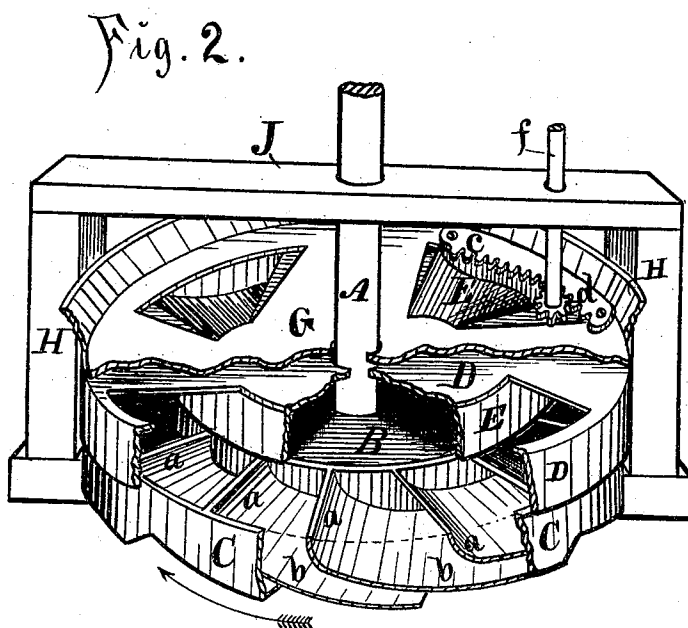
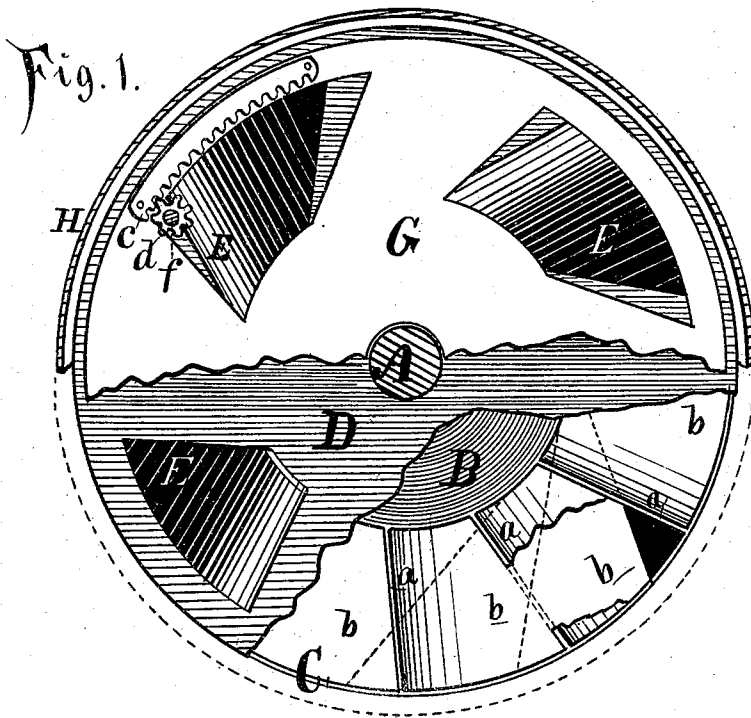


A. EDWARDS.
WATER-WHEEL.

No. 178,612.

Patented June 13, 1876.



Witnesses,
G. M. Macomber,
C. A. Johnson

Abel Edwards, Inventor,
By Thomas G. Orwig, atty

UNITED STATES PATENT OFFICE.

ABEL EDWARDS, OF SUMMERSET, IOWA, ASSIGNOR OF PART OF HIS RIGHT
TO JOHN J. BAKER AND JOHN H. HUKILL, OF SAME PLACE.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. **178,612**, dated June 13, 1876; application filed
December 6, 1875.

To all whom it may concern:

Be it known that I, ABEL EDWARDS, of Summerset, in the county of Warren and State of Iowa, have invented an Improved Water-Wheel, of which the following is a specification:

The object of my invention is to increase the maximum power of a turbine water-wheel, diminish the minimum of water required to operate it, and to provide a means of more readily controlling the action of the wheel, as required for different stages of the water-supply and the varying amount of power required for the numbers and kinds of machines to be run. It consists in a wheel having combined buckets and chutes of peculiar form, being combined, with a fixed directing case or cover, and a corresponding adjustable gate, all as hereinafter fully set forth.

Figure 1 of my drawing is a top-plan view, illustrating the construction of my wheel, fixed case, and adjustable gate.

A is the central and vertical shaft, to which the wheel is rigidly attached in any suitable way. B is the central portion of the wheel, and may be solid or a closed annular chamber. C C is the rim of the wheel. *a a* represent a series of radial buckets extending from the periphery of the closed center B to the rim C. They are vertical, and rigidly fixed at regular intervals from each other, and terminate in horizontal chutes *b*, which chutes incline downward from the base of the vertical buckets. The lower edge of each chute *b* and the upper edge of each bucket *a* form lines parallel to each other, but cross the lines formed by the edges of the contiguous buckets and chutes, as indicated by the broken lines. By means of this peculiarity the mouths of the chutes *b* are made wider than the buckets, and consequently allow the water to escape from the buckets and through the chutes without causing pressure and back action on the wheel. An easy parallel flow is thus provided for the wheel, conforming with the parallel directing-chutes in the case or cover, and the maximum of power is thereby increased. D D is the cover and case. It is rigidly fixed immediately over the revolving wheel A B C by means of a suitable frame or wall. E E represent wa-

ter-inlets and directing-chutes immediately over the series of buckets *a* in the wheel. G is a disk-form gate, journaled to the central shaft A in such a manner that it revolves horizontally upon the surface of the case D. It has openings corresponding in form and number with the water-inlets E in the case. *c* is a segmental rack, rigidly fixed to the gate G near its outer edge. *d* is a pinion rigidly fixed on a vertical shaft, *f*, that has its bearing at its lower end in the case D. By revolving the shaft *f* the pinion *d* moves the rack *c*, and thereby rotates the gate G to make its openings register with the inlets E in the case D. H H is a flaring rim joined to the top edge of the case D, and represents the flume through which the water descends in a large volume from the source of supply.

Fig. 2 is a perspective view, more fully illustrating the construction and operation of my invention.

Similar letters of reference denote corresponding parts in Fig. 1.

Parts are broken away from the gate G, case D, and rim C.

The additional letters J J represent a frame within which the wheel is mounted, and to which the case D is rigidly secured. The frame may be made in any suitable manner and of any material desired.

My wheels may vary in size and capacity, and may be formed in parts, of wrought or cast metal, and joined together in any suitable way.

In the practical operation of my wheel the gate G can be readily adjusted to open or close, or partly open and close, the inlets E in the case D, by simply turning the shaft *f* by means of a hand-wheel or lever at its top. The water allowed to enter the inlets E will be directed through the chutes in the case D, to impinge against the buckets *a* of the wheel, and after the force of the water-pressure has been imparted to the wheel the chutes *b* will allow it to escape in the opposite direction from which the wheel is moving. Much or little water-power can be thus easily applied, and the action of the wheel positively regulated, as desired, by the will of the operator.

I am aware that turbine-wheels having buckets and chutes similar to mine are in use; but

I claim that the peculiar form of my combined buckets and chutes, which causes the edges of each combined bucket and chute to be parallel to each other and to angle across the contiguous buckets and chutes, and thereby enlarge the water-outlets, as and for the purposes described, is new and greatly advantageous. I am also aware that fixed cases having directing-chutes and adjustable gates have been used; but I claim that my disk-form gate, corresponding in form with the top of the case, and its combination with the wheel and the case in such a manner as to register with the water-inlets of the case, and thereby control the action of the wheel, is new and greatly advantageous.

I claim as my invention—

1. In a turbine water-wheel, the combined

buckets and chutes *a b*, extending radially from the closed central portion B to the rim C in such a manner that the edges of each individual bucket and chute are parallel to each other, but at cross-angles with their continuous buckets and chutes, substantially as and for the purposes shown and described.

2. The wheel A B C, having combined buckets and chutes *a b*, as set forth, in combination with the fixed case D, having directing-chutes E, and the adjustable disk-form gate G, substantially as and for the purposes shown and described.

ABEL EDWARDS.

Witnesses:

J. H. HENDERSON,
W. H. BERRY.