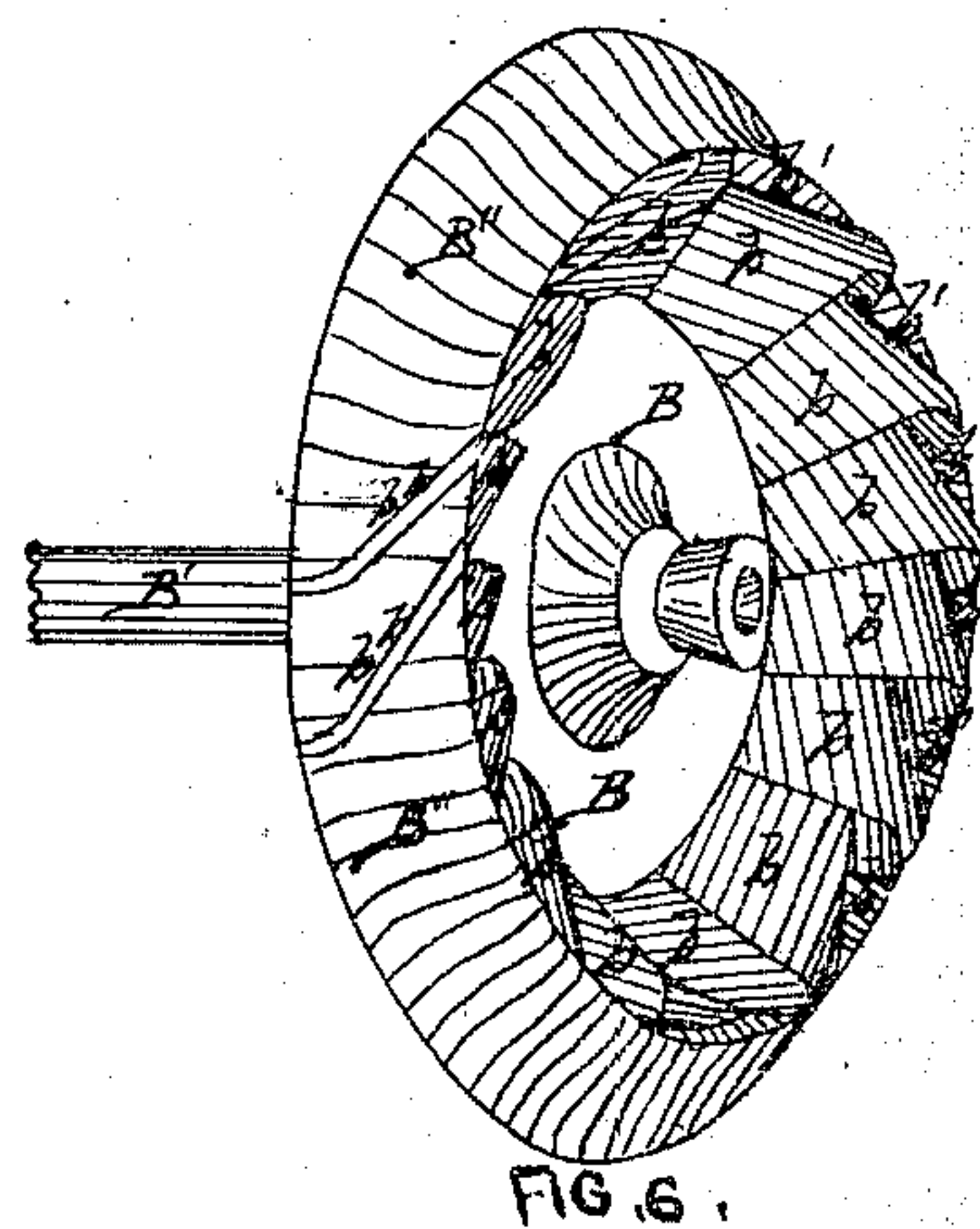
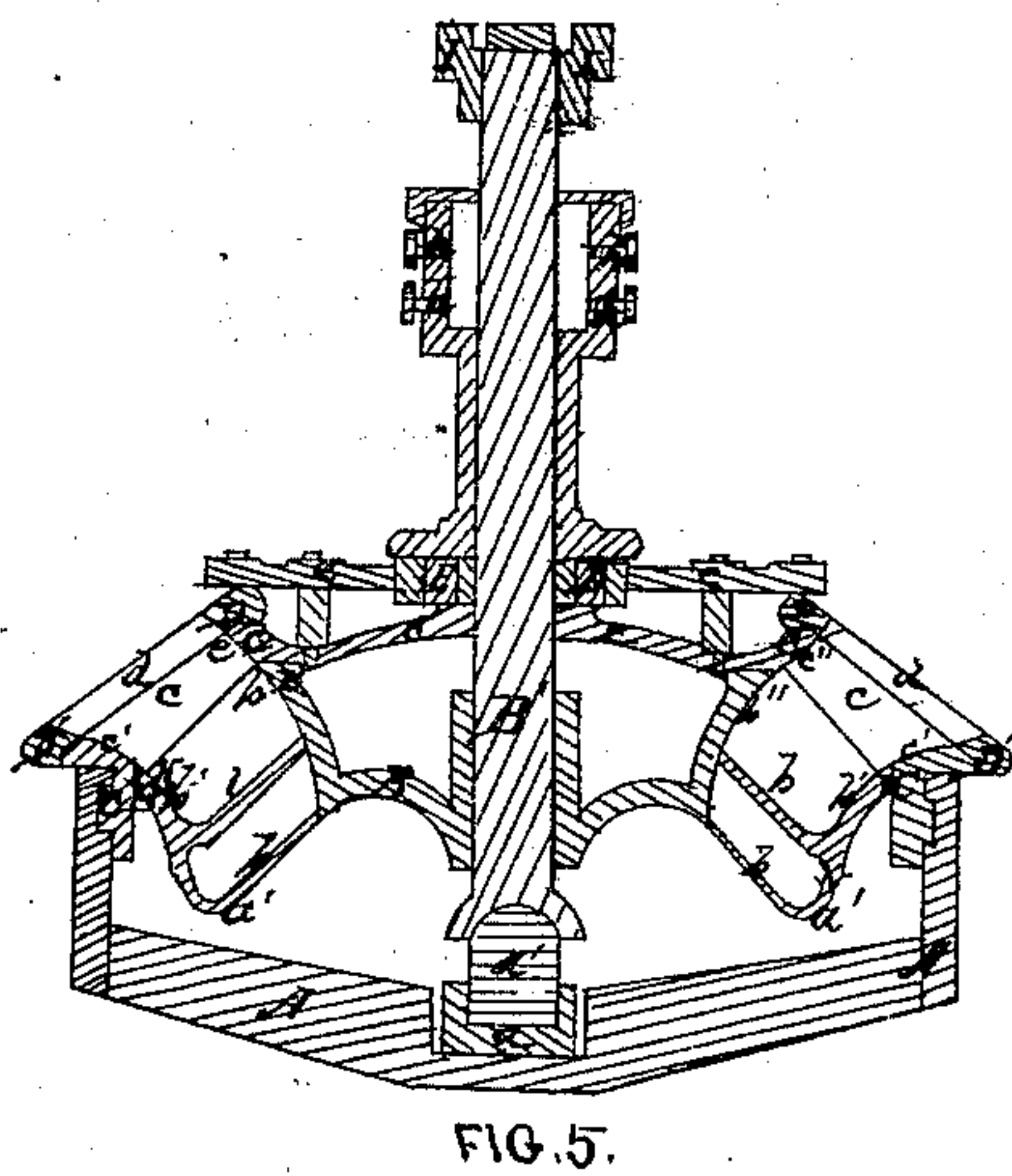
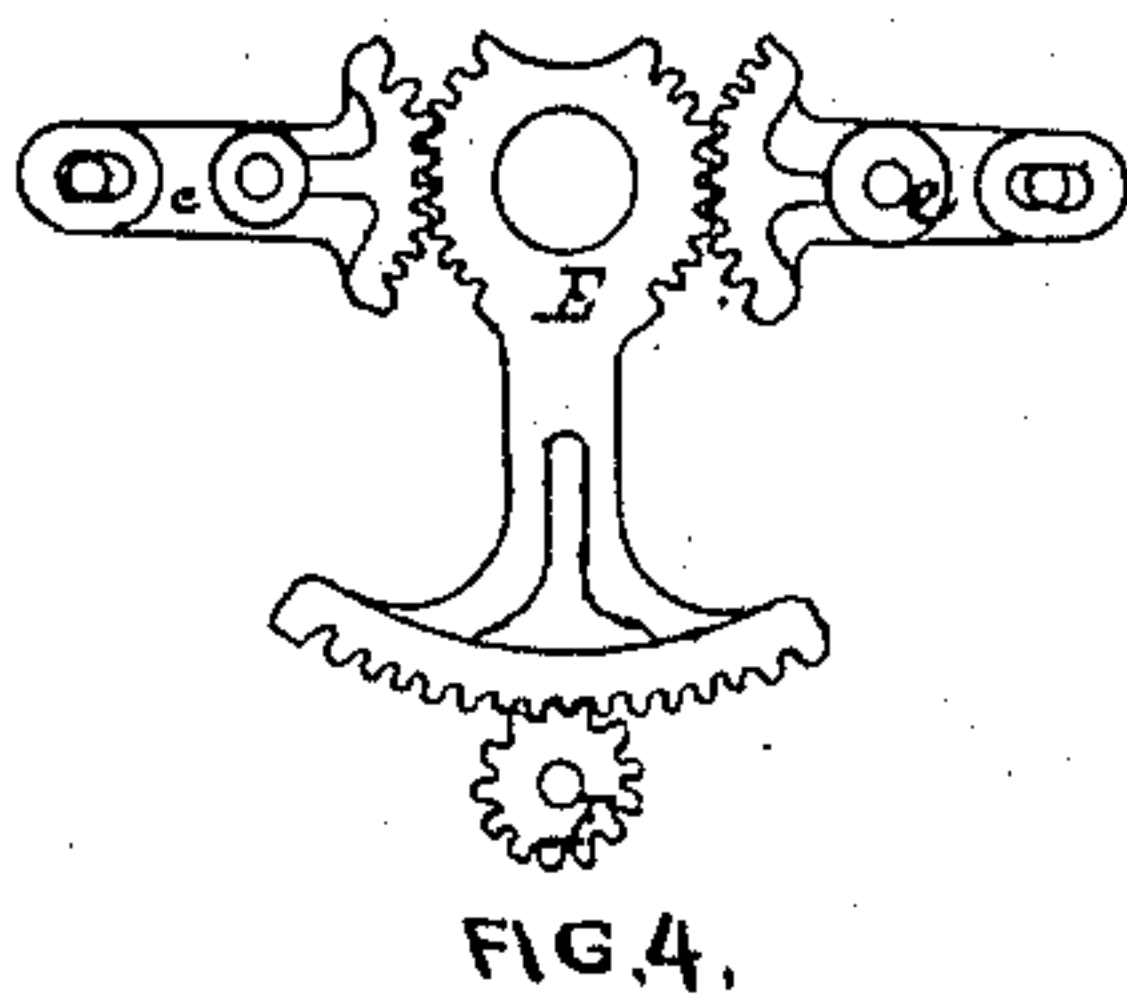
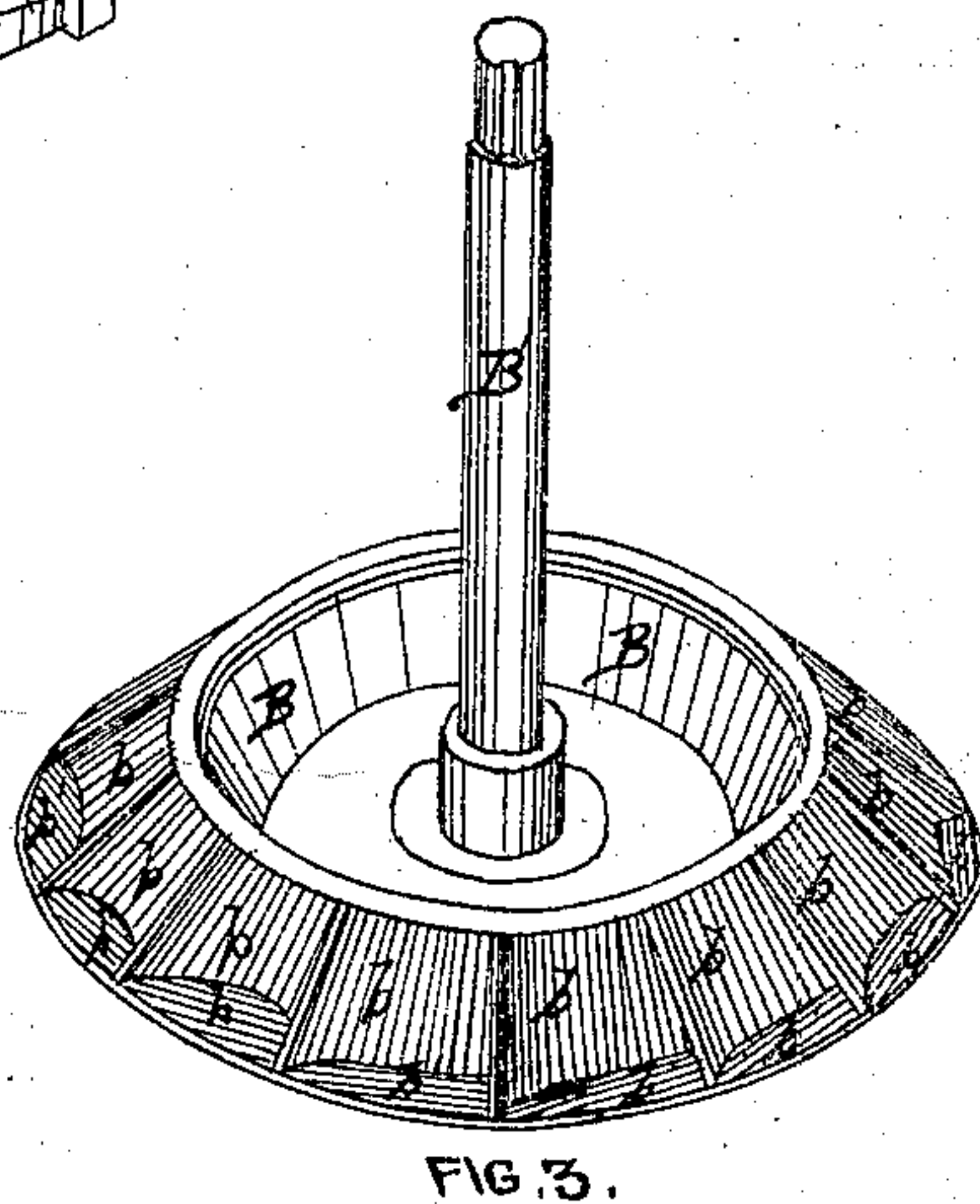
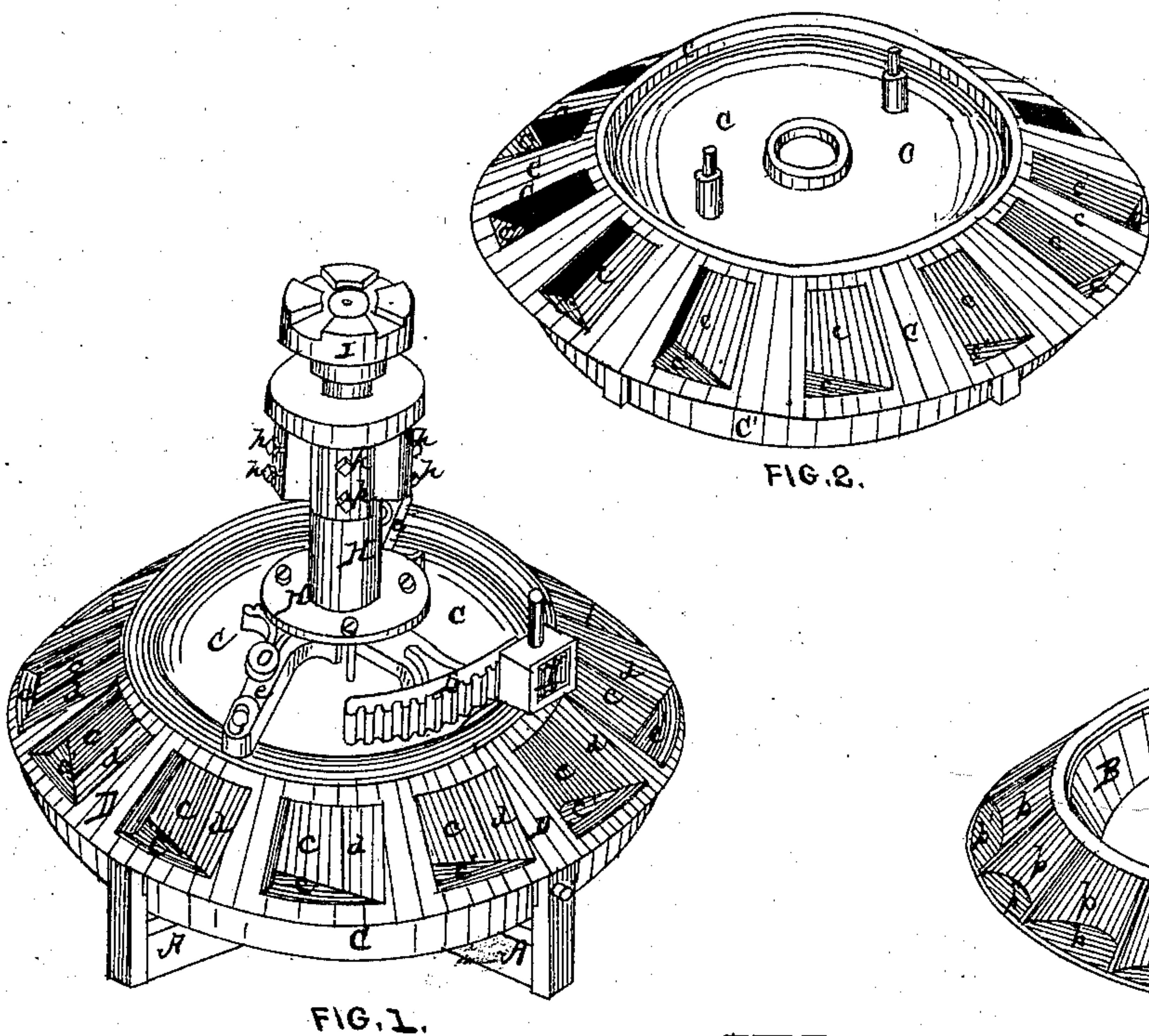


G. A. Houston. Water-Wheel.

99569

PATENTED FEB 8 1870



Witnesses,
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UNITED STATES PATENT OFFICE.

G. A. HOUSTON, OF BELOIT, WISCONSIN.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 99,569, dated February 8, 1870.

To all whom it may concern:

Be it known that I, G. A. HOUSTON, of Beloit, in the county of Rock and State of Wisconsin, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings and the letters and figures marked thereon, which form a part of this specification, and in which—

Figure 1 represents a perspective view of my improved wheel; Fig. 2, a perspective view of the wheel-case detached; Fig. 3, a view of the wheel detached; Fig. 4, a top or plan view of the gearing that operates the gate; Fig. 5, a vertical central sectional view of the wheel complete, as shown in Fig. 1; and Fig. 6 is a perspective view, showing the edge and bottom of the wheel.

The nature of my invention consists in the construction of the water-wheel, as hereafter more fully described, whereby the buckets are set at an angle greater or lesser than forty-five degrees to the shaft of the wheel, between inclined rims, so as to receive the direct action of the water, and the weight of the water to propel the wheel, and at the same time the bottom of the wheel is so shaped that the centrifugal force of the wheel does not cause the water to press against the wheel and obstruct its motion, the direction of the discharge being in the direction of a tangent to the circumference of the wheel, but inclined downward. I also have a novel mechanism for operating the gate of the wheel, and the case and gate of the wheel have a novel construction, hereafter fully described, which adapt them to the admission of the water at an angle between the horizontal and perpendicular, or rather on an incline.

To enable those skilled in the art to understand how to manufacture and use my invention, I will proceed to describe the same with particularity.

The same letters of reference refer to corresponding parts in the different figures.

B represents the inner and upper inclined rim of the water-wheel, the shape of the rim and its connection with the hub of the wheel being clearly shown in the annexed drawings. B' is the shaft of the wheel, which may have

its step in cross-pieces A, hereafter more fully described. B'' is the outer and lower rim of the wheel, and *b* the buckets between the rims. The outer edges of the buckets are flush with the outer edges of the rims B and B'', and are all set on a plane through the center of the wheel. They extend back on that plane as far as they receive the direct action of the water; they thence angle back and downward to the discharge, as clearly indicated and shown in the annexed drawings. The rims B and B'', although circular, are so curved that a line taken upon them from the point of the angle in the buckets above described to the lower corner of the bucket is a straight line, and lies all the way in the surface of the rim; but near its lower edge the bucket curves downward, and it extends below the lower edge of the outer rim B'', the edge of the bucket being curved up to the lower edge of the rim, which construction is shown in Fig. 6, and at *a'* in Fig. 5. This construction of the bucket and rims gives a direct flow of the water from the upper backward curve in the bucket to its discharge at the outer edge of the bucket, where the water is thrown by the centrifugal force of the wheel, and also the weight of the water upon the rim and bucket is utilized in propelling the wheel. Each bucket has a free and independent discharge of water on account of their overlapping each other, and being so constructed as to have a downward and tangential discharge. This wheel is set in a case, C, which covers the entire top of the wheel, but does not extend beneath it, nor quite as low as the lower edge of the outer rim of the wheel, so as to interfere with the tangential discharge thereof above described. That part of the case immediately over the buckets is made on an angle or incline, as clearly shown in the drawings, to correspond with the angle of the buckets above described, and the ports or water-guides are so constructed that their direction toward the wheel is tangential to the periphery of the wheel. This case C is set stationary, and keeps the water from the wheel, only as it is admitted thereto through the ports or guides, as hereafter described. D is a gate, and fits over the inclined surface of the case C, as shown in Figs. 1 and 5. This gate has port-holes *d* to correspond with the

port-holes or chutes *c* in the case C, and it is so constructed that it is made to revolve on the case to open and close the gate, or, in other words, to shut the water from the wheel or let it on, as hereafter described. E is an arm, with a segment of cogs at one end that engage with the pinion F, while the other end passes around the shaft B', and has cogs thereon, as clearly shown in Fig. 4. These cogs engage with segments of cogs on the levers *e*. These levers *e* have their fulcrums on posts attached to the case C, which are clearly shown in Fig. 2, and then are connected with the water-gate D, as shown in Figs. 1 and 5.

By turning the pinion F, the lever E is vibrated, and the levers *e* operated to revolve the gate D on the case C, and open and close the ports, as may be desired. When the ports *d* are directly over the ports *c* the full flow of water is admitted to the wheel; but it is obvious the quantity of water admitted is regulated by turning the gate so as to bring more or less of the ports *d* over the ports *c*.

A A are cross-pieces below the wheel to form the step for the shaft B'. These cross-pieces have upright arms at their ends, in which are notches to fit upon the lugs *c'* on the case C, to hold them firmly in place, as clearly

shown in Fig. 5. A set-screw or spring-catch may be attached to one or more of these arms to pass into the lugs to keep them in place.

Having thus fully described the construction and operation of my invention, what I claim, and desire to secure by Letters Patent, is—

1. A water-wheel with buckets constructed between inclined rims, substantially as described.

2. In combination with the wheel constructed between inclined rims, the case C, when constructed with port-holes through an inclined surface thereof, substantially as described and shown.

3. The combination of the wheel, the case C, and gate D, when constructed and arranged so as to operate substantially as specified and shown.

4. The combination of the arm E and levers *e*, when constructed and arranged to operate a water-wheel gate, substantially as described and shown.

G. A. HOUSTON.

Witnesses:

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L. L. COBURN.