(No Model.) 2 Sheets—Sheet 1.

I. P. LAMBING.

WATER WHEEL.

No. 387,791. Patented Aug. 14, 1888.

Fig. 1.

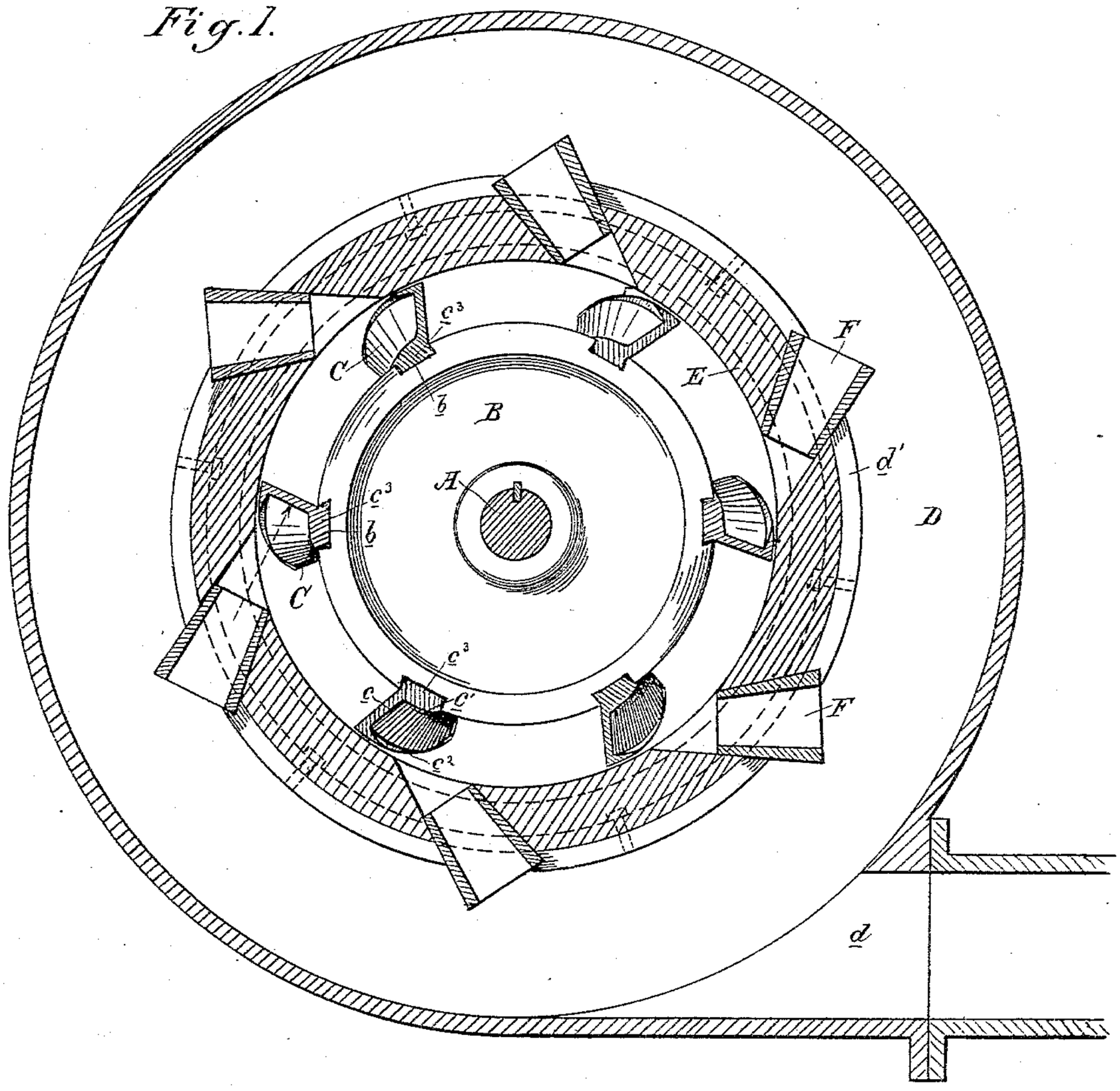
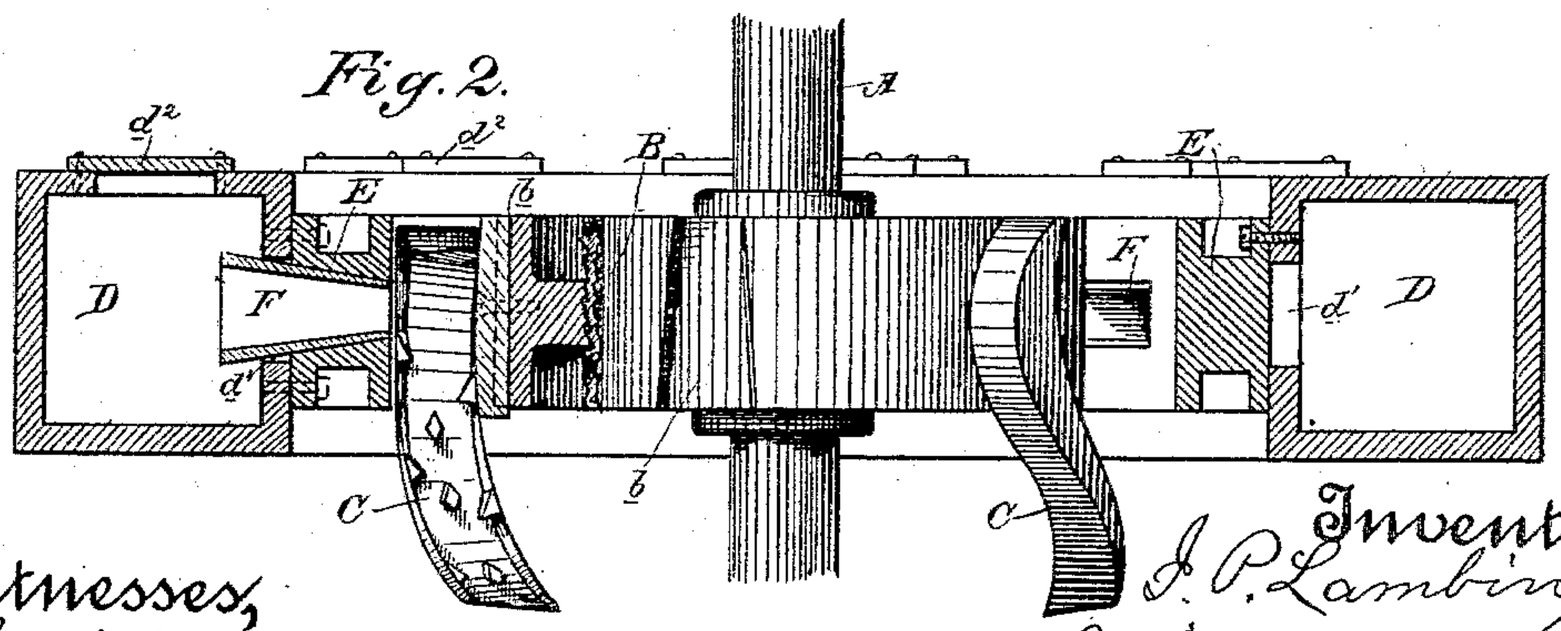


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

I. P. LAMBING.

WATER WHEEL.

No. 387,791. Patented Aug. 14, 1888.

Fig. 4.

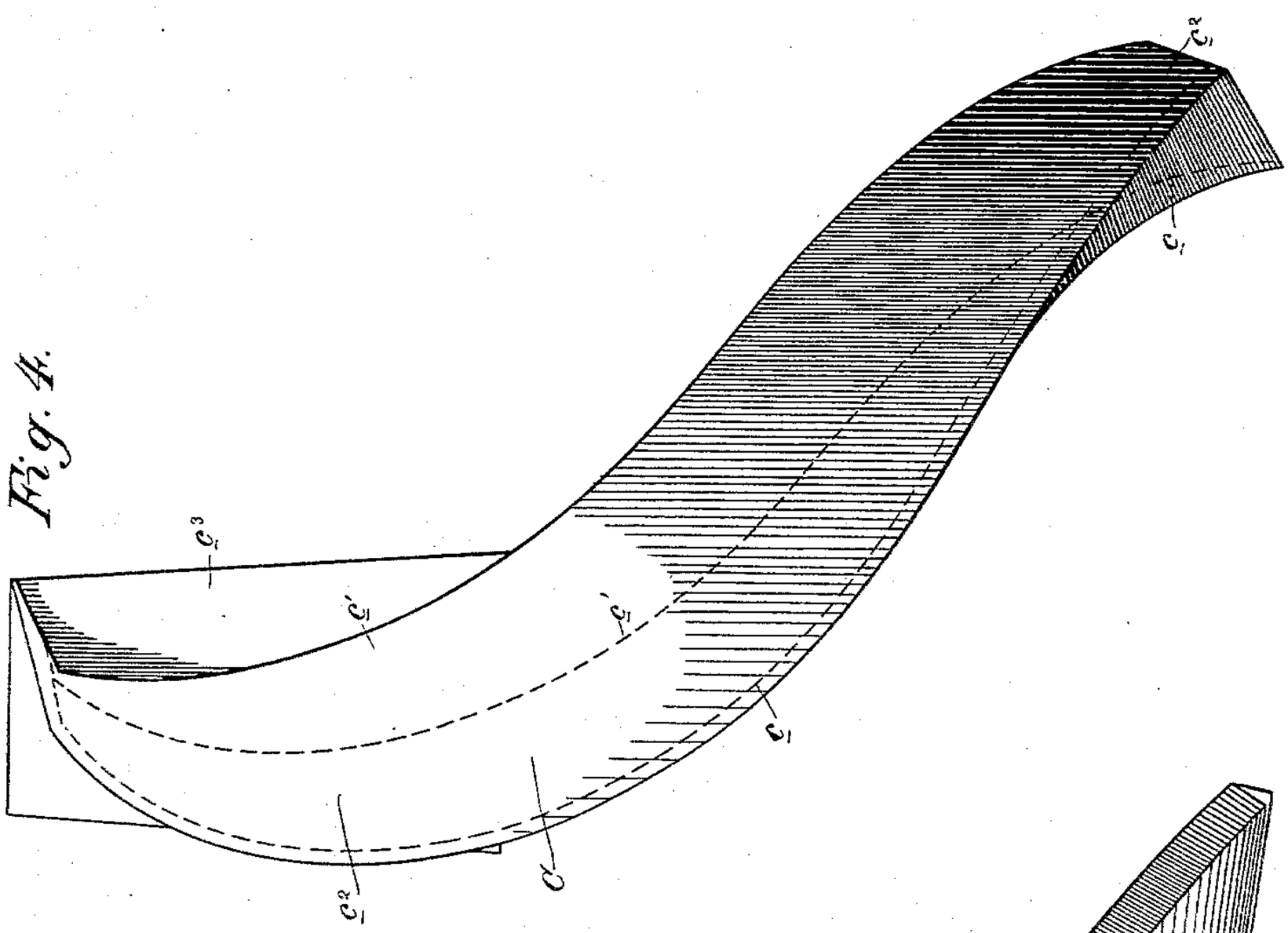
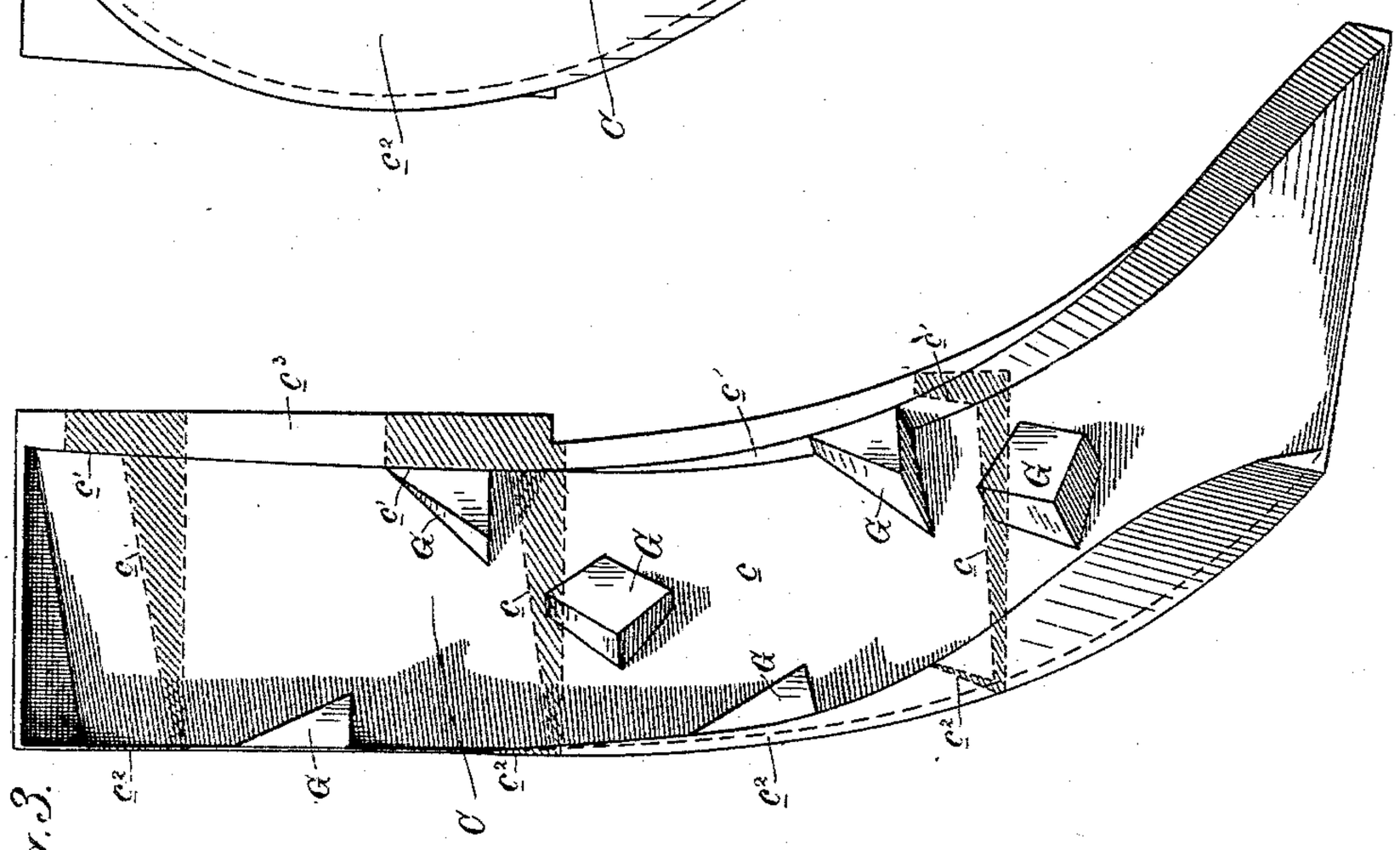


Fig. 3.



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UNITED STATES PATENT OFFICE.

ISAAC P. LAMBING, OF IONE, CALIFORNIA.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 387,791, dated August 14, 1888.

Application filed October 14, 1887. Serial No. 252,392. (No model.)

To all whom it may concern:

Be it known that I, ISAAC P. LAMBING, of Ione, county of Amador, and State of California, have invented an Improvement in Water-Wheels; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the class of water-wheels, and more especially to the sub-class of turbines.

My invention consists in the constructions and combinations of device which I shall hereinafter fully describe and claim.

Figure 1 is a horizontal section of my water-wheel. Fig. 2 is a vertical section of same. Fig. 3 is a perspective view of one of the buckets looking into its face, the dotted lines showing the sections at different points in order to show the inclination of its bottom. Fig. 4 is a perspective view of the bucket taken from the outer side.

A is the axis, here shown as vertical, as I have herein illustrated the wheel as operating in a horizontal plane, though it may be turned to rotate in a vertical plane, in which case the axis would be horizontal.

B is a disk on the axis, having a T shape in section, and provided in its rim with tapering dovetailed grooves *b*, which form seats for the buckets C, the peculiar construction of which I shall presently describe.

D is an annular hollow shell or casing having an inlet, *d*, for receiving the water, and provided on its inner circumference with openings *d'*, which are preferably formed as one continuous slot. To the inner side of the annular casing is bolted an annular band or ring, E, having a shape in section similar to that of the disk B, the inner surface of said ring being close to the outer surfaces of the buckets C. In this ring at intervals are made openings for seating the nozzles F, which may be either round or angular in cross-section and of a tapering form, whereby they fit closely.

The general operation of the wheel is obvious. The water under head or pressure is admitted through inlet *d* to casing D, and discharged therefrom through the several nozzles against the buckets C, whereby the wheel is rotated. In turbine wheels the direct pressure of the water upon the curved bucket is the prime cause of rotation. In tangential wheels, and those commonly known as "hurdy-gurdies," the principle of operation is impact. In my wheel I have embodied both pressure and impact, and, while using a curved bucket of the general type of the turbine wheel, I use instead of its gates or surrounding chutes the nozzles of the hurdy-gurdy.

The buckets C are as follows: Each is a trough-like structure having a bottom, *c*, an inner side flange or wall, *c'*, and an outer side flange or wall, c^2. On the inner surface of the inner wall, *c'*, near its upper end, is formed or secured a plate, c^3, correspondingly tapered and beveled to the grooves *b* in disk B, and said plate fits in said groove and is secured therein by bolts or rivets in such a manner that the bucket hangs downwardly, its general direction being parallel with the axis of the wheel. In the direction of its length the bucket curves in its lower portion inwardly—that is, toward the axis—so as to secure the central and downward discharge. The bottom *c* of the bucket is peculiarly formed. In its upper portion it leads off from a radial plane of the disk B at an angle in the direction of the rotation of the wheel; or, in other words, regarding the securing-plate c^3 as in the plane of a chord of an arc of the disk, the bottom *c* stands at a decidedly obtuse angle to said chord-plane and to the perimeter of the disk. This angle grows slighter downwardly until when near the lower end of the bucket the bottom is turned the other way and slopes inwardly to the inner wall and discharge end of the bucket. The effect of this formation of the bottom is that throughout nearly the entire length of the bucket it is deeper on its outer side, the depth gradually diminishing from the top to near the bottom, when it changes over to the inner wall. The object in this is to throw the greater portion of the water to the circumference of greatest diameter throughout its passage down the bucket, until when near the lower end, on account of the inward curve of the bucket and the inward inclination of the bottom, the water is discharged centrally. Now, with relation to the buckets, the nozzles F are so located that the stream thrown by them shall strike the bottom of the buckets near their top and at right angles to their impact surfaces, so as to secure the best impact. The direction of the water to the outer side of the bucket provides for the

exercise of its reactive force to the best advantage, and the general curve and length of the bucket gives the most desirable reaction and discharge, to wit: centrally and downwardly. By securing the buckets to the disk B, as described, they may be readily adjusted vertically to accurate position, and may also be removed for repairs or the substitution of others. The nozzles F are also removable, and their position may be varied by turning the ring E, which carries them, the continuous slot d' in the outer casing D permitting the nozzles to be moved with the ring and affording communication in whatever position they may be adjusted. In the top of the casing D are made hand-holes d^2, for affording an opportunity to reach the nozzles for removing and replacing them.

The buckets may, of course, if desired, be cast integral with the disk, though this is not preferable.

I place in the bottom of the buckets the barriers G, which consist of angular lugs or points formed or secured in position. These project from each wall alternately, and others may be placed in the middle. These are for the purpose of more perfectly utilizing the reactive force of the water, which result is gained by the water coming in contact with them and reacting directly against them, and also by being diverted from side to side, so as to better react against the walls of the bucket, thus causing it to expend and exhaust its entire force before being discharged, when it drops dead from the lower end of the bucket.

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

1. In a water-wheel, a trough-like bucket with side walls and a bottom deeper along its outer edge, said bucket curving inwardly and the depth of its outer edge diminishing in the direction of its length to its discharge end, substantially as described.

2. In a water-wheel, a bucket having a bottom and side walls, and curved inwardly in the direction of its length to its discharge end, said bottom being at an obtuse angle to the perimeter of the wheel, the angle diminishing gradually toward the discharge end, and the bottom then inclining inwardly, substantially as described.

3. In a water-wheel, and in combination with the disk and its buckets, the encircling hollow casing for the water, having on its inner surface the continuous slot, the adjustable ring secured to the inner surface of the hollow casing, and the nozzles carried by the ring, and communicating with the casing through its slot, substantially as described.

In witness whereof I have hereunto set my hand.

ISAAC P. LAMBING.

Witnesses:
S. H. NOURSE,
H. C. LEE.