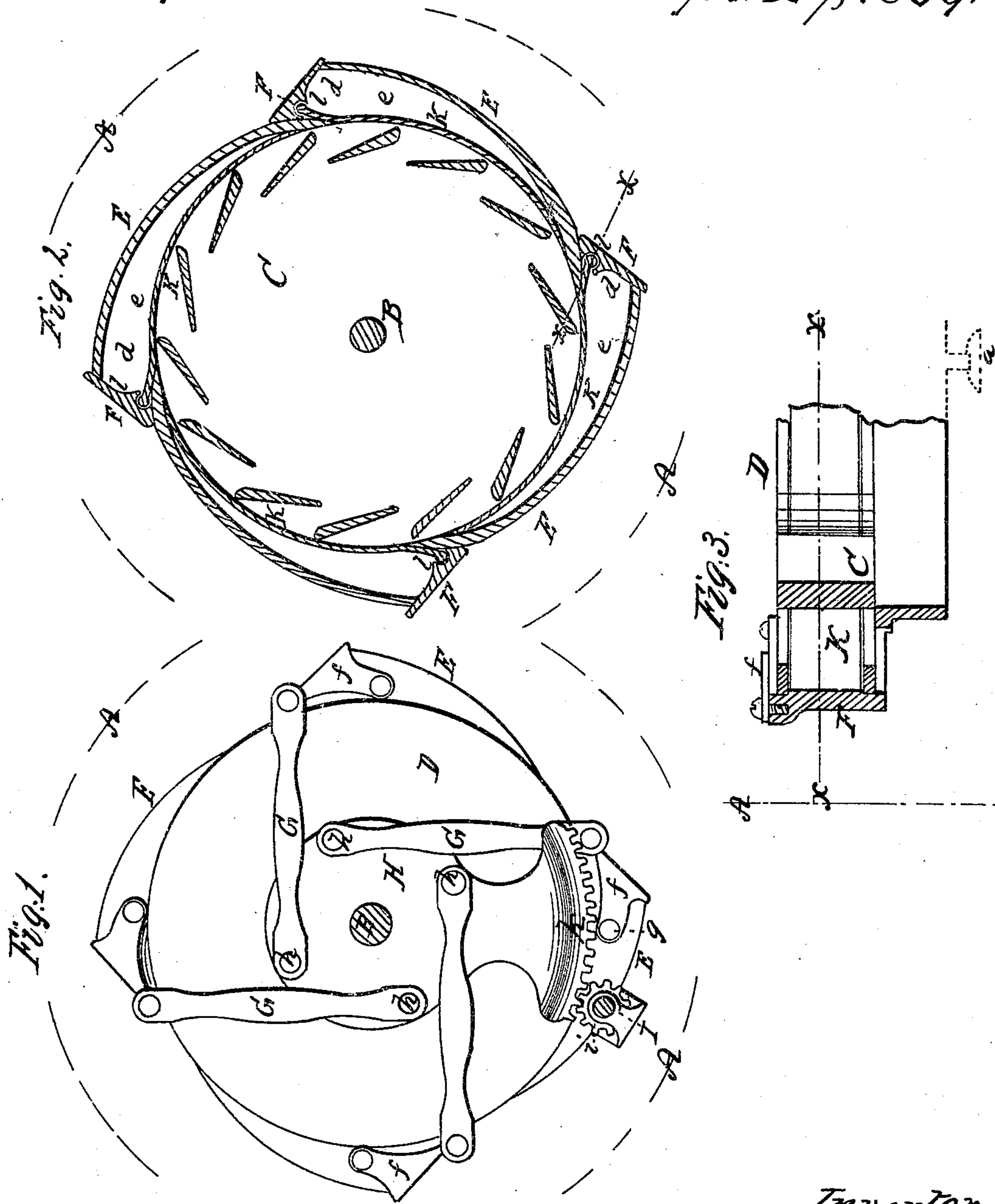


A. Warren.

Turbine Water Wheel.

N^o 89,363.

Patented Apr. 27, 1869.



Inventor

Alonso Warren
Per his Attorneys
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Witnesses
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ALONZO WARREN, OF SUFFOLK COUNTY, MASSACHUSETTS.

Letters Patent No. 89,363, dated April 27, 1869.

IMPROVEMENT IN TURBINE WATER-WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ALONZO WARREN, of Suffolk county, in the State of Massachusetts, have invented certain Improvements in Turbine Water-Wheels, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the upper side of the casing which encloses a turbine water-wheel, having my improvements applied thereto.

Figure 2 is a horizontal section.

Figure 3 is a vertical section, on the line *xx*, of fig. 2.

My invention consists in a series of gates provided with projections, having pivoted thereto a series of sliding curved plates, or gradators, which are operated simultaneously with the gates, thereby dividing the fall of the water into a number of streams of equal volumes, and of uniform velocities, whether the gates be partially or wholly open.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which it is carried out.

In the said drawings, A represents the sides of the wheel-pit, in the centre and on the bottom of which, upon a suitable step, *a*, rests the bottom of the vertical shaft B, of a horizontal wheel, C, provided with floats or buckets, *b*.

This wheel is enclosed by a circular box or casing, D, having four scroll-shaped abutments or projections, E, extending out from the sides thereof, these projections, (in connection with graduating-plates, to be hereafter described,) serving as guiding-curves for directing the water at the proper angle upon the floats or buckets.

The mouth *d* of each of the passages *c* thus formed for the water, is opened and closed by a gate, F, operated by the following mechanism:

From the top and bottom of each gate projects a lug, or ear, *f*, the inner surface of which rests on the scroll-portion of the casing, and is pivoted thereto at *g*.

At the top of the inner end of the gate is pivoted one end of a connecting-rod, or link, G, the other end of which is secured, at *h*, to the periphery of a plate, H, which may be partially revolved around the shaft

B, of the wheel C, as a centre, by means of suitable gearing, *i*, on a short shaft, I, engaging in a toothed portion, *k*, of the said plate H.

Each of the connecting-rods G leads from the gate tangentially to the periphery of the plate H, (or to a circle supposed to be the continuation of its periphery,) and the construction, arrangement, and manner of pivoting the gates in about the line assumed by the water in striking the wheel, instead of being pivoted to one side thereof, enables all the gates to be opened equal distances at the same time in an exceedingly convenient and expeditious manner.

On the inner side of each of these gates is formed a projection, *l*, to which is pivoted, at *m*, a long, thin, curved plate, or graduator, K, the height of which, and also that of the projection *l*, correspond to the height of the inlet-passage, in order that the projections may fit snugly, and swing freely in the mouth of the passage, to prevent the water from running in behind it, and between the graduating-plate *m* and interior of the scroll or projecting portion of the casing.

The connection of each graduator with its gate is such, that when the latter is opened or closed, the former will also be opened or closed, thereby enlarging or contracting the size or volume of the stream, as desired.

Each graduating-plate, by its peculiar connection with its gate, is also moved longitudinally therewith, to free it from any accumulation and chance of obstruction from sand, gravel, and other foreign substances.

Claim.

What I claim as my invention, and desire to secure by Letters Patent, is—

A series of gates, F, with projections, *l*, in combination with a series of curved sliding plates, or gradators, K, so connected therewith that the opening of the gates will simultaneously open the gradators, substantially as described.

ALONZO WARREN.

Witnesses:

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