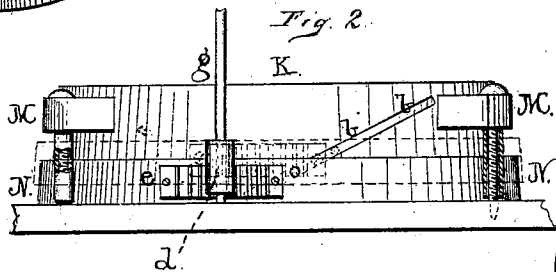
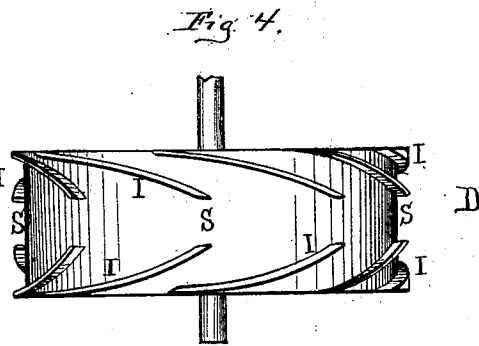
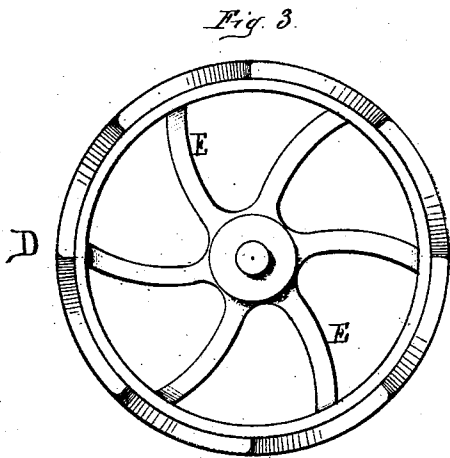
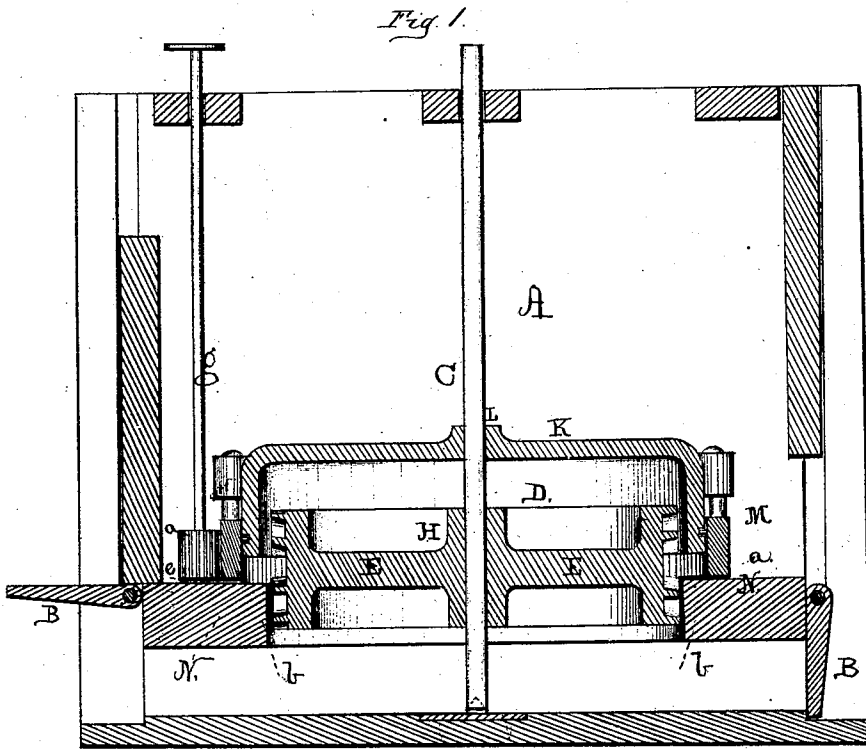


P. W. YARRELL.  
Water Wheel.

No. 101,402.

Patented March 29, 1870.



Witnesses  
*W. A. Finckel*  
*Wm. J. Peyton*

Inventor:  
*Pierce W. Yarrell*  
*J. O. ...*  
*Att'y*

# United States Patent Office.

PIERCE W. YARRELL, OF LITTLETON, NORTH CAROLINA.

Letters Patent No. 101,402, dated March 29, 1870.

## IMPROVEMENT IN 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 I, PIERCE W. YARRELL, of Littleton, in the county of Halifax and State of North Carolina, have invented a new and useful Improved Water-Wheel; and I do hereby declare the following to be a clear and exact description thereof, sufficient to enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a longitudinal section of the box, casing, and wheel.

Figure 2 is a front view of the device for raising and lowering the band-gate.

Figure 3 is a top view, and

Figure 4 a side view of the water-wheel.

Similar letters of reference indicate like parts in all the figures.

My invention consists in a device for raising the band-gate to admit water to the wheel by means of a rack and pinion, and groove in the wheel-casing.

My invention also consists in the arrangement of the curved buckets of the water-wheel opposite each other, in such a manner that the upward and downward pressure of the water on the buckets tend to counterbalance each other, thus relieving the pressure of the shaft of the wheel on its bearing.

In the accompanying drawings—

A is the box, penstock, or chute in which the water-wheel and casing are situated, and may be provided with valves or gates B B, for the water to escape from the turbinized wheel after operating upon it.

C is the vertical shaft of the water-wheel D, and has its bearing in the bottom of the box, penstock, or casing.

E E are arms radiating from the hub H, which latter surrounds the shaft C, and turns with it.

I I are curved buckets lying opposite and overlapping each other, one set of buckets proceeding from the upper surface of the wheel, and the other set of buckets proceeding from the lower surface, and both curved inwardly, leaving open spaces between the up-

per series of buckets for the escape of water, and similar spaces for the same object between the lower series of buckets.

The water from the band-gate being admitted on the smooth surface S of the wheel, between the inner points of the upper and lower series of buckets, presses upward and downward upon the curved surfaces of the upper and lower series of buckets, thus operating the wheel, and, at the same time, relieving the shaft C from pressure on its bearing, and enabling the water-wheel to be operated with less power.

K is the upper part of the casing or cap which surrounds the upper set of buckets, and having a perforation, L, at its center, through which the shaft C passes, and also lugs M. M, provided with bolts, by means of which the casing is attached to that part of the pen-stock, floor, or casing surrounding the lower set of buckets.

N is the band-gate surrounding the casing, and provided with pins or projections *a a* sliding in inclined grooves *b b* made in the casing.

*e* is a curved rack on the band-gate N, into which meshes the pinion *d* on the vertical shaft *g*. By turning the shaft *g* the band-gate is securely closed or opened, thereby admitting a sufficient quantity of water to operate the wheel.

Having thus described my invention,

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

1. The wheel D, having the buckets I arranged in pairs upon its periphery to produce an equilibrium of pressure, substantially as described.

2. The band-gate N, made to rise and fall by rotation through the medium of the rack *e*, pinion *d*, rod *c*, grooves *b*, and pins *a*, applied and operating substantially as described.

To the above I have signed my name this 27th day of January, 1870.

PIERCE W. YARRELL.

Witnesses:

JOHN A. WIEDERSHEIM,  
W. H. FINCKEL.