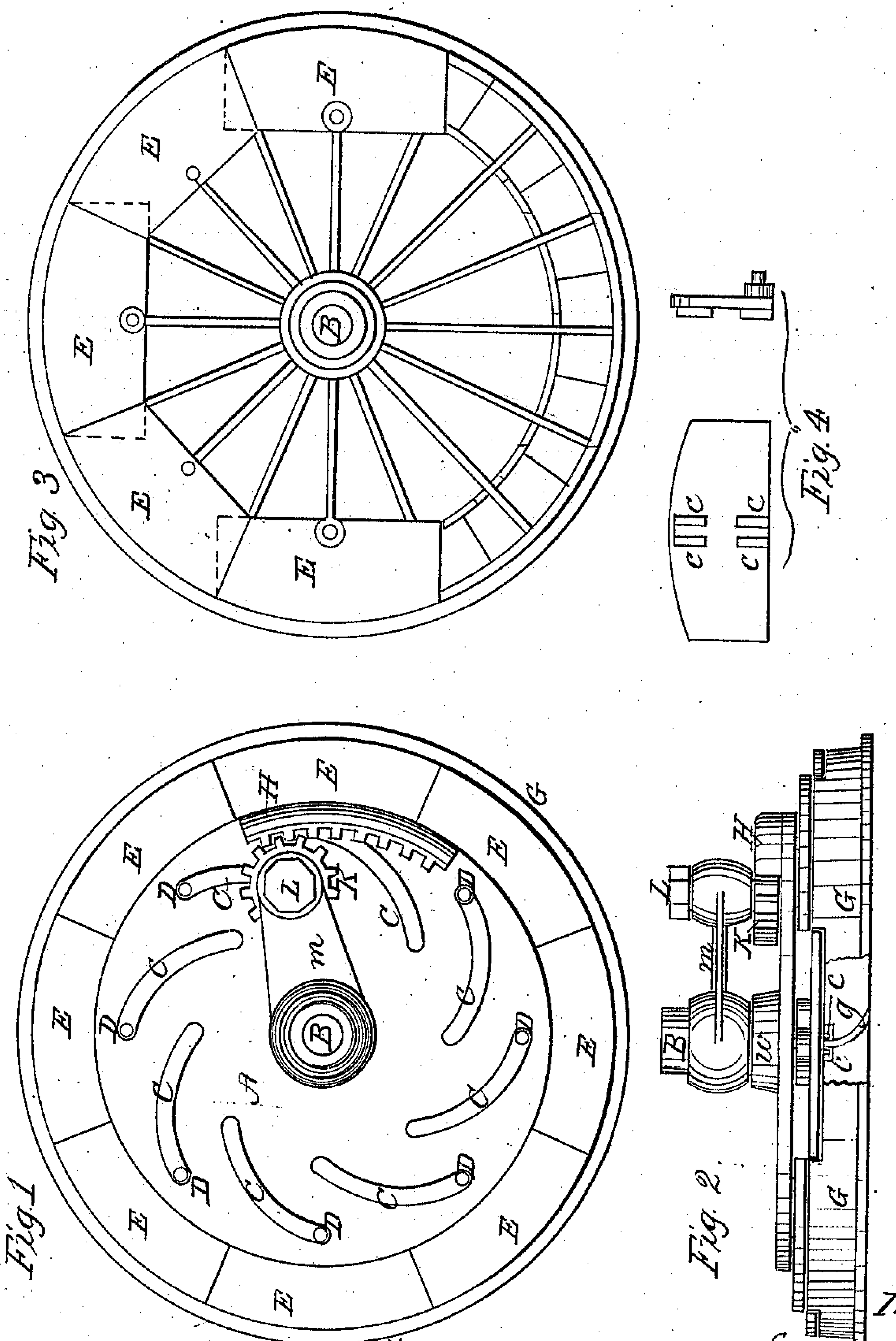
Swett & Graham,

Water-Wheel Gate,

No. 81,557, Patented Aug 25, 1868.



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United States Patent Office.

LEONARD S. SWETT AND JAMES GRAHAM, OF VASSAR, MICHIGAN.

Letters Patent No. 81,557, *dated August* 25, 1868.

IMPROVED GATE FOR 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 we, LEONARD S. SWETT and JAMES GRAHAM, of Vassar, in the county of Tuscola, and State of Michigan, have invented a new and valuable Improvement in "Guide and Gate for Turbine Water-Wheel;" and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of an external view of our device.

Figure 2 is a side view thereof, and

Figure 3 is a plan view, with the guide-plate removed.

Figure 4 shows details.

The object of our invention is to construct and combine, in one form or machine, a gate and guide for water-wheels, that shall be more perfect in construction and more efficient in operation than any similar device heretofore known or invented.

To this end, we construct and combine a guide and gate in the form shown on the drawings, and which is particularly described, as follows:

The letter A is a guide-plate, adjusted at its centre to the hollow shaft B, around which it is allowed to move in a circle, so far as it is permitted by the mechanism hereinafter described.

Letter B is a hollow shaft, attached firmly to the centre of the bottom plate of the guide G, hereinafter mentioned, and extends upward through the guide-plate A. Its office is mainly to serve as a holder for the upright shaft of the water-wheel, and as an axle, around which the said guide-plate may rotate.

Letters C are circular slots in guide-plates A, the office of which is to receive and regulate the movements of the guide-pins, hereinafter set forth.

Letters D are guide-pins, which are respectively attached to the gates next mentioned, and move back and forth in the slots C.

Our gates are usually eight in number, constructed in a triangular form, as shown on fig. 3 They are adjusted on the top of the guide, in the manner shown on fig. 3, four of them moving on the extreme upper surface of the gaide, and four in the niches shown thereon.

On the lower side of these gates respectively, we affix four lugs, marked *c c c c* on fig. 4, which are adjusted to the water-guides proper, two of which are placed on each side thereof, and serve, in conjunction with the slots and pins above mentioned, to regulate the movements of the gates.

For purposes of convenience. we call this aggregation of gates the gate E. They may be increased or diminished at the will of the machinist, but we find the number herein shown to be more convenient and useful than any other number we have yet experimented with.

We call all that portion of our device shown below the gate, the guide G, and of which the letter *g* is the water-guide proper.

Letter H is a ratchet, attached to the upper side of the guide-plate A, at or near its periphery.

Letter K is a cog-wheel, that meshes with the cogs on ratchet H.

Letter L is a pinion-shaft, that is attached to and extends upwards from cog-wheel K into the mill, and it is by turning this shaft forwards or backwards, as the case may require, that the gate is opened or closed.

Letter M is an arm, that extends from the hollow tube surrounding shaft K to a similar tube surrounding the hollow shaft B.

Letter *w* is a washer, placed below the last-mentioned tube, and above the guide-plate A.

Our device is operated as follows, namely:

The botton plate of the guide G is placed in the bottom of the flume, directly over a turbine water-wheel, resting on the curbing, with the water-wheel shaft running up through the hollow shaft B. The pinion-shaft L extends upward into the mill, and to the top thereof a governor is attached, by which it is operated.

If the operator moves the governor in one direction, the shaft L actuates the cog-wheel and ratchet in such manner that the gates are drawn inward, and the water from the flume passes directly through the guides proper on to the wheel, and, at the same instant, produces a pressure upon every bucket thereof.

To close the gate and shut off the water, we reverse the movement of the governor.

In gates and guides heretofore used, the water travels from eight to twelve feet, after it leaves the flume, before it strikes the wheel, thereby causing foam and loss of power; while by this device, with the water within a few inches of the wheel, scarcely any foam is created, and no power lost.

Another great advantage gained by our guide and gate is, the instant the gate is opened, an unbroken circle of water falls upon the wheel, and actuates every bucket alike, thereby causing an instantaneous movement thereof, and of the entire machinery operated thereby.

What we claim as our invention, and desire to secure by Letters Patent, is—

A combined gate and guide for water-wheels, having gate E, guide G, guide-plate A, slots C, guide-pins D, lugs *c c c c*, ratchet H, cog-wheel K, and shafts L and B, constructed, arranged, and operating substantially as specified.

In testimony that we claim the above, we have hereunto subscribed our names in the presence of two witnesses.

LEONARD S. SWETT,
JAMES GRAHAM.

Witnesses:
B. W. HUSTON, Jr.,
JOHN JOHNSON.