2 Sheets—Sheet 1.

# J. C. CLIME.

## Turbine Water-Wheel.

No. 213,625. Patented Mar. 25, 1879.

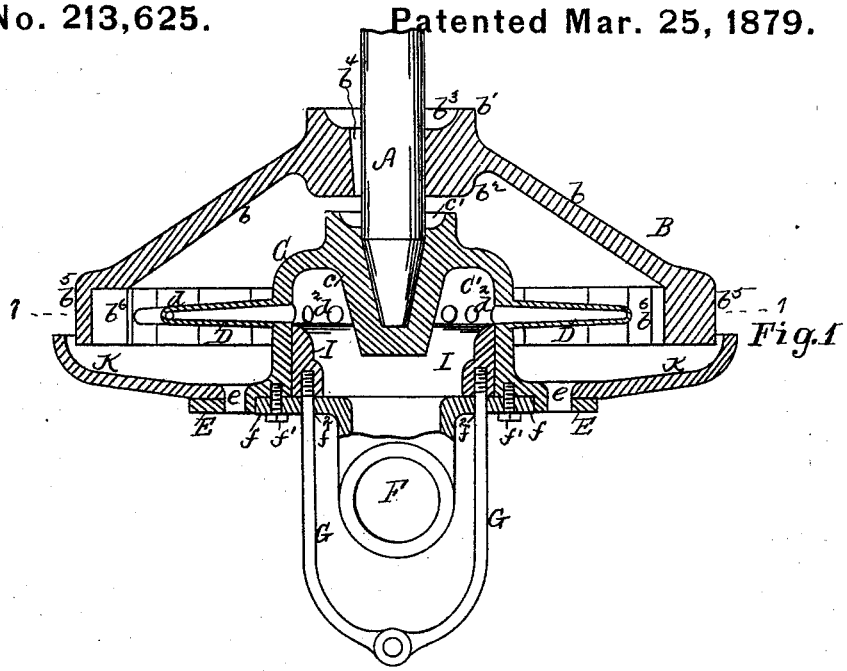

Fig. 1

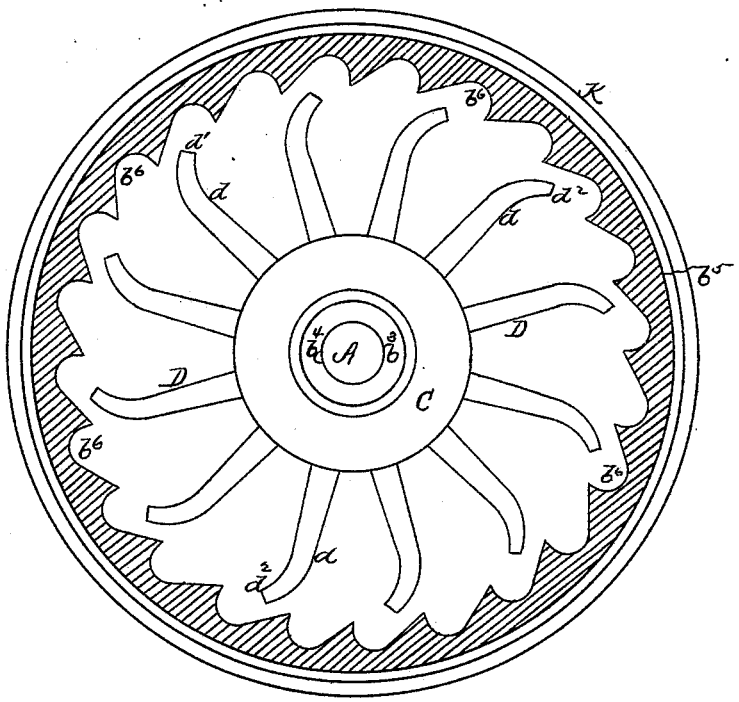

Fig. 2

WITNESSES:

C. Ferguson.

Chas. Streech.

INVENTOR,

John C. Clime

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

2 Sheets—Sheet 2.

# J. C. CLIME.
## Turbine Water-Wheel.

**No. 213,625.** **Patented Mar. 25, 1879.**

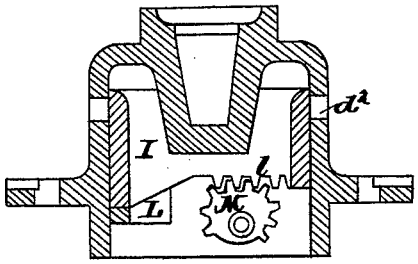


*Fig. 3*

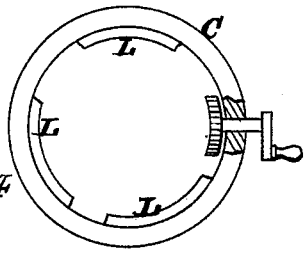


*Fig. 4*

*WITNESSES:*

C. Ferguson.

Chas. Strock

*INVENTOR,*

John C. Clime

# UNITED STATES PATENT OFFICE.

JOHN C. CLIME, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE F. GODLEY, OF SAME PLACE.

## IMPROVEMENT IN TURBINE WATER-WHEELS.

Specification forming part of Letters Patent No. **213,625**, dated March 25, 1879; application filed April 27, 1878.

*To all whom it may concern:*

Be it known that I, JOHN C. CLIME, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Turbine Water-Wheels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a longitudinal vertical section of my improvements. Fig. 2 is a horizontal section on the line 1 1, Fig. 1. Figs. 3 and 4 are detail views, the former a section, and the latter a plan view, of a modification of the gate-adjusting mechanism.

The object of my invention is to provide an improved turbine water-wheel, having reference to the following points: First, to the provision of a series of chutes attached to an annular ring, which is also provided with the water inlet and outlet openings, a step-bearing for the wheel-shaft, and an annular chamber, in which is placed a gate for regulating the flow of water to the wheel; second, to the provision of means whereby the water ascends to the wheel instead of flowing downwardly thereto, the water-inlet and chutes being placed beneath and opposite the buckets of the wheel; third, to the novel construction, combination, and arrangement of parts, as hereinafter more fully set forth.

Referring to the accompanying drawings, A is the shaft, and B a turbine water-wheel securely fastened thereto. Said wheel has a flaring or dish-shaped disk, *b*, having hubs $b^1$ and $b^2$, the former of which has its inner edge cut away, to form an oil-cup, $b^3$, from which proceeds a groove, $b^4$. The lower edge of the disk *b* is provided with a depending flange, $b^5$, which is constructed with the buckets $b^6$, shaped as shown. All of said parts are formed in the operation of casting, so that when the wheel is cast nothing remains to be done but secure it to the shaft A.

C is an annular ring, its sides inclosing the chamber C′, from which proceed a series of curved radial chutes, D, which may be formed integral therewith or made separately and secured thereto in any appropriate manner.

It will be observed that said chutes D are straight and proceed in radial lines from the side of the chamber C′ to about the point *d*, whereat they begin to curve, so that their ends $d^1$ will be tangentially to the buckets of the wheel. Said chutes may have a tapering bore, or, if desired, they may be made of an equal bore throughout.

The ring C is also provided with an annular flange, E, in which are the water-outlet openings *e e*, and is also formed with a step-bearing, *c*, for the reception of the shaft A, as shown, said step being formed with an oil-cup, *c*′. F is the water-inlet, having a flange, *f*, affixed thereto, by means of which it is secured to the ring C by screws $f^1$ $f^1$. $f^2$ $f^2$ are openings in said flange *f*, through which pass the rods G G. To the latter is secured the annular gate I, which is placed in the chamber C′, as shown, and is raised or lowered therein by said rods G G, to cover and uncover the chute-openings $d^2$, and thereby regulating the flow of water therethrough. This adjustment of the gate I may be automatically effected by connecting the bars G G to a governor; or it may be made by the hand, by attaching them to a pivoted lever in which is a series of adjusting-holes.

Operation: The gate I being adjusted to the chute-openings, the water is now turned on and rushes into the chamber C′, and from thence it passes into and out of the chutes D D and strikes tangentially against the curved sides of the buckets $b^6$ of the wheel B and sets the same in motion. The exhaust-water falls from said wheel and is conducted away by any suitable means.

When it is desired to run the wheel within a building, the curved annular drip-cup K is employed to confine the water and conduct it to the outlet-openings. This ring K is loosely placed upon the flange E of the ring C, and extends upwardly above the lower edge of the wheel B, as shown. The exhaust-water falls into the drip-cup K and is conducted to the exit-openings *e e* in the flange E.

The step $c$ and other bearings are oiled by pouring the lubricant into the cup $b^3$. It then passes out of the same through the groove $b^4$ and runs down to the oil-cup $c'$, and thence to the step-bearings.

With this construction I dispense with a separate case or cover, within which the wheel is usually placed, and need no air-chambers, thus producing an effective and durable wheel, which is easily put together, and not liable to get out of order.

In Figs. 3 and 4 is shown a modification of mechanism for raising or lowering the gate I. The lower edge of the latter is formed with two or more incline planes, which rest and ride upon the inclined projecting ledges L L, secured to the side of the annular ring C. Said gate is also provided with a rack, $l$, which engages with a cam-pinion, M, having its shaft-bearings in the annular ring C, as shown. By turning said cam M the gate I is adjusted to seal or unseal the chute-openings $d^2$.

What I claim as my invention is—

1. In combination with a turbine water-wheel, the water-inlet, terminating in a ring inclosing a chamber, from the sides of which proceed chutes, the latter being placed beneath the body of the wheel, so as to be in a line with the buckets of the same, thereby causing the flow of water to ascend to the wheel from below the same, substantially as shown and described.

2. The turbine water-wheel B, formed with a flaring disk, $b$, and flange $b^5$, the latter being formed on its inner side beneath the disk $b$ with the curved buckets $b^6$ $b^6$, as shown and described.

3. The wheel B, having flaring disk $b$, hubs $b^1$ $b^2$, oil-cup $b^3$, groove $b^4$, flange $b^5$, and buckets $b^6$, substantially as shown and described.

4. The stationary ring C, provided with radial chutes D D, substantially as shown and described.

5. The ring C, provided with chutes D, step $c$, and flange E, having outlet-openings $e$ $e$, substantially as shown and described.

6. In combination with the ring C, having chamber C′ and chutes D D, the gate I, substantially as shown and described.

7. In combination with the turbine water-wheel B, constructed substantially as shown and described, the drip-cup K, the sides of which extend upwardly a short distance above the extreme lower edge of said wheel, substantially as shown and described.

8. The combination of the wheel B, the ring C, placed beneath the body of the former, said ring being formed with chutes D D, which are in a line with the buckets of the wheel, substantially as shown and described.

9. A turbine water-wheel, the body of which is placed above the chutes in such a manner that its buckets will be in a line therewith, so as to be impelled by an ascending current of water, as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand.

JOHN C. CLIME.

Witnesses:
DAVID HANLEY STONE,
WM. D. STONE.