

UNITED STATES PATENT OFFICE.

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FEATHERING WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 744,786, dated November 24, 1903.

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To all whom it may concern:

Be it known that I, MORTIMER F. McDONALD, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented a new and useful Feathering Water-Wheel, of which the following is a specification.

This invention relates to improvements in wheels; and the object is to provide a simple and improved construction of wheel which will be effective in operation.

Another object is to provide simple and improved means for automatically feathering the blades or paddles of the wheel after the same has been acted upon by the current.

A further object is to provide means for readily starting and stopping the wheel.

A still further object is to provide a simple construction whereby the wheel may be raised and lowered from the water when desired.

With the above objects in view the invention consists in the novel features of construction hereinafter fully described, particularly pointed out in the claims, and clearly illustrated by the accompanying drawings, in which—

Figure 1 is an elevation of a construction embodying my invention viewed from the "downstream" side. Fig. 2 is a horizontal section showing the wheel in top plan view. Fig. 3 is an enlarged sectional view of the bearing for the lower end of the shaft. Fig. 4 is a perspective view showing the means for feathering the paddles and for starting and stopping the wheel and view of track from the "upstream" side. Fig. 4* is a detail sectional view through the sliding section of the upper track, the operating-link being in elevation. Fig. 4* is a detail sectional view showing the connection between the swinging and false gates and the rod operating same. Fig. 5 is a plan view of my device, a plurality of the wheels being shown in position in dotted lines.

My improved water-wheel may be mounted in any suitable manner, either on shore or on a wharf, floating platform, or boat, the manner of such mounting depending on the stream by which the wheel is to be run.

In the drawings, A represents a frame or trestle-work built upon the foundation select-

ed and preferably extending over the water on both sides. Supported by braces B are T-shaped standards C, which extend downward to the required depth and also project a considerable distance above the frame for the purpose presently to be set forth. Sliding upon said T-shaped standards is a carriage D, the vertical rails of which are provided with flanges D' to embrace the edges of said standards, as clearly indicated in Fig. 2. This carriage D is suitably braced and may be raised and lowered by suitable apparatus provided therefor. By having the standards project above the frame A said carriage may be raised entirely from the water. Centrally secured to the bottom rail of the carriage is a pyramidal bearing E, having balls F and supporting the lower end of the wheel-shaft G. This wheel-shaft is preferably provided at its lower end with a hood H, which fits over the bearings and effectually prevents the entrance of water, sand, and mud, which would clog the bearing and prevent the easy running of the wheel. To keep the bearings constantly oiled, a tube I is provided, which passes down the side of the shaft and communicates at its lower end with said bearing. The shaft at its upper end is supported in a suitable bearing J in the upper rail of the carriage, said shaft extending beyond said bearing and carrying a driving-gear K, which meshes with a gear L on a shaft M, by means of which power is communicated to the machinery to be driven.

Secured at intervals upon the shaft G are hubs N, to which the inner ends of arms O are secured, their outer ends being connected by a circular band or rim O', that firmly holds the outer ends in position. These arms may be either solid or hollow, as preferred.

Each section of the wheel is suitably braced by braces P, which are placed angling and so arranged that they will be a support to the paddle in either operative or inoperative position. The upper series of these braces are secured at their inner and upper ends to the collar P', which encircles the wheel-shaft above the hubs N, and the lower ends of these braces are secured to the upper tier of arms O, adjacent the paddles. The remainder of the braces are connected at one end to the

arms O above them and at their opposite ends to the corresponding series of arms below them, as shown in Fig. 1.

Attached to the arms O are paddles Q, which are centrally disposed and so mounted thereon as to oscillate from a perpendicular to a horizontal position, as seen on the left and right sides of Fig. 1. Said paddles may be of any preferred shape, either flat, saucer, or scoop shaped in outline. To have paddles fill the entire space when in a perpendicular position, which is desirable, the same are of such size that when in a horizontal position they will overlap at their inner corners.

To shift the paddles from a horizontal to a perpendicular position, and vice versa, vertically-disposed rods R are provided, each rod extending downwardly the entire depth of the wheel and being pivotally attached to the paddles of one of the vertical series—as, for instance, should there be twenty series there would be twenty rods, each operating as many paddles as there were in each series in the wheel, which would depend on the depth of the water where the wheel was to be used.

Secured to vertical brackets S, depending from the under side of the upper rail of the carriage, is a track, consisting of a continuous upper track T and a substantially semicircular lower track T', disposed below one-half of the upper track T.

The upper ends of the rods R are bent laterally and carry rollers U, which move upon said tracks as the wheel revolves. To connect the lower track-section T' with the main track T, a swinging gate V is provided, which is movable vertically at its outer end and at its inner end is hinged to the upper track. This gate is raised and lowered to form a continuous upper track on the same plane or a continuous track having the two halves of its circumference on two planes by an operating-lever W, connected with the hinged gate through the medium of the link W' and rod W², secured at its outer end to the gate and revolvably journaled at its inner end in the link. This arm passes through and works in a slot W³. Above the track T is a projecting flange T², intended to hold the roller from vertical movement. When the track-gate V is lowered to connect the upper track with the lower track T', a false guide-gate T³ above the gate on which the roller travels drops down, thus connecting the flange T² with the track T, which track forms a flange for the track T'. The gate V is hinged at one end to the track T; but no hinge is placed on the false gate T³, as the roller would be apt to pound same loose. Instead, a smooth flexible spring-plate T⁴ is secured so as to support one end of the gate T³, and the roller passes smoothly from one track to the other without any danger of the rod rising and causing it to strike the end of track T.

A rod T⁵ is connected at one end to the gate T³, extending beneath it, and at the opposite end is revolvably connected to the link W',

working in the slot W³, so that movement of the link W' will actuate gate V and false gate T³.

The effect of lowering the gate V to form a continuous track, the two halves of which are in different planes, is to impart to the rods R oscillatory vertical movement during the rotation of the wheel, which causes the paddles to feather—that is, to be moved from a perpendicular to a horizontal position when the wheel reaches a point where the paddle ceases to be effective.

To stop the wheel, it is only necessary to raise the gate V, making a continuous track on one plane, when all the paddles will be feathered or moved into a horizontal position, so that the current will have no effect on them.

For starting the wheel I provide the upper track T with a sliding section Y, which is operated by a link Y', and a bell-crank Y², extending to convenient reach. This section Y may be moved inwardly from beneath the rollers of the rods R, causing said rollers to drop to the lower track T', effecting a movement of the rods and bringing a certain number of the paddles to a perpendicular position. The gate V is also lowered, and the wheel is thus set in operation.

The frame A is provided with deflecting-wings Z, which are arranged to deflect the water to the wheel and which extend downward a distance equal to the depth of the wheel. The wings at the upper right and lower left hand sides of Fig. 5 tend to throw the current in an angular course, giving force to a greater part of the wheel than could otherwise be obtained. By the use of these wings the current is deflected in an angular course from one wheel to the other, as will be understood.

From the above description it will be seen that I have devised a simple and effective water-wheel which can be readily started and stopped and which will automatically feather the paddles.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a current water-wheel, the combination with swiveled paddles and vertically-movable rods connected therewith and provided with rollers, of a circular track, a semicircular track in a different plane from said circular track, a gate hinged to said circular track and forming a part thereof and adapted to be lowered to form a complete track with the semicircular track, operating means for swinging said gate, said rollers of the rods moving upon said track, a guide-gate above the hinged gate and a spring-plate positioned above the upper end of the hinged gate and adapted to support one end of the guide-gate.

2. The combination with a slideway, of a carriage movable thereon, a stepped bearing mounted on the said carriage, a shaft mounted on the bearing, a plurality of collars arranged upon said shaft one above the other,

radially-extending arms carried by said collars, a rim connecting the outer ends of said arms, paddles swiveled upon said arms and of such size that the paddles of one series extend to those of the series beneath when in vertical position, means for automatically swinging said paddles from vertical to horizontal position and vice versa, and means for moving a number of paddles to vertical position to start the operation of the wheel, substantially as described.

3. The combination with a slideway, of a carriage movable thereon, a stepped bearing mounted on the carriage, a shaft mounted on the bearing, a plurality of collars arranged upon said shaft one above the other, radially-extending arms carried by said collars, rims connecting the outer ends of said arms, paddles swiveled upon said arms and of such size that the paddles of the same series overlap when in horizontal position, means for automatically swinging said paddles from the vertical to horizontal position, and deflecting-wings positioned on the up and down stream sides of the turbines.

4. In a current-wheel, the combination with swiveled paddles of a vertical operating-rod

connected thereto, a roller at the upper end of said rod, a circular track, an outwardly-extending flange above said track, a semicircular track below the circular track, a gate connecting the tracks, means for raising and lowering the gate V to form a continuous track on one plane or with the halves thereof on different planes, the said roller moving on said track, a false gate movably supported above the gate V, and adapted to rise and fall with it, and deflecting-wings on opposite sides of the wheel.

5. In a current water-wheel, the combination with swiveled paddles, of vertically-movable rods connected thereto, a circular track, a semicircular track below and adapted to be connected with the circular track, means for connecting the tracks, rollers journaled on the upper ends of the rods and adapted to move on said tracks, a sliding section formed in the circular track above the semicircular track, and means for drawing said section inward from beneath a plurality of the rollers.

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Witnesses:

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