

W. B. CAMPBELL.
SUBMERGED WATER WHEEL.
APPLICATION FILED AUG. 2, 1909.

948,105.

Patented Feb. 1, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

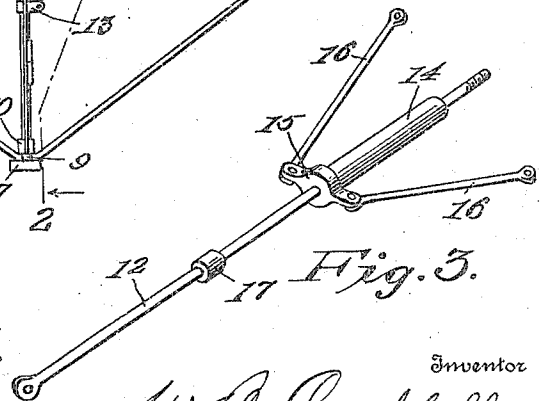
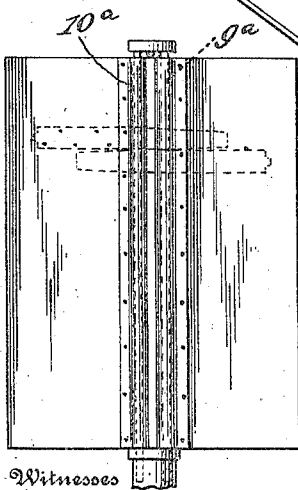
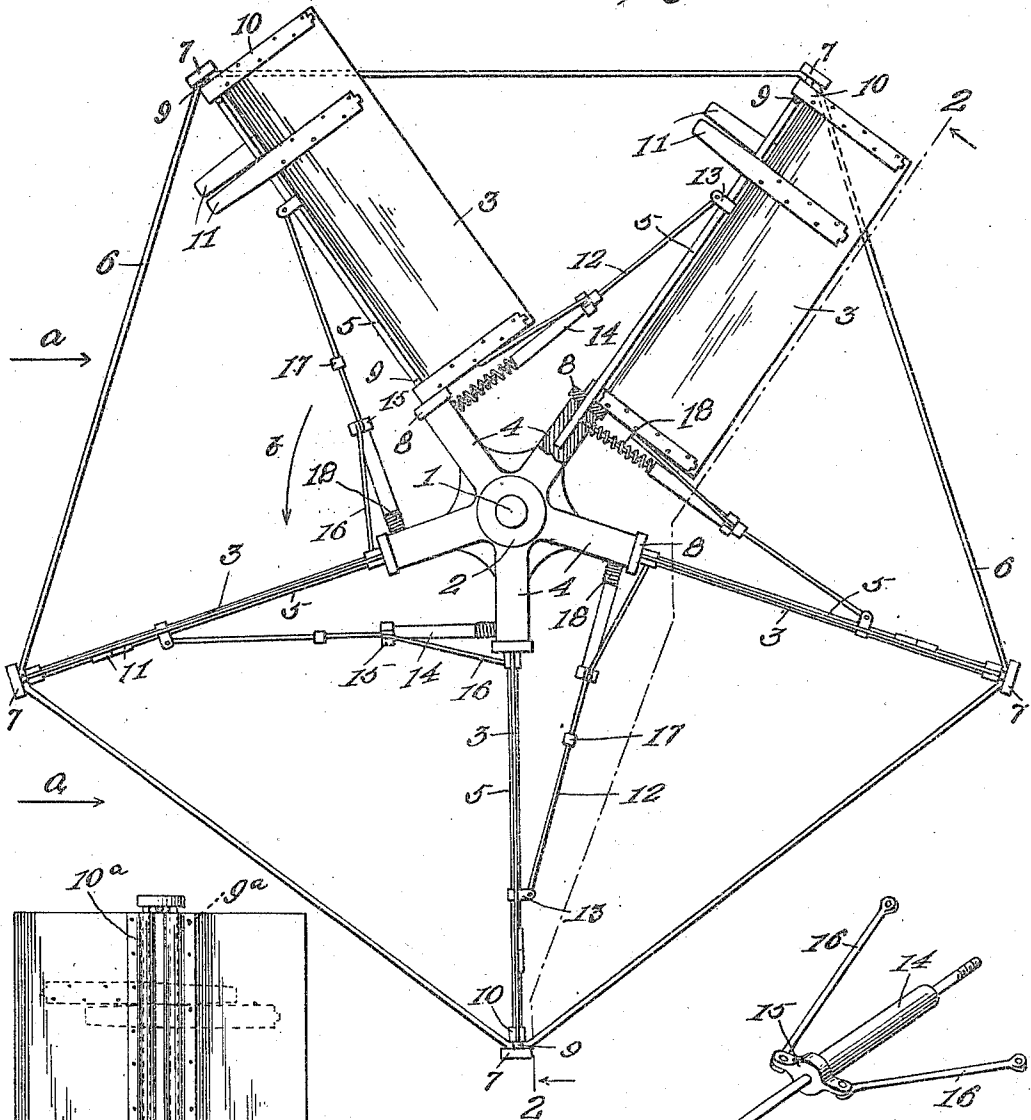


Fig. 4.

Inventor

W. B. Campbell

By

Watson E. Coleman

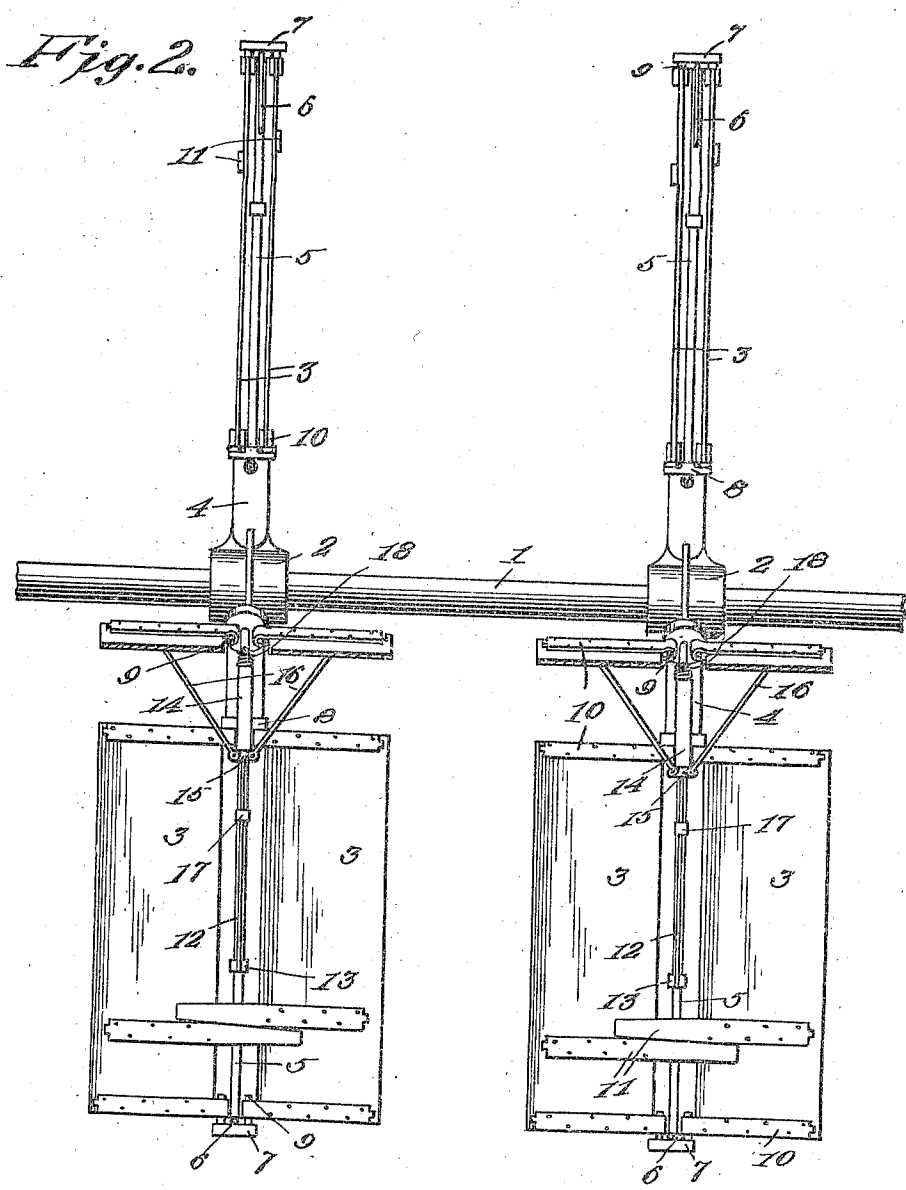
Attorney

James F. Crown
E. M. Ricketts

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Witnesses
 James F. Brown
 E. M. Ricketts

W. B. Campbell ^{Inventor}
 By Watson E. Coleman ^{Attorney}

UNITED STATES PATENT OFFICE.

WILLIAM B. CAMPBELL, OF TOPPENISH, WASHINGTON.

SUBMERGED WATER-WHEEL.

948,105.

Specification of Letters Patent.

Patented Feb. 1, 1910.

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To all whom it may concern:

Be it known that I, WILLIAM B. CAMPBELL, a citizen of the United States, residing at Toppenish, in the county of Yakima and State of Washington, have invented certain new and useful Improvements in Submerged Water-Wheels, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in water wheels and more particularly those adapted to be submerged and having feathering blades or paddles.

The object of the invention is to provide a simple and practical power wheel of this character having double paddles or blades hingedly mounted to open and receive the full force of the current during the movement of the paddles through half of the revolution of the wheel and to automatically close during their movement through the remaining portion of the revolution so as to offer little or no resistance.

Further objects of the invention are to provide improved means for mounting the paddles or blades of a wheel of this character, improved means for bracing such paddles and improved means for limiting the closing movement and cushioning the opening movement of the paddles.

With the above and other objects in view, the invention consists of the novel features of construction and the combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is an end view of the improved water wheel showing parts in section; Fig. 2 is a detail section taken on the irregular plane indicated by the dot and dash line 2—2 in Fig. 1; Fig. 3 is a detail perspective view of one of the stop and cushioning devices for the paddles; and Fig. 4 is a detail view showing another way in which the paddles or blades may be hinged.

In the drawings 1 denotes the axis of the improved water wheel which may be disposed horizontally or vertically and mounted in any suitable bearings or supports. As illustrated in the drawings, the axis or shaft 1 is disposed horizontally and the wheel is adapted to act as an under shot wheel, although it may be arranged to act as an over shot wheel. The wheel comprises a suitable hub 2 fixed to the shaft and from which radiate a plurality of arms or spokes,

each of which latter carry a pair of co-acting blades or paddles 3 hingedly mounted for swinging movement toward and from each other. The hub 2 is preferably in the form of a casting and has radiating from its central portion a plurality of arms 4, preferably five in number, which arms support the inner ends of radially projecting rods 5, the outer ends of which latter may be connected by braces 6. Fixed to the outer and inner ends of the rods 5 are plates 7, 8 which carry pivots 9 for hinge straps 10 secured to the paddles 3, whereby said paddles may swing toward and from each other. Instead of mounting or hinging the paddles in this manner, pivots 9 may extend continuously from the plate 7 to the plate 8, as indicated at 9^a, in Fig. 4, and the inner edges of the sheet metal plates from which the paddles 3 are preferably made may be bent around the pivots 9^a to provide continuous pivot or hinge eyes 10^a.

For the purpose of bracing the pairs of paddles 3 when in their open position and preventing them from swinging beyond their full open position, stop or brace arms 11 are provided on said paddles, as shown in Figs. 1 and 2. These arms are in the form of metal straps or plates each of which has one end secured transversely to the paddle and adapted to extend beyond the inner edge of the same so as to strike against the co-acting paddle when the paddles assume their full open position.

For the purpose of limiting the closing movement of the paddles and also cushioning them as they are opened by the current, I provide the device shown more clearly in Figs. 1 and 3 of the drawings. This device which is provided for each pair of paddles consists of a guiding and bracing rod 12 having one end secured to one of the arms 4 of the hub and its other end secured by clips 13 or other means to the outer portion of one of the spoke rods 5. On the rod 12 is a slidable sleeve 14 provided at one end with oppositely projecting apertured ears 15, to which latter are pivoted links 16 having their opposite ends pivoted to the paddles 3. A stop 17 is provided on the rod 12 to limit the sliding movement of the sleeve 14 in one direction thereon, thereby limiting the closing movement of the paddles 3. A coil spring 18 is arranged on the rod 12 between the other or inner end of the sleeve 14 and the adjacent arm 4 to cushion the movement

of the sleeve 14 in the other direction and hence to cushion the opening movement of the paddles 3.

Any number of the wheels may be arranged on one axis or shaft and they may be arranged so that the paddle carrying spokes or arms of the several wheels are in the same longitudinal planes passing through the axis or shaft, but I preferably arrange said wheels so that the spokes of one will be disposed opposite the spaces between the spokes of the next adjacent one, such arrangement overcoming dead centers and insuring a steady rotation of the shaft.

The operation of the invention will be readily understood on reference to Fig. 1, in which the arrows *a*, *a* represent the direction of the current in which the wheel is submerged and the arrow *b* represents the direction of movement of the wheel. It will be noted that as the upper and foremost pair of paddles 3 which are in closed position, pass below the horizontal plane of the axis or shaft 1 the current will enter between said paddles and open them against the tension of the spring 18. When they are thus opened they receive the full force of the current against their flat faces and they will remain in such open position until they pass above the horizontal plane of the axis 1, whereupon the force of the current together with the action of the spring 18 will swing them inwardly toward each other to closed position. It will be seen, therefore, that the paddles are entirely automatic in operation. By turning the wheel around in the current it will act as an over shot wheel instead of an under shot wheel. It will also be noted that it may be used with its axis or shaft in a perpendicular position.

While I have shown and described in detail the preferred embodiment of my invention, it will be understood that I do not wish to limit myself to the precise construction set forth since various changes in the form, proportion and arrangements of parts and in the details of construction may be resorted to within the spirit and scope of the invention.

Having thus described the invention what is claimed is:

1. A water wheel comprising a rotary supporting structure, pairs of radially disposed paddles hingedly mounted to swing toward and from each other, guides, members slidable on said guides, connections between said members and the adjacent paddles, and stops on said guides to limit the movement of said sliding members.

2. A water wheel comprising a rotary supporting structure, pairs of radially disposed paddles hingedly mounted to swing toward and from each other, guides, members

slidable on said guides, connections between said members and the adjacent paddles, and coil springs on said guides and adapted to be engaged by said sliding members to cushion the movement of the latter in one direction.

3. A water wheel comprising a rotary supporting structure, pairs of radially disposed paddles hingedly mounted to swing toward and from each other, guides, members slidable on said guides, connections between said members and the adjacent paddles, a stop upon each of said guides for engagement by one end of the sliding member thereon, and a coil spring on each of said guides for engagement by the other end of said member.

4. A water wheel comprising a shaft, a hub fixed thereon and having radiating arms, spoke rods radiating from said arms, inner and outer plates on said rods and provided with pairs of upper oppositely disposed pivots, pairs of paddles, straps secured to the paddles and having hinge eyes to receive said pivots, guide rods, slidable members on said rods, connections between said members and the paddles, stops on the rods for engagement by said members, and springs for cushioning said members.

5. A water wheel having radiating spokes or arms, pairs of paddles hingedly mounted on said spokes or arms, guide rods, slidable members on said rods, links connecting said members to said paddles and stops on said rods to limit the movement of said members.

6. A water wheel having radiating spokes or arms, pairs of paddles hingedly mounted on said spokes or arms, guide rods, slidable members on said rods, links connecting said members to said paddles, and coil springs upon said rods to be engaged by said members to cushion the movement of the latter in one direction.

7. A water wheel comprising a shaft, a hub fixed thereon and having radiating arms, spoke rods radiating from said arms, braces uniting said spoke rods, pivots carried by said spoke rods, pairs of paddles hingedly connected to said pivots, stop and brace arms upon said paddles to limit their opening movement, guide rods arranged between said arms on the hub and said spoke rods, sleeves slidable on said guide rods, links connecting said sleeves to said paddles and coil springs on said guide rods between said sleeves and said arms of the hub.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

WILLIAM B. CAMPBELL.

Witnesses:

NELL G. HATFIELD,
RUBY JACK.