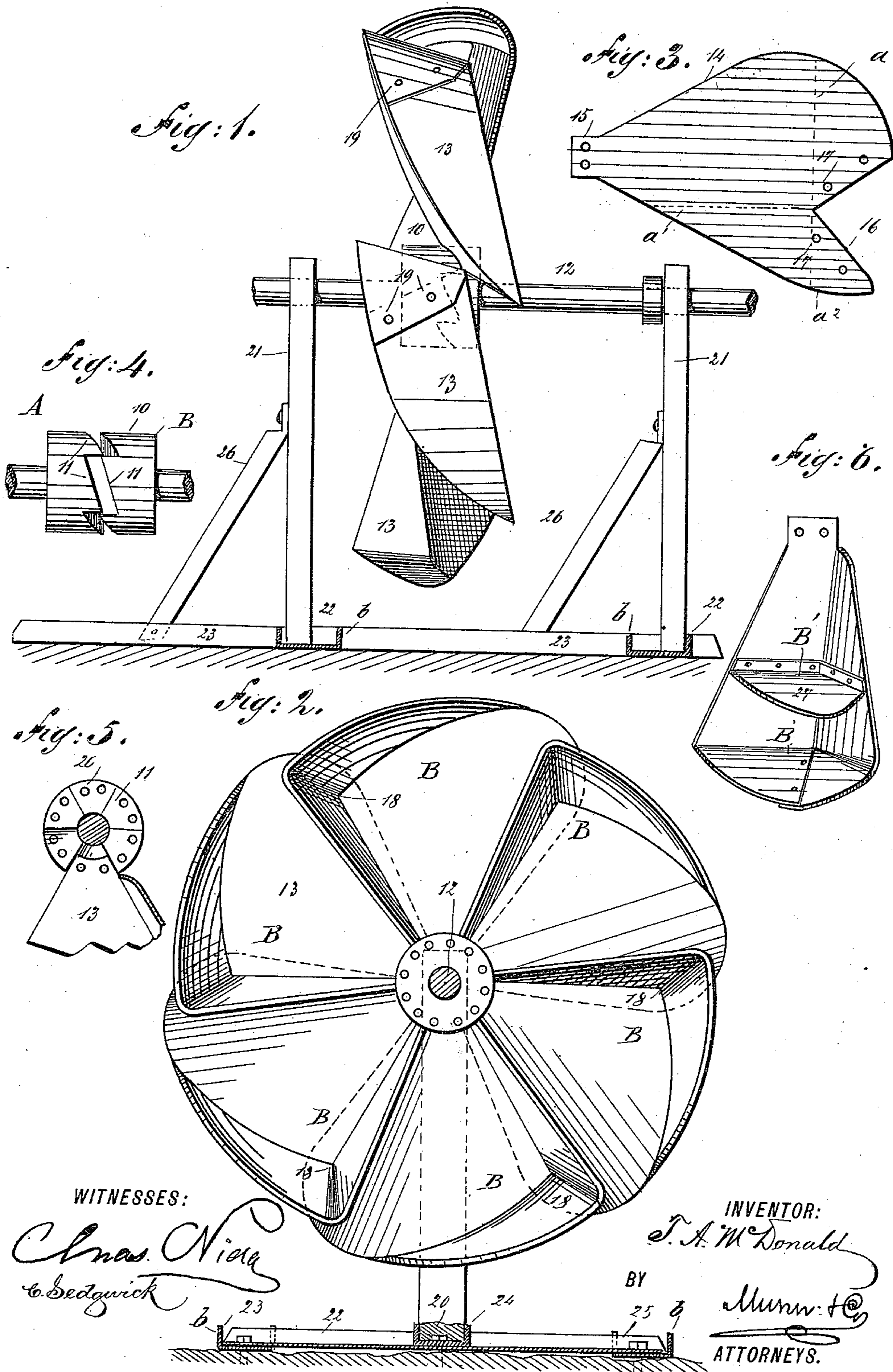


(No Model.)

T. A. McDONALD.
WATER WHEEL.

No. 442,694.

Patented Dec. 16, 1890.



UNITED STATES PATENT OFFICE.

THOMAS A. McDONALD, OF DURHAM, CANADA, ASSIGNOR TO THE LESLIE BROTHERS MANUFACTURING COMPANY, OF PATERSON, NEW JERSEY.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 442,694, dated December 16, 1890.

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To all whom it may concern:

Be it known that I, THOMAS A. McDONALD, of Durham, in the Province of Nova Scotia and Dominion of Canada, have invented a new and useful Improvement in Water-Wheels, of which the following is a full, clear, and exact description.

My invention relates to an improvement in water-wheels especially adapted to be anchored in a stream, and has for its object to provide a wheel of simple and durable construction whereby the force of the current of the stream may be effectually utilized to drive machinery of any description.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is an edge view of the wheel mounted and represented as anchored upon the bed of the stream. Fig. 2 is a side elevation of the frame upon which the wheel is mounted, being in transverse section. Fig. 3 is a plan view of the blank from which the wings or paddles are constructed. Fig. 4 is a detail section of the hub of the wheel. Fig. 5 is a face view of one of the hub-sections, illustrating the method of attaching the wings or paddles of the wheel thereto; and Fig. 6 is a perspective view of a modified form of wing or paddle detached from the hub.

In carrying out the invention the hub 10 of the wheel is made in two sections A and B, the opposed faces of which sections are provided with a series of inclined planes 11, so arranged that when the two hub-sections are placed together the one section will neatly fit in the other. The hub 10 is provided with a central bore, whereby it may be mounted upon the shaft 12. The several wings or paddles 13, attached to the hub, are each constructed from a blank 14, (illustrated in detail in Fig. 3,) which blank is essentially heart-shaped in general contour, having formed at the lower end or point a rectangular projection 15, the faces of which projections are in a plane with the faces of the blank. In the outer or en-

larged end of the blank, near one side, a triangular recess 16 is produced, and near the walls of the said recess apertures 17 are formed. The blank is bent upon itself upon the transverse line a , which extends from the inner angle of the recess 16 out to the edge, as shown in dotted lines in Fig. 3, the outer end of the blank being carried upward nearly at a right angle to the body portion, forming a sharp or angled inner corner 18. One side of the blank is also bent upward nearly at a right angle to the body upon the dotted line a' in Fig. 3, and the said upturned side is bent inward upon the dotted or score line a'' until it is brought in contact with the outer face of the upturned end section, and the two contacting parts are thereupon secured together by rivets, screws, bolts, or equivalent devices, as illustrated at 19 in Fig. 1.

The outer upturned edge of the wings or paddles is essentially cylindrical, and the said flanges of the body form a decided pocket B, as shown in Figs. 2 and 6, the corners whereof are angular, as heretofore stated. The wings or paddles are attached to the hub by causing the projection 15 of the paddle to come into contact with the inclined plane 11 of one of the hub-sections, whereupon the other hub-section is carried into contact with the said projection and the opposed section, and the two hub-sections are securely united by means of bolts passed through longitudinal apertures 20, formed in the hub-sections near the periphery, as shown in Fig. 5.

By reason of the inclined planes each of the paddles or wings is given a downward and outward inclination, as illustrated in the edge view of Fig. 1, the plain or unflanged side surface of each wing or paddle being opposed to the side flanged surface of the one below. Thus, as the wheel revolves, each paddle delivers the water from the pocket to the rear of the paddle immediately below it, and by reason of the angular corners in the pocket the paddles are rendered very susceptible to the action of the water and are rapidly revolved by the current.

As heretofore stated, the wheel is mounted upon the shaft 12. This shaft 12 is journaled in uprights 21, having their lower ends attached to transverse base-bars 22, which trans-

verse base-bars are in turn secured at their extremities to longitudinal side bars 23, and the base-frame or anchor of the wheel is usually completed by the addition of a central longitudinal bar 24. This central longitudinal bar 24 is provided with a weight or weights 25 of sufficient heft to effectually anchor the frame upon the bed of the stream, and the several uprights or standards in which the shaft 12 is journaled are ordinarily braced by bars 26 attached thereto and to the central longitudinal beam of the base. The longitudinal base-beams, likewise the transverse base-beams, the braces, and the standards or uprights 21, preferably consist of flat metal bars having the longitudinal edges upturned to form flanges *b*, as illustrated in Figs. 1 and 2, the side flanges being cut away where the several bars intersect. The transverse base-bars 22 may be provided with attachments, whereby guys or anchor-chains can be carried to the shore or side of the stream and there securely fastened by suitable means. By anchoring in this way the wheels and frame can be lifted to the surface for repairs and replaced again.

When the wheel is large, in order to obtain more power, one or more partitions 27 are attached to the upper face of each paddle at suitable distances from the pocket B, forming thereby several pockets B' on each paddle or wing, as illustrated in Fig. 6.

A wheel constructed as above described will cover at least one-fifth more surface than if the wheel were a solid disk, and each of the paddles overlaps the one below to such an extent that the contents of one will clear the contents of the other.

Two or more wheels can be placed on the same shaft with the requisite number of uprights.

It will be observed that the flanged edge and end of the paddles are beveled slightly outward, giving the pocket an inclined side and end surface. By reason of this construction the wheel must of necessity turn a little slower than the current moves, and a division is made in the water above and below the wheel, so that there is a vacancy behind the wings. There is in this way no back-drag to the wheel in the water. The water behind the wheel is carried away by gravitation, and also by the current below, while the water above the wheel is stopped (in part) in the revolution of the wheel by this peculiar form of the wings.

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

1. In a water-wheel, the combination, with a hub divided into vertical clutch-sections, of a series of wings or paddles constructed substantially as described, each paddle being provided with a contracted tongue-like extension at its inner end introduced between the clutch-sections, and bolts passed through the tongue-like extensions of the paddles and the clutch-sections of the hub, uniting the same, substantially as specified.

2. A paddle or wing for a water-wheel, having a body provided with one inclined or beveled side edge, a straight opposite side edge, and a straight outer end, and a flange projected upward from the straight side edge and from the straight end, which flanges are united to form a pocket having angular corners, substantially as shown and described.

3. A paddle or wing for a water-wheel, having a body provided with one inclined or beveled side edge, a straight opposite side edge, and a straight outer end, and a flange projected upward from the straight side edge and from the straight end, which flanges are united to form a pocket having angular corners, and a series of cross-partitions attached to the upper face of each paddle or wing, forming thereby several pockets on each paddle or wing having angular corners, substantially as shown and described.

4. In a water-wheel, the combination, with a wheel consisting of a hub made in two sections, the opposed faces of which sections are provided with inclined planes and a series of paddles or wings provided with an inclined or beveled side edge, a straight outer end, and a flange projected upward from the straight side edge and from the end, which flanges are united to form a pocket having angular corners, and a projection integral with the inner end of each wing or paddle, adapted to be attached to the inclined planes of the hub, of a shaft upon which the wheel is mounted, a weighted base-frame or anchor comprising a series of longitudinal and transverse essentially U-shaped beams, and U-shaped standards projected upward from the said beams in which to journal the shaft, substantially as shown and described.

THOMAS A. McDONALD.

Witnesses:

GEORGE W. KERR,
HENRY GRAHAM.