Nov. 24, 1925. 1,562,486

W. G. ALEXANDER ET AL

WATER MOTOR

Filed July 25, 1924

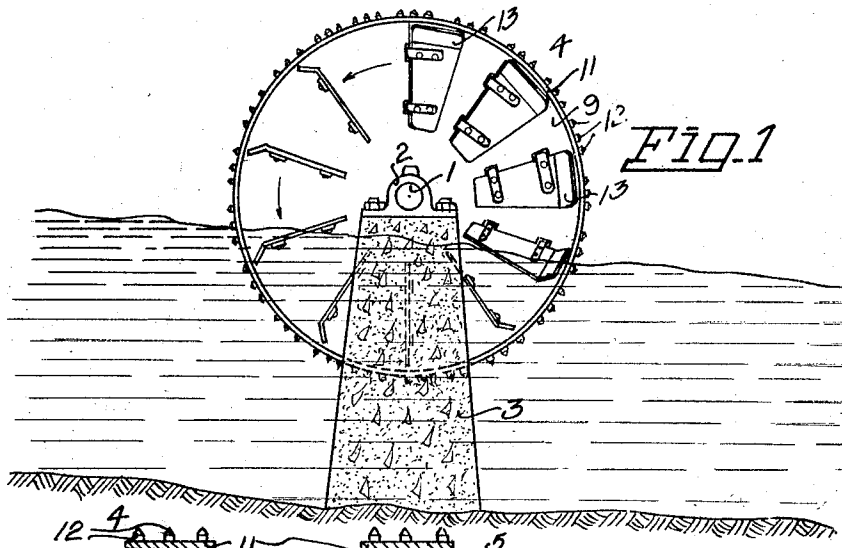


Fig. 1

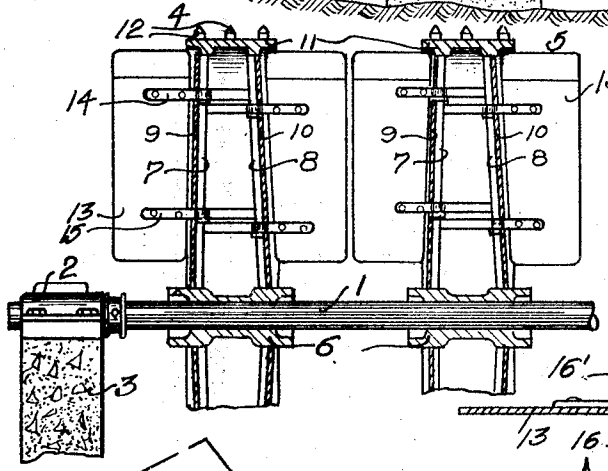


Fig. 2

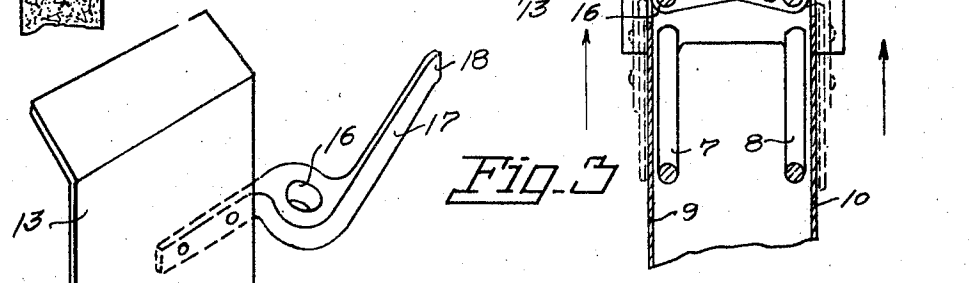


Fig. 3

Fig. 4

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UNITED STATES PATENT OFFICE.

WILLIAM G. ALEXANDER AND MILBURN E. ALEXANDER, OF BREWSTER, WASHINGTON.

WATER MOTOR.

Application filed July 25, 1924. Serial No. 728,251.

To all whom it may concern:

Be it known that we, WILLIAM G. ALEXANDER and MILBURN E. ALEXANDER, citizens of the United States, residing at Brewster, in Okanogan County, and State of Washington, have invented certain new and useful improvements in Water Motors, of which the following is a specification.

Our present invention relates to improvements in water motors of the fluid current type and involving the use of a rotary wheel having a horizontal axis of rotation and provided with feathering blades arranged upon a series of radial axes. The primary object of the invention is the provision of a water wheel of this type adapted for use in the current of a flowing stream or river, which is simple in construction, durable, and effective in operation, and especially designed to withstand encounters from or impact of débris such as logs which are continually floating down stream in many rivers.

The water motor may consist of a desired or suitable number of duplicate wheels fixed upon a single shaft arranged transversely of the flowing current and provided with means and arranged in such manner as to shield the operating parts of the wheels from drift wood and other débris, and at the same time afford an efficient power plant of this type suitable for production of power.

The invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully described and claimed.

In the accompanying drawings we have illustrated one complete example of the physical embodiment of our invention wherein the parts are combined and arranged in accordance with the best mode we have thus far devised for the practical application of the principles of our invention.

Figure 1 is a view in side elevation showing the position of the water motor with relation to the flowing current of a stream or river.

Figure 2 is an enlarged detail view illustrating in transverse section the upper portions of a pair of wheels and their shaft, with the hinged feathering blades in working position.

Figure 3 is a detail view showing the pivoted blades in operative position.

Figure 4 is a perspective detail view of one of the blades and its supporting arm.

The water wheels, of course, are of the undershot type with a portion below the central axis submerged below the surface of the flowing current, and the wheels are carried by a single shaft 1 arranged transversely to the course of the currents and provided with the required number of spaced bearings 2 in which the shaft is journaled. The required number of supporting piers 3 are utilized and spaced at proper distances to accomodate the shaft, and the power developed is transmitted from the shaft 1 to its desired destination in suitable and usual manner.

The water wheels designated as a whole by the numerals 4 and 5 are of duplicate or standardized construction and they are spaced apart on the shaft in suitable numbers depending upon the width of the current, upon the amount of power required, or on other factors. Each wheel is fashioned with a hub 6 which is fixed to its shaft 1 and also with a pair of spaced series of spokes 7 and 8 extending radially from the hub. As shown in the drawing these spokes may be round bars or rods of metal, each series being provided with a lateral side plate or round disk, as 9 and 10, and an annular rim 11, preferably of cast metal or wrought metal encircles the side plates. The side plates and spokes are affixed to the rim, the spokes being located within the space between the plates, and the lateral edges of the rim overhang or project beyond the plates as indicated in Figure 2 to afford protection to the hinged blades. By this construction a hollow wheel is fashioned, having a strong and durable rim and spoke construction to withstand strains due to wear, and a further means of protection is provided for the wheel by the use of studs 12 projecting from the exterior of the rim. These studs are sharpened and spaced over the area of the wheel rim in such manner as to strike against débris, such as drift wood floating down the stream, and carry the débris under the motor, thus preventing contact of the débris with the operating parts or blades of the water wheels, and shielding these parts against breakage.

At each side of the water wheel is arranged a series of radially disposed, approximately rectangular, flat blades 13, each

of which has an inclined inner edge conforming to the exterior face of the side plate of the wheel, and it will be noted that the side plates form walls converging toward the rim of the wheel. These converging walls thus provide an annular space within the projecting edges of the rim in which the inner corners at the outer extremities of the blades are located and protected.

Each blade is provided with a pair of outer and inner attaching arms 14 and 15 disposed transversely of the blade and affixed thereto as by rivets or bolts. Each of these arms is fashioned with a journal opening or pivot bearing 16 by means of which the blades are hinged on their respective spokes, and as seen in Figure 3 the hinges of the blades are located within the hollow wheel, a slot or opening 16′ being provided in the side plates for accommodation of the arm. Each of these attaching arms is fashioned with a lever extension 17 which forms a bearing arm for the blades, and at the ends of these bearing arms a bend 18 is provided, as seen in Figures 3 and 4. In Figure 3 it will be seen that the blade is hinged on a spoke at one side of the wheel, and that the bearing arm 17 projects transversely across the interior of the hollow wheel and at its end has a bearing against a spoke at the opposite side of the wheel, when the blade is in operative position.

In Figure 3 the blades are shown by dotted lines in folded, inoperative position, a position which they assume under action of gravity as the blades emerge from their submerged position, and the blades exterior of the wheel as well as the bearing arms within the interior of the wheel, lie substantially parallel with the side walls of the wheel. The blades swing to operative position, by gravity as the wheel rotates, and the contact of the bearing arms with the spoke at the operative side of the wheel limits this movement of the blade to operative position as well as receiving the pressure exerted on the extended blade by the flowing current of water against the blade. In this manner the usual feathering action of the blades is accomplished, and they are alternately moved to operative and inoperative position.

The bearing arms maintain the blades in a position at right angles to the diameter of the wheels, and of course the spokes of the wheels are arranged in such manner as to permit free movement as required of the blades, and also to limit the movement of the blades and hold them in extended operative position. By enclosing the pivotal or hinged supports and the bearing arms of the blades within the hollow wheels these elements are protected from débris and maintained at all times in condition for operation.

In order to secure an instant action of the water upon the blade as the blade enters the water the tips are formed at an angle, as indicated in Figures 1 and 4, and offer a comparatively flat face to the action of the water during the entrance of the blades therein. This feature also insures the blades opening in case they have not done so by gravity before entering the water.

From the above description taken in connection with the accompanying drawings it will be apparent that we have provided a substantial and durable water motor of high efficiency, which is simple in both construction and operation, and is well protected against breakage from débris or other shifting material in the flowing currents utilized for the production of power.

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

1. In a water wheel, the combination with a hub and spaced side walls and an enclosing rim, of radial spokes arranged in two spaced series within the walls, feathering blades pivoted on said spokes at each side of said wheel, and means carried by said blades for co-action with spokes at the opposite side of the wheel for retaining said blades in operative position.

2. In a water wheel, the combination with a hub, spaced side walls and an enclosing rim and radial spokes arranged in two spaced series within the walls, of feathering blades each having a plurality of arms pivoted on a spoke, and a bearing arm on each blade projecting transversely of the wheel adapted to co-act with a spoke at the opposite side of the wheel for retaining said blade in operative position.

3. In a water wheel, the combination with a hub, spaced side walls and an enclosing rim and radial spokes arranged in two spaced series within the wheel, of feathering blades each comprising a plurality of pivoted arms on a spoke, and an integral extension on each arm having a bent end adapted to co-act with a spoke at the opposite side of the wheel for retaining the blade in operative position.

In testimony whereof we affix our signatures.

W. G. ALEXANDER.
MILBURN E. ALEXANDER.