

C. C. Stillman, Water Wheel Gate.

N^o 54,792.

Patented May 15, 1866.

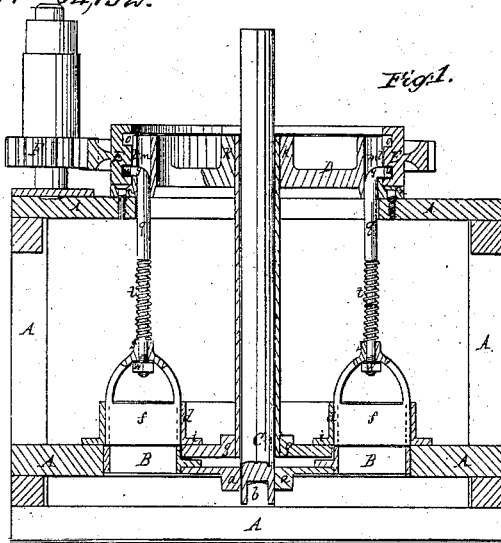


Fig. 1.

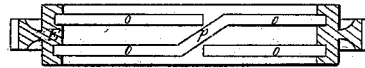


Fig. 3.

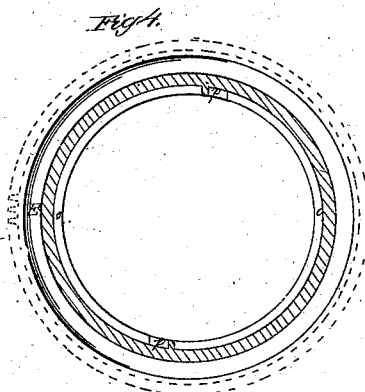


Fig. 4.

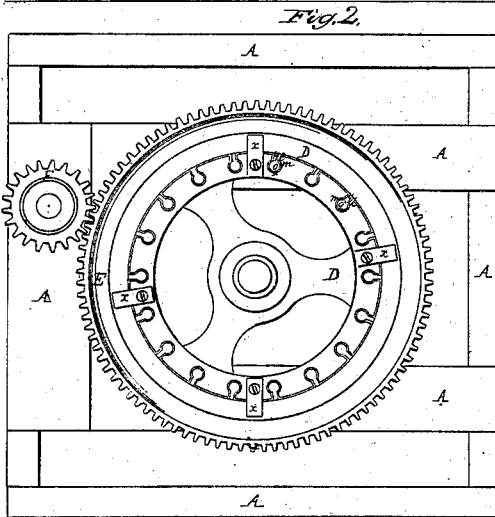


Fig. 2.

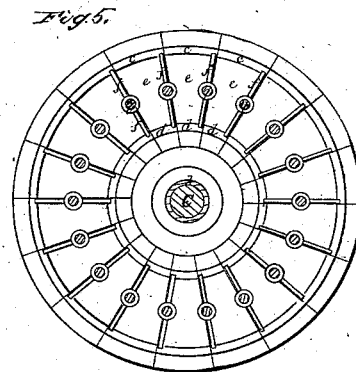


Fig. 5.

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CHRISTOPHER C. STILLMAN, OF WESTERLY, RHODE ISLAND.

WATER-WHEEL.

Specification forming part of Letters Patent No. 54,792, dated May 15, 1866.

To all whom it may concern:

Be it known that I, CHRISTOPHER C. STILLMAN, of Westerly, in the county of Washington and State of Rhode Island, have invented new and Improved Arrangements of and Modes of Operating the Gates of Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central vertical section of a water-wheel with my invention applied. Fig. 2 is a top view of the mechanism for holding or lowering the gates. Fig. 3 is a central vertical section of an annular cam, which constitutes a part of the mechanism for operating the gates, and Fig. 4 is a horizontal section of the said cam. Fig. 5 is a top view of the stationary pitches or guides for the water and the gates for opening or closing them. The gate stems or rods are shown in section.

Similar letters of reference indicate corresponding parts of the machine in all the figures.

This invention relates to water-wheels of the turbine kind. Its object is to provide means for a better regulation of the supply of water, to better adapt the speed or power of the water-wheel to the work by applying the necessary amount of water in full spouts or pitches, and to preserve under all circumstances a full head of water in the flume, and thereby to obtain a greater amount of power from a given quantity of water than by the ordinary arrangement of the gates, which, when it reduces the quantity of water let on the wheel also diminishes the level in the flume.

This object is accomplished by providing a separate gate for every pitch, and by means of novel and simple mechanism by which two gates on opposite sides of the center of the wheel can be opened or closed simultaneously and all the gates by pairs in succession.

To enable others skilled in the art to make and apply my invention to use, I will proceed to describe it with reference to the drawings.

A is the frame-work of the flume, made of proper material and suitable size for supporting the water-wheel and the parts connected therewith.

B is the water-wheel, which is firmly attached to the lower end of a vertical shaft, C,

at the central hub, *a*, Fig. 1. The lower countersunk end of the shaft C turns on the step *b*, secured to the lower part of the frame A. The upper end of the shaft C is sustained in a proper bearing.

c d e c d e are the stationary pitches or spouts by which the water is conducted to the buckets or floats of the water-wheel, so constructed and arranged in a circle that the bottom *e* of one forms the top of the next one. These pitches are partly supported on the framing A and partly upon a circular plate, *g*, secured to the lower end of a fixed tube, *h*, which surrounds the shaft C, and the upper end of which is secured in the center of a circular horizontal wheel-like iron frame, D, which is firmly secured upon the top of the framing A in a position concentric with the water-wheel. Each of the pitches is furnished with an upright gate, *f*, which slides in vertical grooves in the inner and outer sides, *c* and *d*, of the pitch, and which closes against the bottom *e* thereof.

The annular rim of the circular frame D has in it vertical holes *m*, Figs. 1 and 2, of proper size, equidistant apart, and in line with the centers of the gates *f*, Fig. 1. The said holes extend entirely through the rim. Grooves *l*, Figs. 1 and 2, are cut in a radial line from the holes *m* to the outer face of the rim, extending nearly down to the bottom flange, *n*, of the frame D. (See Fig. 1.) The frame D is surrounded by the annular cam E, Figs. 1 and 2, which has two grooves, *o o*, Figs. 1, 3, and 4, in the inner surface, extending nearly all around, parallel with the plane of the ring and connecting with each other on two opposite sides by means of an inclined groove, *p*, as shown in Figs. 3 and 4.

q q, Fig. 1, are stems or rods fitted into the holes *m* in the rim of the circular frame D, Figs. 1 and 2. The upper ends of these stems are bent sidewise, as shown at *y*, Fig. 1, and are fitted into grooves *l*, Figs. 1 and 2, so that they can freely slide up and down therein and extend into the groove or grooves *o* of the annular cam, where each may be provided with a friction-roller, *u*, Fig. 1. These stems *q* are made at their lower ends of a smaller diameter to within about one-half of their length, and are provided at these ends with coiled springs *t*, Fig. 1, the upper ends of which press against shoulders on the stems *q*, and the lower ends

of said springs impinge against the hubs *s* of the gates *f*, through which the lower ends of the stems *q* extend, and are held by means of screw-nuts *w*, Fig. 1. The object of these springs *t* is to enable the gates *f* to be brought down close to the bottoms of the pitches without danger of breakage, as the springs will allow the stems *q* to be brought lower down after the gates have reached the bottoms of the pitches.

The annular cam *E* has teeth all around its exterior, like a cog-wheel, and gears with a pinion, *F*, by which it is operated. The said cam is held in position by means of small pieces *x* being screwed to the stationary wheel *D*, and made to extend partly over the upper side of the said cam.

The operation of the opening and closing of the gates will be in the following manner: When the gates are all closed the bent ends of the stems *q* are all in the lower groove *o* of the annular cam *E*, as shown in Fig. 1. Now as the said cam, by means of the pinion *F*, is moved a certain distance in the right direction the two opposite inclined grooves, *p*, in the said cam, will simultaneously lift two gates, one on each side of the center of the wheel. When the wheel *E* is turned a certain distance farther in the same direction the said inclined grooves will raise the next following pair of opposite gates in the same manner, and when the wheel *E* has made half a revolution all the gates are open and have been opened two at a time in succession. When the wheel *E* is turned in an opposite direction the gates will be closed pairwise in the same manner. As the water is admitted on two opposite sides simultaneously and the flow there-

of is increased or diminished in the same manner, no lateral strain is thereby produced either on the turbine wheel or to the shaft thereof.

By this system and arrangement of gates no matter how little water is admitted to act on the wheel, the full level in the flume is preserved and the maximum power to be obtained from that quantity of water is always obtained.

With the arrangement of gates in common use the reduction of the quantity of water admitted to act upon the wheel also reduces the head in the flume and diminishes the power by using it in thin sheets.

Having thus described my invention, I will proceed to state what I claim and desire to secure by Letters Patent.

1. Furnishing every one of the pitches of a turbine wheel with a separate gate, operated substantially as and for the purpose herein specified.

2. In combination with a series of gates applied one to each of the pitches of a turbine water-wheel, a cam so applied as to open and close the said gates in pairs successively all around the wheel, one on each side of the center thereof, substantially as herein described.

3. The combination of the annular grooved cam *E*, the circular slotted guide-frame *D*, and the stems of the gates, substantially as and for the purpose herein set forth.

4. The springs *t*, applied in combination with the gates and their stems, substantially as and for the purpose herein described.

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Witnesses:

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