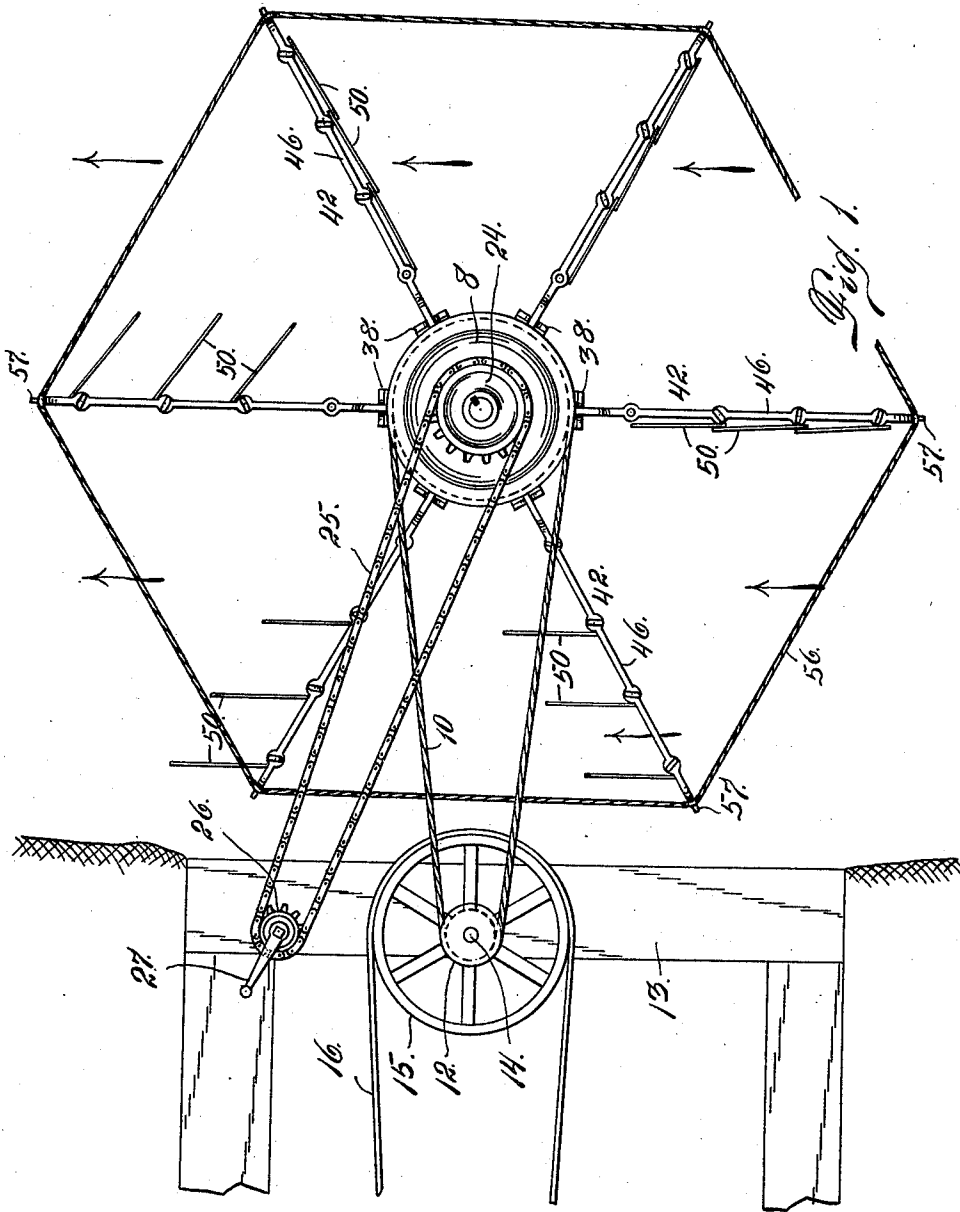


M. E. BOOTS.
WAVE AND CURRENT MOTOR.
APPLICATION FILED JULY 17, 1911.

1,029,788.

Patented June 18, 1912.

3 SHEETS-SHEET 1.



Witnesses
Otto E. Hoddick.
C. H. Rossmore.

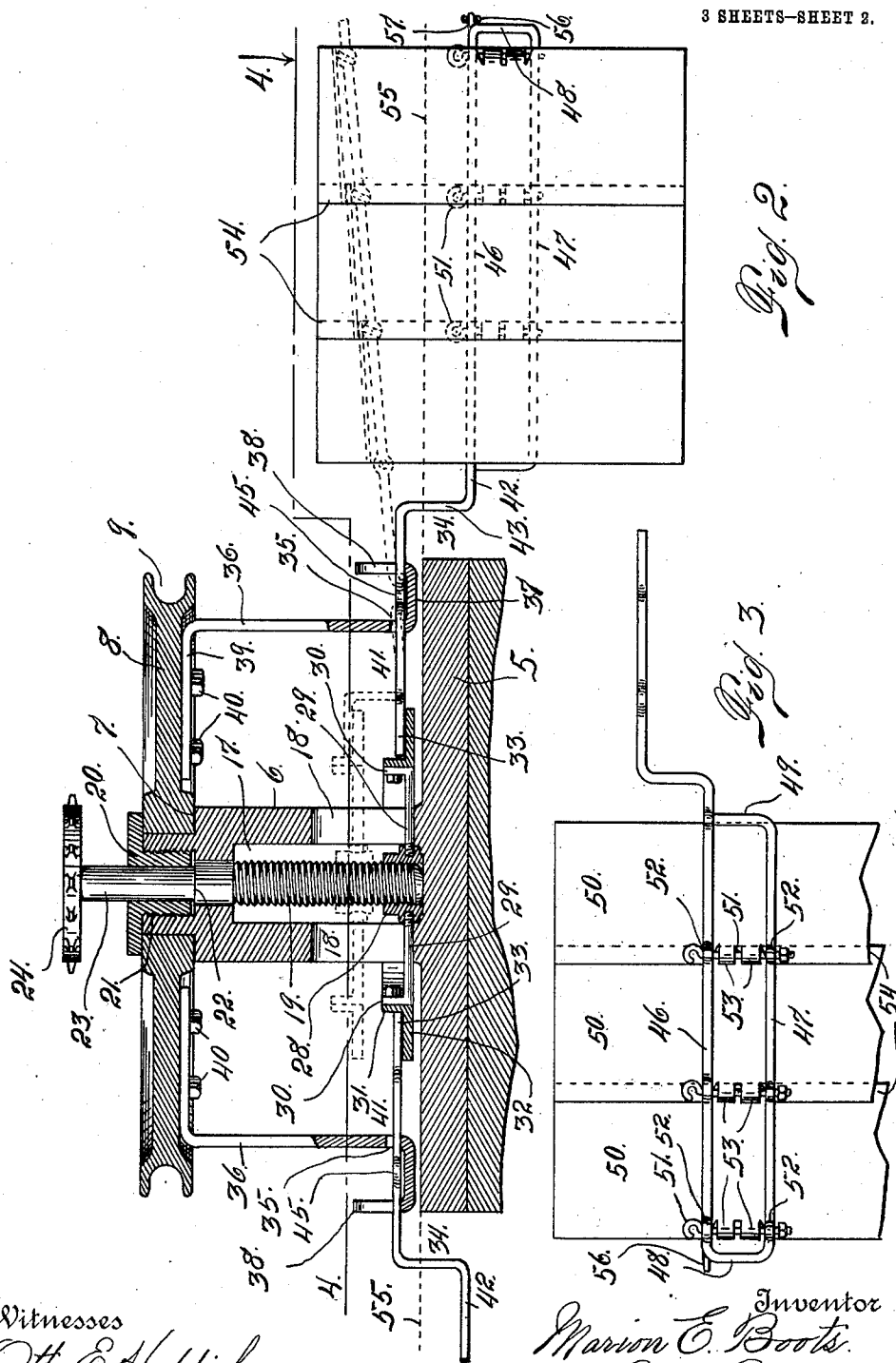
Inventor
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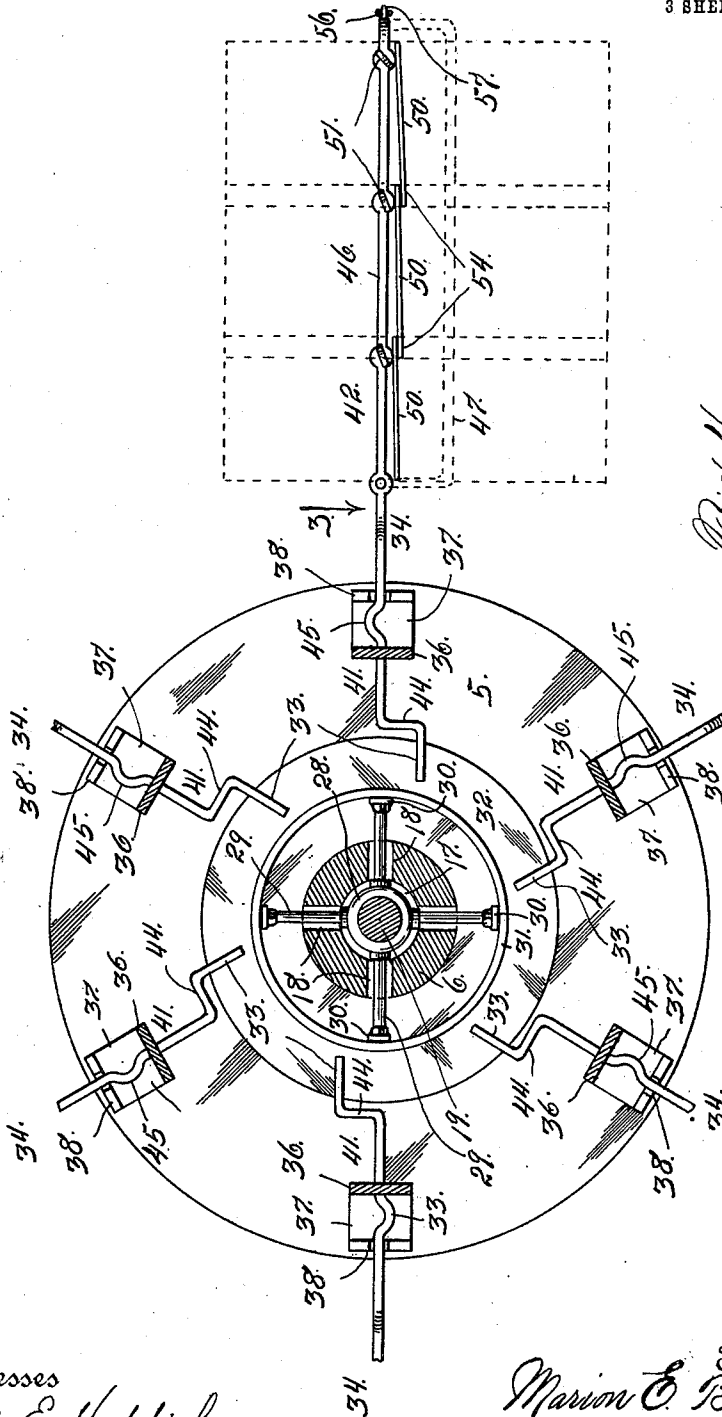
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UNITED STATES PATENT OFFICE.

MARION E. BOOTS, OF LEADVILLE, COLORADO.

WAVE AND CURRENT MOTOR.

1,029,788.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed July 17, 1911. Serial No. 638,903.

To all whom it may concern:

Be it known that I, MARION E. BOOTS, a citizen of the United States, residing at Leadville, county of Lake, and State of Colorado, have invented certain new and useful Improvements in Wave and Current Motors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in wave and current motors, or motors adapted to be operated by the force of the current of a river or other stream, or by the waves of large bodies of water, as lakes or oceans. My present invention is perhaps more especially designed for use as a current motor, though it may be employed also as a wave motor, as will be readily understood from the description hereinafter given.

The construction, generally speaking, consists of a number of sweeps connected with a rotating element, as a pulley, the sweeps being equipped with blades adapted to close when engaged by the force of the water moving in one direction, while they open when the water engages them flowing in the opposite direction. In this way, the sweeps are actuated to turn the pulley on one side of the latter, while, when the sweeps are moving in the opposite direction, or on the opposite side of the pulley, the blades open to allow the water to pass through, thus offering very little resistance to the flow of water. The pulley, which is actuated by the sweeps, may be connected with a belt, chain, or other suitable device for taking off power to operate machinery or do work of any character.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a top plan view of my improved motor, illustrating the manner of taking power therefrom, and also showing means for actuating the sweeps to lift their blades out of the water when it is desired to stop the machine. Fig. 2 is a central vertical section, taken through the mechanism, one of the sweeps being shown

in elevation, its blades being closed, the parts being shown on a larger scale. Fig. 3 is a detail view of one of the sweeps, showing the blades in the closed position and partially broken away. This is a view looking in the direction of arrow 3, Fig. 4. Fig. 4 is a horizontal section, taken on the line 4-4 of Fig. 2.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a stationary base, which is constructed within the stream or body of water where the motor is to be used. Extending upwardly from the central portion of this base is a column 6, whose upper extremity is shouldered, as shown at 7, and upon which rests a pulley wheel 8, whose periphery is grooved, as shown at 9, to receive a belt or cable 10, whereby motion is transmitted to a smaller pulley 12, fast on a shaft 14, journaled in a suitable framework 13. A larger pulley 15 is also fast on the same shaft, a belt 16 leading from this pulley to the shore and suitably connected with the machine to be operated from the motor. The column 6 is hollow, as shown at 17, and is further provided at suitable intervals with openings 18 communicating with the central cavity 17. In the post 6 is journaled a screw 19, whose upper extremity passes through a nut 20 engaging a threaded opening 21 formed in the top of the column in its reduced portion above the shoulder 7. This nut occupies a position above a shoulder 22 formed on the plain portion of the screw, whereby the latter is prevented from longitudinal movement in an upward direction. The upper extremity of the reduced portion 23 of the screw is equipped with a sprocket wheel 24, with which is connected a chain 25 leading to a sprocket wheel 26, mounted on the frame 13, and with which is connected a hand crank 27 for the purpose of operating the screw. Upon the lower part of the threaded portion of the screw is mounted a nut 28, with which are connected arms 29, whose outer extremities are bent upwardly, as shown at 30, and bolted to a ring 31 provided at its lower edge with a horizontally-disposed flange 32, upon which rest the inner extremities 33 of sweeps 34. These sweeps pass through openings 35 formed in the lower extremities of vertically-disposed brackets 36, these brackets also being equipped with horizontally-disposed lower

portions 37 extending outwardly beyond the openings 35, their outer extremities being bent upwardly and slotted, as shown at 38, the parts 38, being parallel with the lower portions of the main vertically-disposed parts of the brackets. The upper extremities of the brackets are bent inwardly to form horizontal members 39, which are secured to the under surface of the pulley wheel 8 by bolts 40.

The inner portions 41 of the sweeps occupy a higher plane when the motor is in use than the outer parts 42, the two parts 41 and 42 being offset from each other by a vertically-disposed part 43. The parts 41 engage the slots 38 of the bracket, their inner portions being passed through the openings 35. The inner extremity of each sweep has a crank 44 formed thereon, the crank normally, or when the motor is in use, occupying a horizontal position. Between the slotted parts 38 of the brackets and the vertically-disposed parts 36, and resting on the horizontal bracket part 37, are cams or bends 45 formed in the sweeps and also normally occupying a horizontal position, lying in the same plane as the cranks 44 of the sweeps, the cranks 44 and the bends 45 being formed in planes at right angles to the offsets or bends 43 of the sweeps, the latter being journaled in the brackets, whereby they may be given a partial turn for the purpose of raising the blades out of the water when it is desired to stop the motor, as hereinafter explained. The outer portions 42 of the sweeps are composed of two separated parallel parts 46 and 47, which, as illustrated in the drawing, are formed by bending the rods or bars constituting the sweeps, as shown at 48 and 49, the length of these bends determining the space between the two members 46 and 47. This construction gives the necessary strength to the portions of the sweeps upon which the blades 50 are mounted. These blades are hinged to the sweeps by passing hinge pins 51 through eyes 52 formed in the sweep arms and registering with hinge members 53 formed in the blades 50. These blades overlap each other a short distance, as shown at 54, so that, when they are in the closed or operating position, no water can pass between them. The blades, being mounted on one side of the sweeps, are held closed by the action of the water, when moving in one direction, while, when moving in the reverse direction, the water acts to open them, whereby it is allowed to pass freely between the blades, their edges only being exposed and offering resistance to the flow of the water. This makes it practicable to employ the structure as a wave motor, since the entire surfaces of all the blades, except their overlapping edges, are engaged by the water on one side of the machine, while

there is no resistance, as aforesaid, to the movement of the blades on the opposite side of the machine. The area of the blades may be regulated, as may be desired, and made to harmonize with the strength of the other structure and the desired capacity of the motor.

From the foregoing description, the use and operation of my improved motor will be readily understood. It is assumed that the structure 13 is mounted on the shore adjacent the river or body of water where the motor is to be located. When the machine is in use, the sweeps and the blades mounted thereon are in the positions illustrated in Fig. 1. It is assumed, referring to this figure, that the current is moving in the direction indicated by the arrows, or that the movement of the waves, in order to be operative upon the blades of the sweeps, is in the same direction. I will assume, however, for the purpose of describing the operation of the motor, that it is located in a stream whose water is flowing continuously in one direction, the sweeps, therefore, being actuated by the current. By referring to Fig. 1, it will be understood that, as soon as the water has an opportunity to act upon the blades 50, from the side of the sweeps where the blades are located, the force of the water will close the blades or cause them to occupy a position approximately parallel with the direction of the sweeps. The water, acting on these blades, will rotate the pulley wheel, 8, through the instrumentality of the brackets 36, whereby power may be taken through the medium of the belt 10, the pulleys 12 and 15, and the belt or cable 16, to the machine on shore to be operated. Now, when it is desired to stop the motor, it is only necessary to turn the crank handle 27 mounted on the structure 13 in a direction to cause the nut 28 to travel upwardly upon the threaded portion of the screw 19. This will lift the ring 31, and, by virtue of the cranks 44, which engage the horizontal flange of the ring, the sweeps will be given a partial rotation, whereby the blades will be thrown to a horizontal position and lifted out of the water, whose level is indicated by the dotted line 55. At the same time, the action of the cams 45 on the horizontal lower portions 37 of the brackets will throw the sweeps to an inclined position, whereby their outer extremities are uppermost, the sweeps being gradually inclined downwardly therefrom, thus insuring the downward movement of the blades by gravity to the closed position, after they have been raised above the level 55 of the stream or other body of water.

Attention is called to the fact that the arms 29 pass through the openings 18 formed in the column 6 and have only a ver-

tical movement during the operation of the screw for the purpose of throwing the sweeps out of commission or returning them to the operative position, as may be desired. 5 After the sweeps have been thrown to the position indicated by dotted lines in Fig. 2, or above the water, they may be returned to their normal operative position within the water by reversing the movement of the screw 19, whereby the nut 28 is caused to move downwardly upon the screw. The positions of the ring 31, the arms 29 and the cranks 44 of the sweeps, when the nut 28 is in the raised position, are also indicated by 10 dotted lines in Fig. 2.

In order to strengthen the machine and give the sweeps the desired rigidity, their outer extremities are connected by a cable 56, and, in order to allow the sweeps the 20 necessary movement, the upper portion of the outer extremity of each is equipped with a projection 57, adapted to pass through between the strands of the cable, whereby the outer extremities of the sweeps are virtually journaled in the surrounding cable. 25

Having thus described my invention, what I claim is:

1. In a wave or current motor, the combination with a stationary structure mounted 30 in the water, including a column projecting upwardly above the level of the water, of a power wheel journaled on the column, brackets connected with the power wheel, sweeps carried by the brackets and extending outwardly beyond the stationary structure, the said sweeps being equipped with blades 35 adapted to close, whereby their area is exposed to the action of the moving water, when traveling in one direction, while the water causes them to open whereby their edges only are exposed thereto, when traveling in the opposite direction, and suitable means connected with the sweeps for raising them above the water, when it is desired 40 to stop the motor, substantially as described.

2. The combination with a stationary structure located in the body of water where the motor is to be placed, a power wheel journaled in the structure, brackets carried 50 by the power wheel, sweeps connected with the brackets, their inner portions being offset in a vertical direction from their outer portions, whereby the outer portions may occupy a position below the surface of the water, while their inner portions are located 55 above the water, blades hinged to the outer portions of the sweeps and arranged to overlap each other, the action of the water upon the blades serving to close them, whereby the action of the water serves to move the sweeps in one direction, while the blades are caused to open when the sweeps are traveling in the opposite direction, the inner ex-

trimities of the sweeps being equipped with cranks, and means acting upon the cranks 65 for imparting a partial rotation to the sweeps, whereby their outer blade-carrying portions are lifted above the surface of the water, substantially as described.

3. A motor of the class described, comprising in combination with a stationary 70 structure and a power wheel mounted thereon, depending means attached to the power wheel, sweeps whose inner extremities are connected with the said means and whose 75 outer portions are equipped with blades hinged thereto and adapted to close and open by the action of the water thereon in opposite directions, substantially as described. 80

4. The combination with a suitable stationary structure having a central column extending above the surface of the water, of a power wheel mounted on the upper portion of the column, depending brackets at- 85 tached to the power wheel, sweeps movably connected with the brackets and equipped with hinged blades, a screw journaled in the column and having a nut at its lower extremity, a ring connected with the nut and 90 engaging the inner extremities of the sweeps, which are provided with cranks whereby, as the screw is raised, the sweeps are actuated to lift their blades above the water for the purpose of stopping the motor, substantially 95 as described.

5. A motor of the class described, comprising in combination with a stationary structure and a power wheel mounted thereon, sweeps whose inner extremities are connected with the power wheel and whose 100 outer portions are equipped with blades hinged thereto and adapted to close and open by the action of the water thereon in opposite directions, a cable being connected 105 with the outer extremities of the sweeps, the latter being connected to turn in the cable, substantially as described.

6. A motor of the class described, comprising in combination with a stationary 110 structure a power wheel mounted thereon, sweeps whose inner extremities are connected with the power wheel and whose outer portions are equipped with blades hinged thereto and adapted to open and close by 115 the action of the water thereon in opposite directions, and a flexible device connecting the sweeps with one another, the outer extremities of the sweeps being journaled in the said device, substantially as described. 120

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

MARION E. BOOTS.

Witnesses:

THOMAS H. DUNNE,
P. R. ASHLEY.