2 Sheets—Sheet 1.

W. N. WHIPPLE.

WATER-WHEEL.

No. 174,649. Patented March 14, 1876.

Fig. 1.

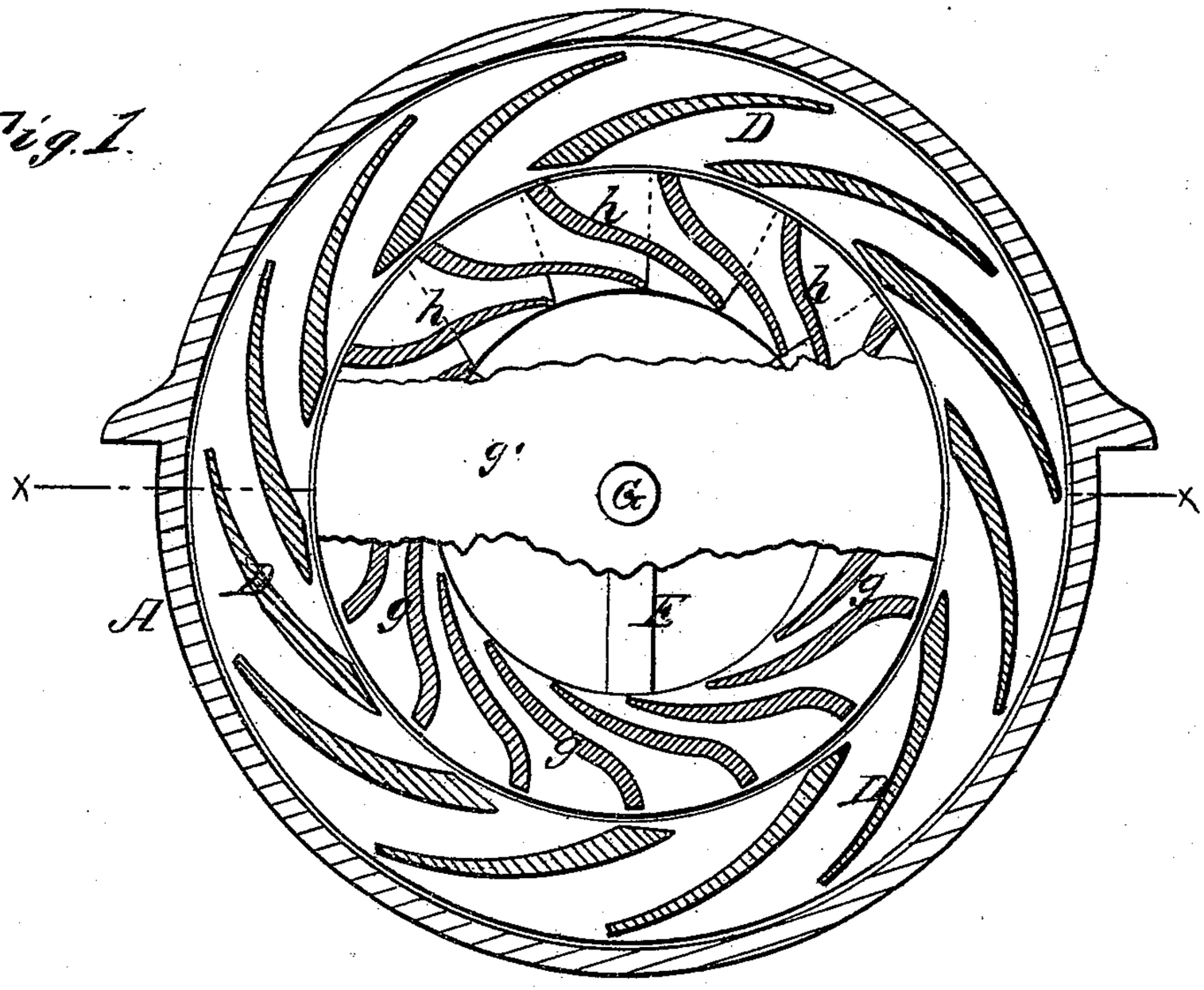
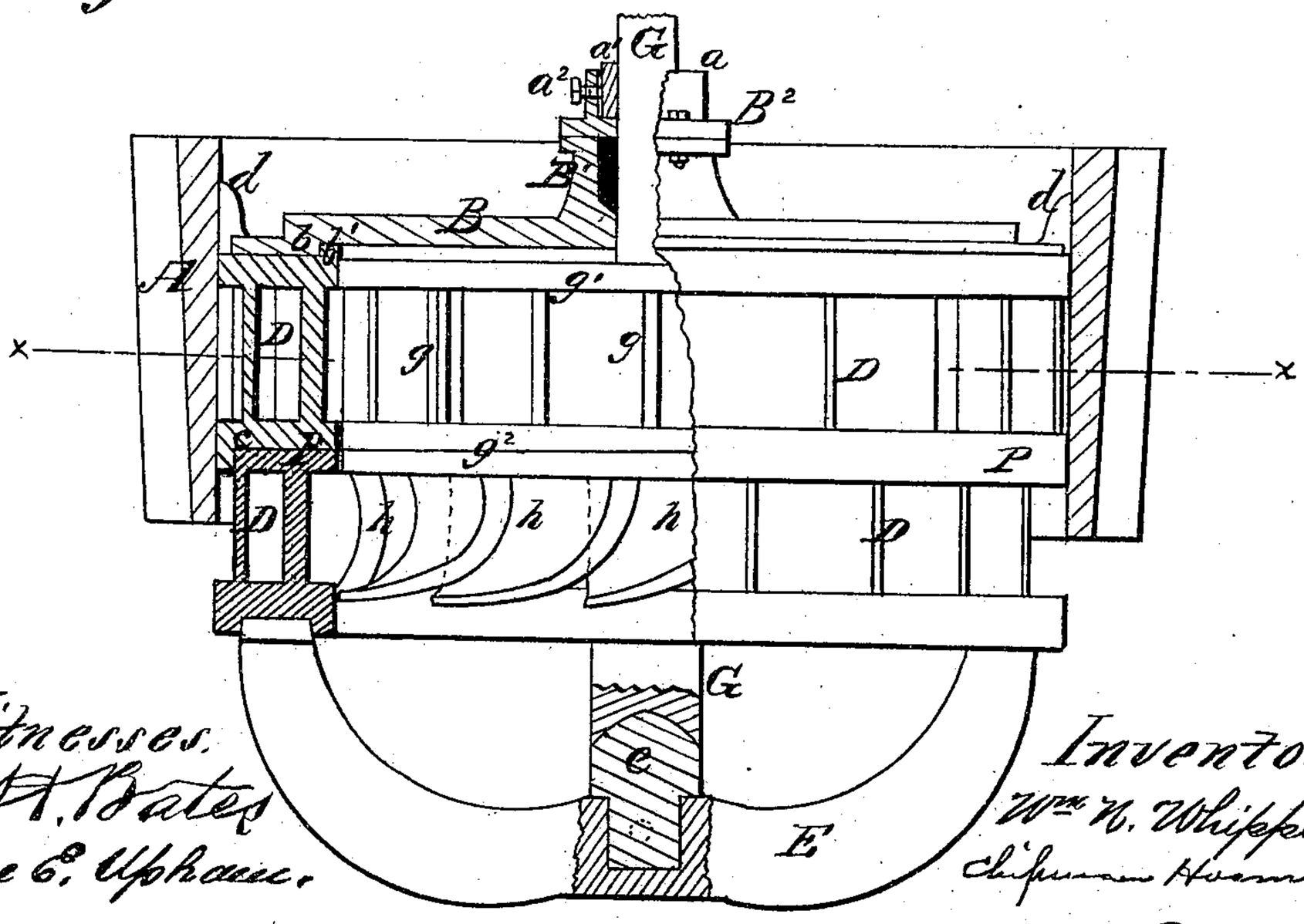


Fig. 2.



Witnesses.
E. A. Bates
George E. Upham.

Inventor.
Wm N. Whipple,
Chipman Hosmer & Co
Attys.

2 Sheets—Sheet 2.

W. N. WHIPPLE.

WATER-WHEEL.

No. 174,649. Patented March 14, 1876.

Fig. 3.

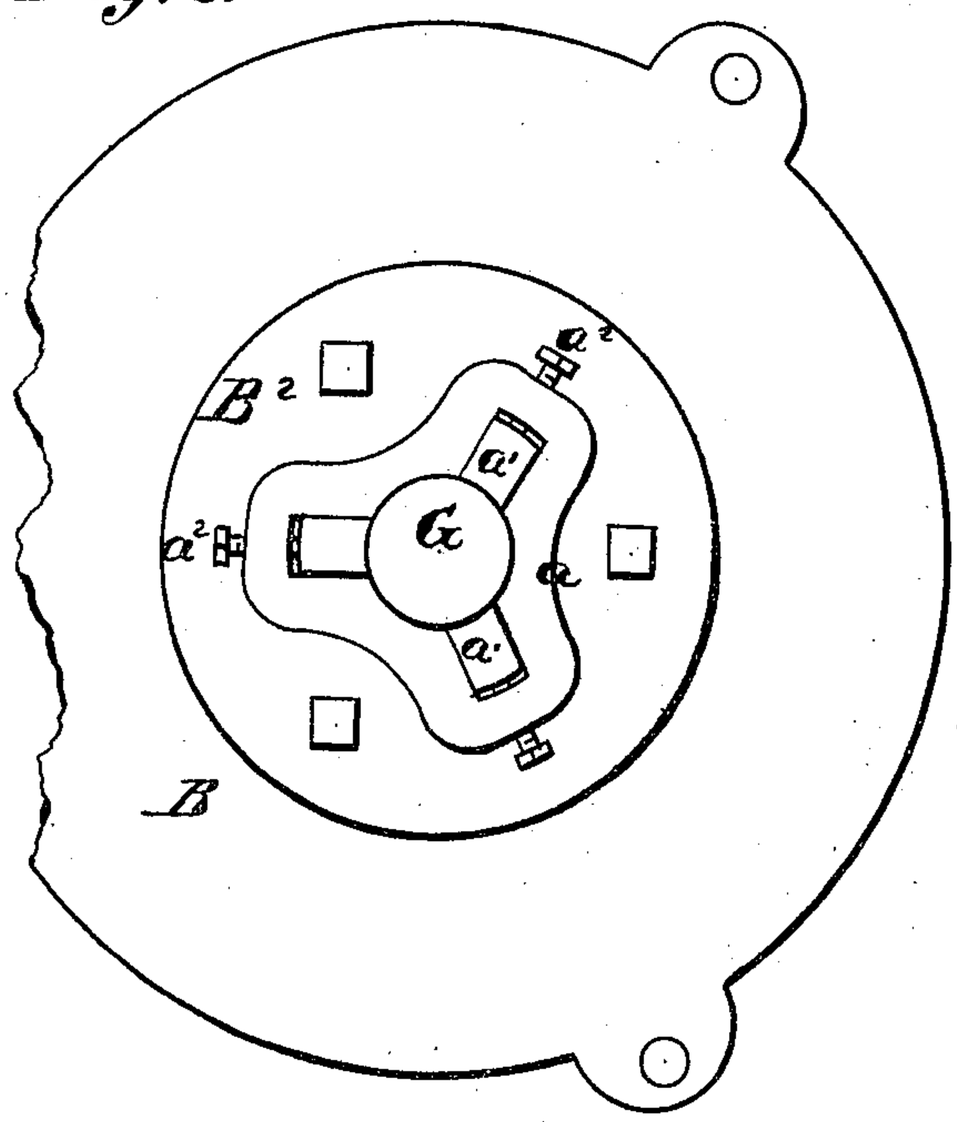


Fig. 4.

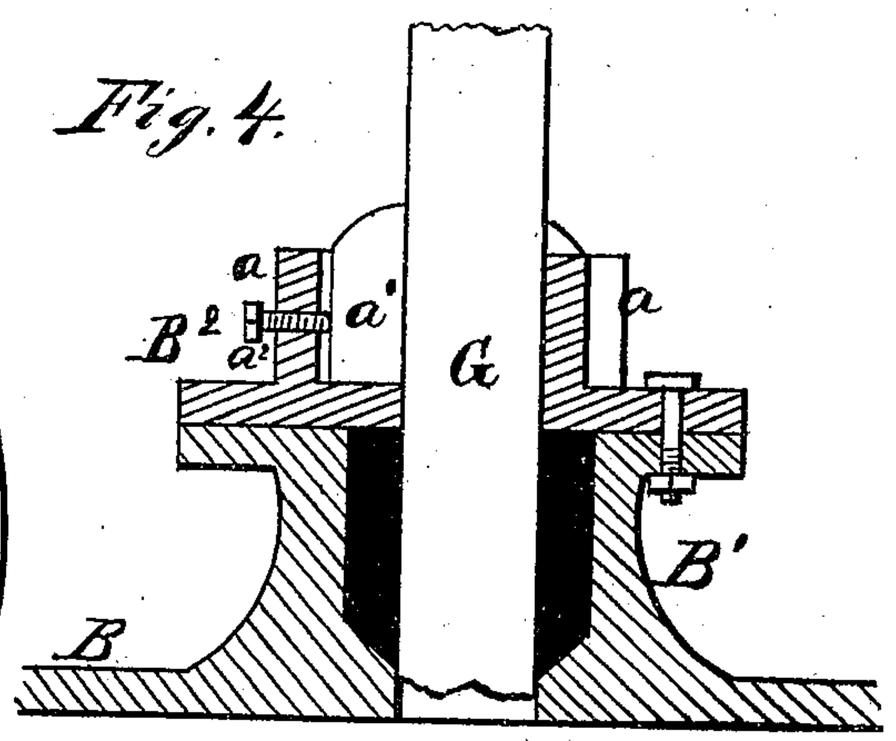


Fig. 5.

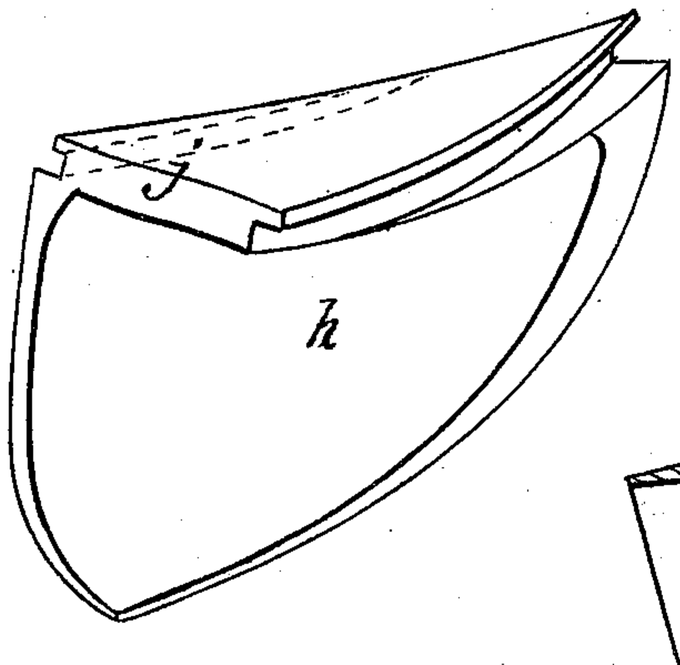


Fig. 6.

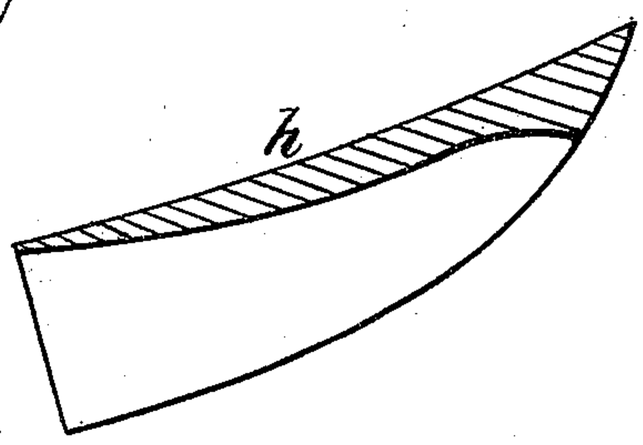
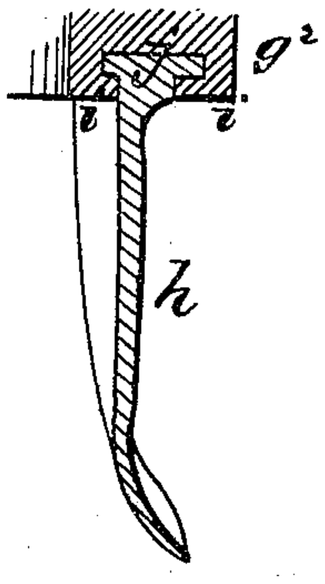


Fig. 7



Witnesses.
E. H. Bates.
George E. Upham.

Inventor.
William N. Whipple,
Chipman Hosmer "G".
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM N. WHIPPLE, OF MORAVIA, NEW YORK.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **174,649**, dated March 14, 1876; application filed February 9, 1876.

To all whom it may concern:

Be it known that I, WILLIAM N. WHIPPLE, of Moravia, in the county of Cayuga and State of New York, have invented a new and valuable Improvement in Water-Wheels; and I 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 a horizontal section of my water-wheel. Fig. 2 is a transverse section of the same. Figs. 3, 4, 5, 6, and 7 are detail views.

This invention relates to certain novel improvements on the construction of center-flow turbine water-wheels, as will be hereinafter explained and claimed.

The following is a description of my improvements: In the annexed drawings, A designates the vertically-adjustable gate which surrounds the wheel-case, and is intended for regulating the supply of water to the wheel. B represents the top of the wheel-case, which is constructed with a central stuffing-box, B^1, through which the shaft G of the water-wheel passes. The cap B^2 of this box is constructed with a flange, *a*, which forms three equidistant receptacles for receiving bearing-blocks a^1, which blocks are adjusted to the shaft G by means of set-screws a^2. By adjusting the set-screws the wheel can be made to run perfectly true, and its proper central position in the wheel-case can be maintained.

The top B is bolted upon the top ring of the wheel-case, and made water-tight thereon by means of a flange, *b*, fitting snugly over an annular rib, *b'*, rising from the inner edge of the said top ring.

The wheel-case consists of two horizontal halves, secured together by means of bolts and a close-lapped joint, *c*, formed by the bottom ring of the upper half of the case lapping over the top ring of the lower half of the case. These two rings thus united constitute a horizontal partition, P, between the upper and lower guides D D of the case, which prevents water from acting on the upper buckets of the wheel when the lower edge of the gate A is not above said partition. Each half of the case with its guides is cast entire, and on the upper ring of the upper half of this case are three raised guides, *d*, which will hold the gate steady when it is raised. The bottom ring of the lower half of the case has an annular groove in its under side, which receives the upper ends of a bridge-tree, E, and, with the aid of bolts, holds this tree rigidly in place. The lower end of the bridge-tree has a socket in it, in which a step, *e*, is secured for centering and supporting the lower concave end of the wheel-shaft G.

The guides D D correspond in number to the number of the buckets in the wheel, and these guides are the arcs of circles beveled at their ends, as shown in the drawings, and arranged so as to direct the water tangentially against the buckets of the wheel.

The wheel has two horizontal tiers of buckets corresponding to the two tiers or guides in the case. The upper tier of buckets *g*, the top g^1 of the wheel, and the bottom ring g^2 are cast entire. Each bucket *g* is thickest at its outer or receiving end, and presents a short outer curve and a longer inner reverse curve, as shown in Fig. 1. The ring g^2 has an annular groove in its bottom side, the flanges *i i* forming which groove are themselves grooved, as shown in Fig. 7. The groove thus formed is intended to receive T-shaped tenon *j*, which is formed on each one of the lower buckets *h*. At one point in the circumference of the ring g^2 a portion of the outer flange *i* is broken away or rather omitted, which allows the tenons on the buckets *h* to be inserted into their groove. By this novel arrangement all the buckets *h*, except the last one introduced into the groove, are held by the flanges *i i*. This last bucket is secured in its place by means of one or more bolts, by removing which any one or more of the buckets which may have been broken can be detached from the wheel and new ones substituted in their places. The buckets *h* are curved in two directions—that is to say, their upper portions are curved so as to direct the water toward the center of the wheel, while their outer edges and lower portions direct the water both downwardly and centrally. By constructing the buckets *h* as described, they are acted on by the tangen-

tial currents of the water as well as by the gravity of the inflowing water.

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

1. The case of the wheel, constructed of two horizontal guide-sections, connected together by the lapping ring which forms the partition P, substantially as described.

2. The lower series of buckets *h*, connected to the bottom ring of the upper series of buckets by means of T-shaped tenons *j*, applied in a groove of corresponding shape formed in said ring, substantially as described.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM NELSON WHIPPLE.

Witnesses:

WM. TALLMAN,

JOHN MCCREDIE.