

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 111,630, dated February 7, 1871.

To all whom it may concern:

Be it known that I, JAMES GARDNER, of South Lee, in the county of Berkshire and State of Massachusetts, have invented a new and Improved Water-Wheel; 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.

Figure 1 represents a vertical central section of my improved water-wheel, the line *x x* in Fig. 2 indicating the plane of section. Fig. 2 is a horizontal section of the same, taken on the plane of the line *y y*, Fig. 1. Fig. 3 is a detail inner face view of one of the gates. Fig. 4 is an outer face view of the same. Fig. 5 is a detail top or edge view of the same.

Similar letters of reference indicate corresponding parts.

This invention relates to a new form of gate for water-wheels, and to a novel construction of guide for the same, and has for its object to make the gate of the most advantageous form for guiding the water to the buckets of the wheel, and provide a sand-channel on the stationary guides, whereby sand and gravel will be promptly washed out, to not obstruct the operation of the gates.

The invention consists, first, in making each gate in form of the letter **L**, the outer larger part forming part of the circumference of the wheel-case, while the short inner part enters an aperture in said wheel-case and guides the water properly to the buckets.

The invention also consists in providing a sand-channel in the lower plate or guide of the stationary case, the lower part of the gate entering said channel. The latter is, however, wider than the gates, and will therefore constitute a constantly-open channel, which can be washed by the water to remain clear of obstructions.

A in the drawing represents a water-wheel of suitable kind, mounted upon a shaft, B, in the ordinary manner, and contained within a case, C, which is provided with the gates D D, for regulating the amount of water admitted to the wheel. The case C consists of a lower

annular plate, *a*, upper plate, *b*, and of a vertical flange or rim, *c*, which surrounds the wheel. The flange or rim *c* is perforated at proper distances apart to form openings *d d*, for the entrance of water to the wheel, each opening being guarded at one end by an oblique projecting guide-plate, *e*. The gates D D are curved plates, fitted against the circular flange *c*, with inwardly-projecting oblique guides *f*. These guides *f* of the gates enter the openings *d*, respectively, and as they are nearly parallel with the guides *e*, they form, together with the same, channels for properly conducting the water toward the buckets.

E is a ring placed upon the lower plate, *a*, of the case C, and toothed at *g* to mesh into a pinion, *h*.

The gates have projecting tenons *i*, which enter forked ears *j* on the ring E. As the latter is turned, by means of the pinion, the gates will be moved in equal manner, to form larger or smaller throats for the entrance of water to the wheel.

The inner edge of the ring E is at such a distance from the outer faces of the gates as to form a continuous channel, K, around the same. This is a sand-channel, in which the water will form a continuous stream or current, washing out through the throats all impurities that may have entered it. For this purpose the openings *d* do not reach farther down than to the height of the ring E, there being thus a projecting ledge, *l*, at the lower part of each opening. The several ledges *l*, together with the non-perforated part of the rim *c*, form the inner circumference of the said channel. A similar ledge, *m*, may be formed at the upper end of each opening *d*.

The gates, on account of said ledges, must necessarily be reduced in length where they enter the openings *d*, and their inner parts, *f*, are therefore shorter than the outer parts, as shown in Figs. 3 and 4.

In operation, the gates can be set at any desired distance from the guides *e*, and can at any time be locked flush against the same. The water in the sand-channel carries all impurities clear of the gates and washes them into the wheel. Should some sand or impu-

rity pass one throat or a few, it will certainly be washed in when it arrives in line with the main stream.

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

1. The gates D D for a water-wheel, made of curved outer parts and of the shorter inwardly-projecting oblique guides *f*, substantially as and for the purpose herein shown and described.

2. The combination of the adjusting-ring E with the gates D D and ledges *l l*, to constitute a sand-channel, substantially as herein shown and described.

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Witnesses:

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