(No Model.)

# J. H. KNIGHT.

## CURRENT WATER WHEEL.

No. 384,916. Patented June 19, 1888.

Fig. 1

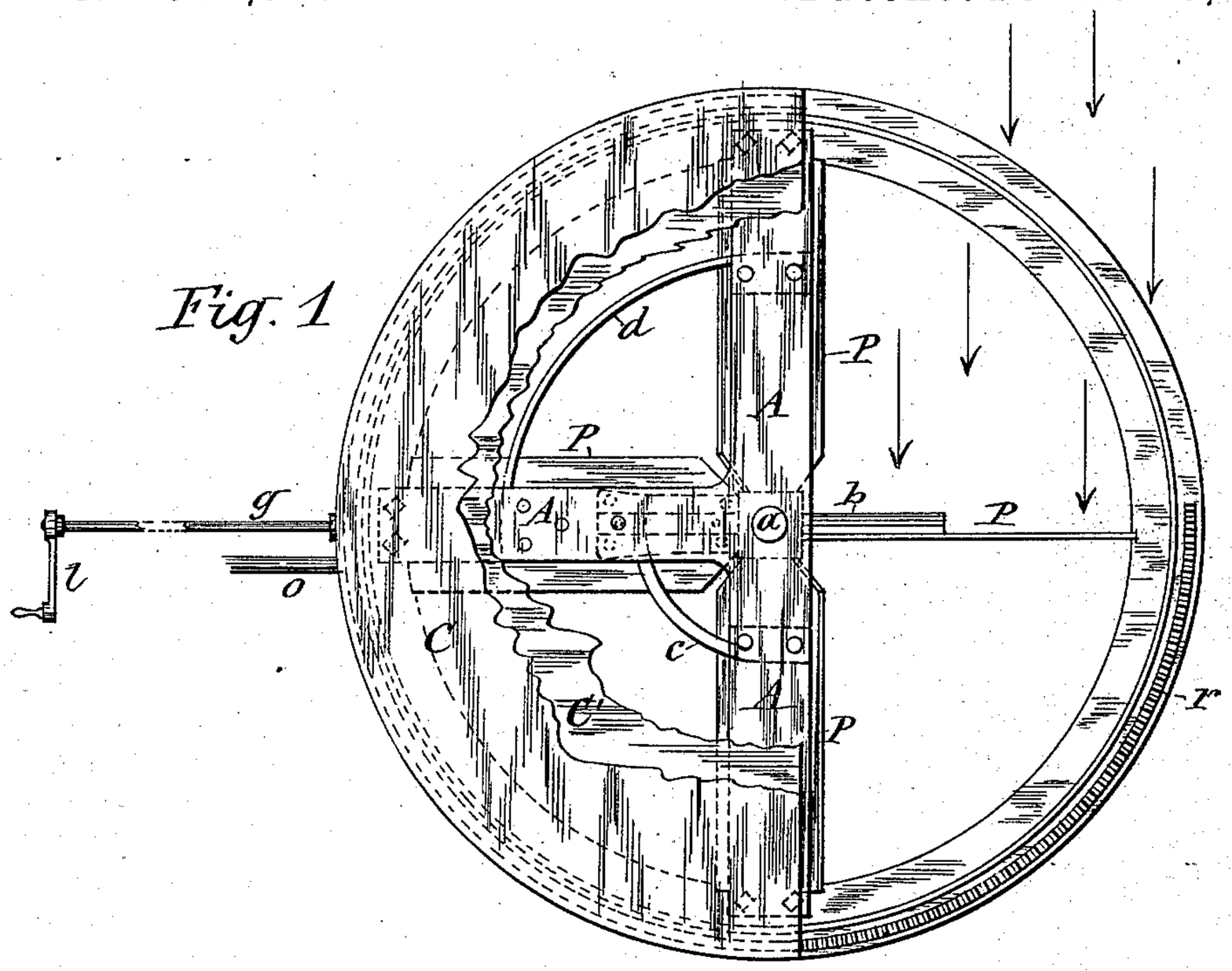



Fig. 2

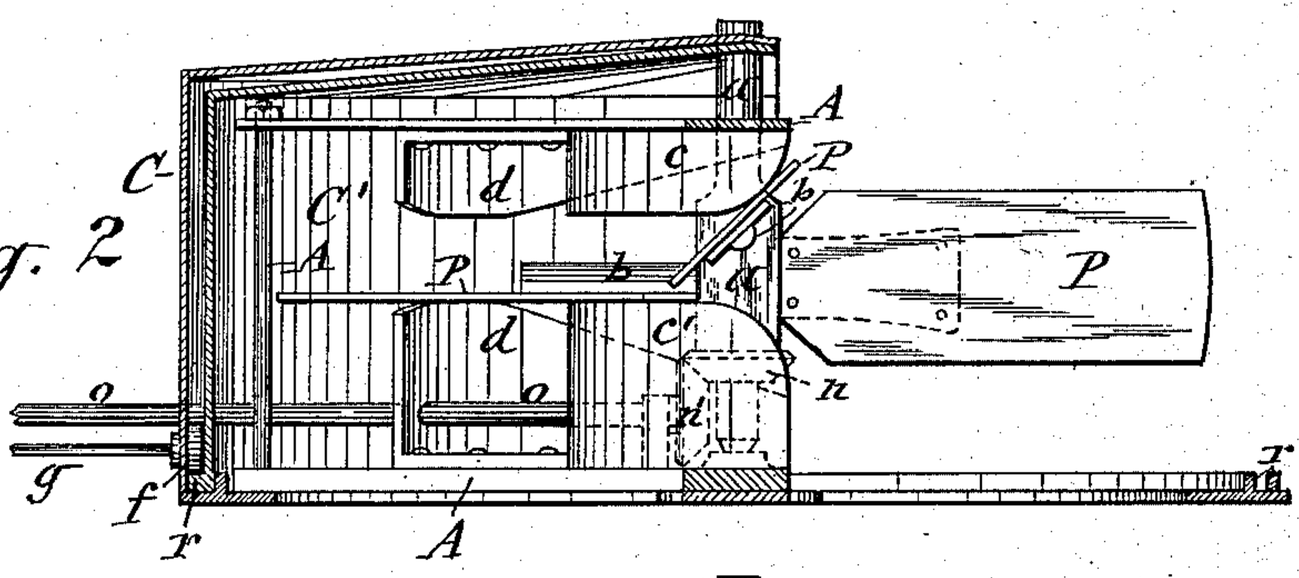
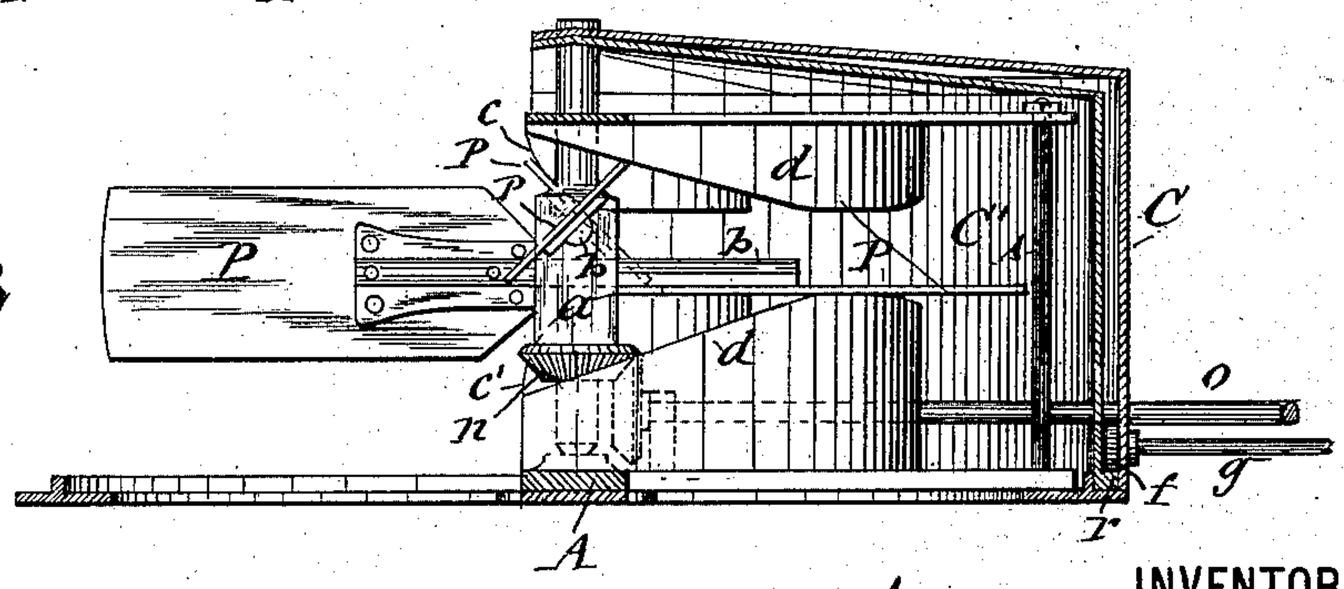



Fig. 3

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# UNITED STATES PATENT OFFICE.

JOHN H. KNIGHT, OF BUFFALO, NEW YORK.

## CURRENT WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 384,916, dated June 19, 1888.

Application filed December 7, 1887. Serial No. 257,208. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. KNIGHT, of Buffalo, in the county of Erie, in the State of New York, have invented new and useful Improvements in Current Water-Wheels, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention consists in an improved construction of a water-wheel designed to be submerged in the current of a stream, so as to receive the pressure of said current against the paddles of the wheel, and thus receive rotary motion, all as hereinafter fully described, and specifically set forth in the claims.

The invention is fully illustrated in the annexed drawings, in which—

Figure 1 is a top plan view of a current-wheel embodying my invention, a portion of the inclosing-case being broken away to better illustrate the wheel; and Figs. 2 and 3 are elevations of the wheel, taken at opposite sides of the same, with the inclosing-case shown in section and the front post of the frame removed.

Similar letters of reference indicate corresponding parts.

A represents the supporting-frame of the wheel, which frame is to be securely anchored in the stream, so as to support the wheel submerged in the current thereof. To said frame is pivoted vertically a shaft, *a*, and diametrically through this shaft are extended radial horizontal arms *b b*, arranged one above the other and journaled in said shaft so as to allow them to freely rotate therein. To opposite ends of each of said arms I rigidly secure paddles P P, disposed in planes at right angles to each other.

To the top and bottom of the interior of that portion of the frame A which is at the side of the shaft *a* facing downstream are rigidly attached two cams, *c c'*. During the rotation of the wheel, and at the time when the paddles are nearly or quite parallel with the current, and consequently least subjected to the force of the current, the top edge of one of the paddles of the upper arm *b* encounters the upper cam, *c*, and is thereby caused to make one-fourth of a revolution and turn from a vertical plane into a horizontal plane, and consequently the paddle on the opposite end of said arm, and which presents its free end upstream, is turned back from a horizontal plane to a vertical plane. It will be observed that the paddles simply oscillate in an arc of ninety degrees, and thus the friction of the bearings of the arms *b b* on the shaft *a* is comparatively insignificant. The paddles on the lower arm *b*, are turned in the same manner by the lower cam, *c'*, but in a direction reverse from that of the paddles of the upper arm.

The paddle which is turned from a horizontal plane to a vertical plane presents its side to the current of the stream, and thus receives the force of the same, while the paddle on the opposite end of the same arm is carried edgewise upstream, and thus its resistance is reduced to a minimum.

The paddles are sustained in the aforesaid positions by means of guides *d d*, secured to the top and bottom of the interior of the frame A, on which guides the flat sides of the paddles slide.

Around the described wheel I place a case arranged concentric with the axis of the wheel and composed of two sections, C C', one of which is secured stationary to the frame A at that side of the wheel where the paddles P P move upstream, or against the current. The other section, C', is mounted movably on a circular track secured to the base of the frame A concentric with the axis of the wheel, and it is adapted to be swung around, so as to either completely inclose the wheel when it is desired to stop the motion of the latter, or only partly inclose the wheel to reduce the power, as may be desired, or to stand completely inside of the stationary section C and expose that half of the wheel which presents the paddles with their sides toward the current, as represented in the annexed drawings, in which position the case-section C' is to be placed when desired to set the wheel in motion. Said case-section may be moved by means of a pinion, *f*, secured to a horizontal shaft, *g*, mounted in suitable bearings on the stationary case section C, which pinion engages a semicircular horizontal rack, *r*, secured to the movable case-section C', and the shaft *g* is extended to the shore, where it is provided with a crank, *l*, or other suitable means by which to turn said shaft. Motion is transmitted from the wheel-shaft *a* by means of a bevel-gear, *n*, on said shaft meshing with a corresponding bevel-gear, *n'*, on a horizontal

driving-shaft, *o*, extending to the shore or other place where the power is to be utilized.

I have described the wheel as being pivoted vertically and rotary in a horizontal plane, because in that condition it is adapted for shallow as well as deep water; but I do not limit myself to said arrangement of the wheel, inasmuch as in deep water the wheel may be pivoted horizontally and rotate in a vertical plane. In either case the paddles are pivoted at right angles to the shaft.

What I claim is—

1. The combination, with the frame A and vertical shaft *a*, of the arms *b b*, arranged horizontally one above the other at right angles to each other, and extending diametrically through the vertical shaft and journaled therein, paddles P P, rigidly attached to opposite ends of each arm *b* and disposed in planes at right angles to each other, and cams *c* and *c'*, projecting, respectively, from the top and bottom of the frame A and engaging the successive paddles alternately at the top and bottom edges to turn each succeeding paddle in opposite direction from the preceding paddle, substantially as set forth.

2. The combination of the frame A, the shaft *a*, pivoted vertically to said frame, the arms *b b*, pivoted horizontally to said vertical shaft, paddles P P, secured to said arms, cams *c c'*, secured to the frame A and adapted to turn the paddles on their pivots on the shaft, a stationary semicircular casing inclosing the frame A and one half of the wheel, a semicircular casing pivoted to the vertical shaft *a* and adapted to inclose the other half of the wheel, the pinion *n*, secured to the shaft *a* inside of the casing, the driving-shaft *o*, extending into the casing, and the pinion *n'* on said driving-shaft meshing with the pinion *n*, all combined to operate substantially as described and shown.

In testimony whereof I have hereunto signed my name, in the presence of two witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 1st day of December, 1887.

JOHN H. KNIGHT. [L. S.]

Witnesses:
C. H. DUELL,
H. P. DENISON.