid conical bonnet or cap is placed on the supporting-case D', and provided with the requisite number of apertures *b* for admitting the water. The conical bonnet gate-ring E is supported on bonnet D, and arranged with inclined upper and lower rims E', which form extensions of the curved rims B B of the wheel. The chute-pads F, with the outwardly-curved wings F' and the opening *b'*, form the chutes, through which the water is conveyed to the buckets. The gate-ring E is operated, in the usual manner, by a rack and pinion, for admitting, cutting off, or regulating the flow of water from a thin sheet to its full capacity. The solid chute-pads F close tightly on the apertures *b* of bonnet D, so that on stopping the wheel no floating wood or other rubbish may clog the wheel or otherwise obstruct the passage of the water. The adjustable gate-ring may also be applied to straight wheels with equal advantage.

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

The bonnet gate-ring E, made with inclined rims E', which carry the chute-pads F, with the outwardly-curved chutes F', and having openings *b'*, arranged over corresponding apertures *b* of the bonnet or cap D, for regulating the flow of the water, as described.

Witnesses:

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