N. A. STAMM.

WATER MOTOR.

APPLICATION FILED MAY 10, 1909.

973,823.

Patented Oct. 25, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

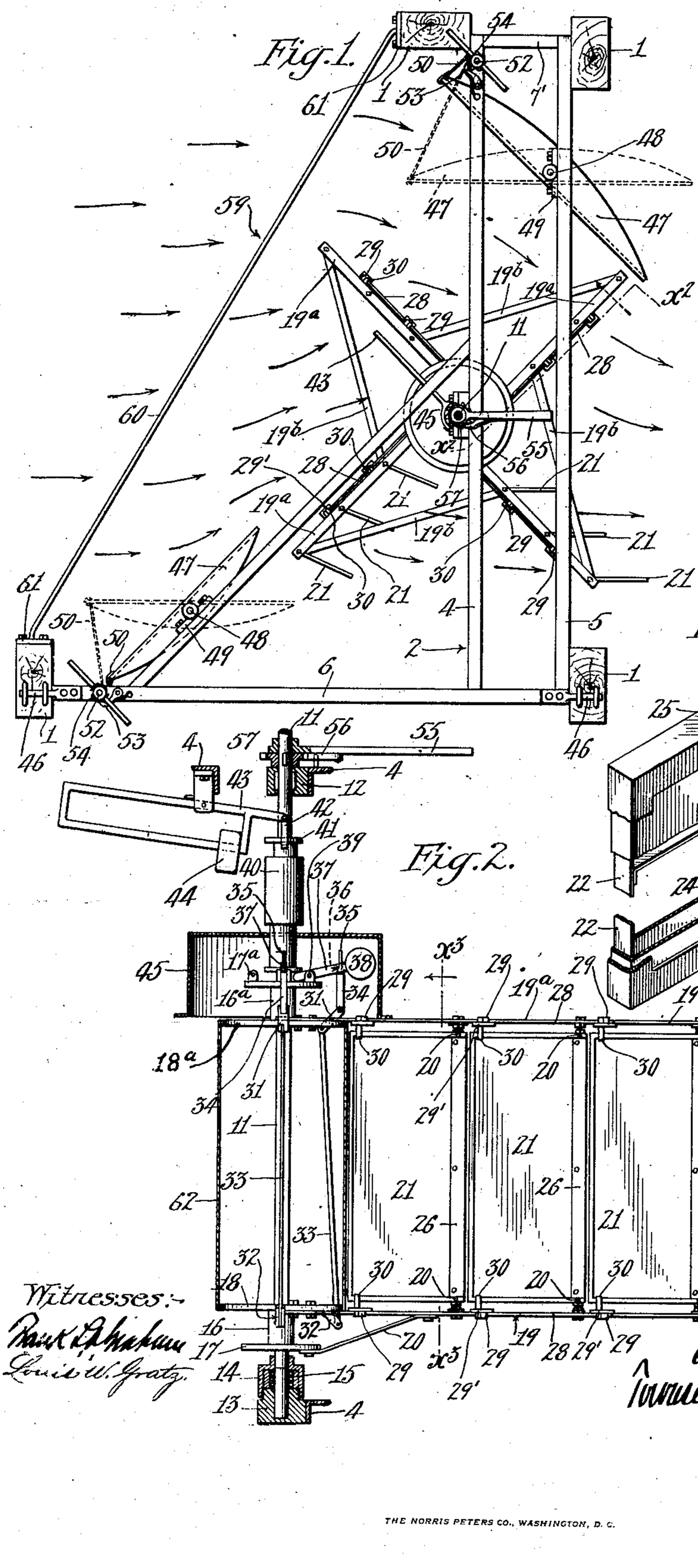

Fig. 3.

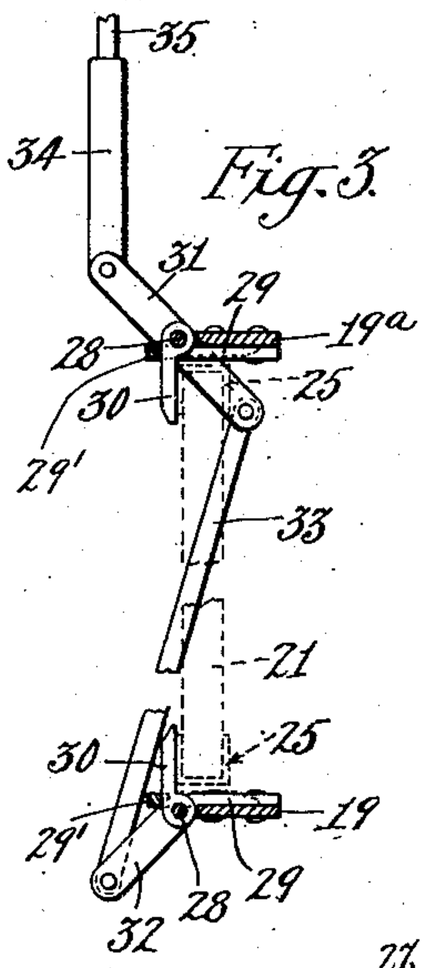

Fig. 4.

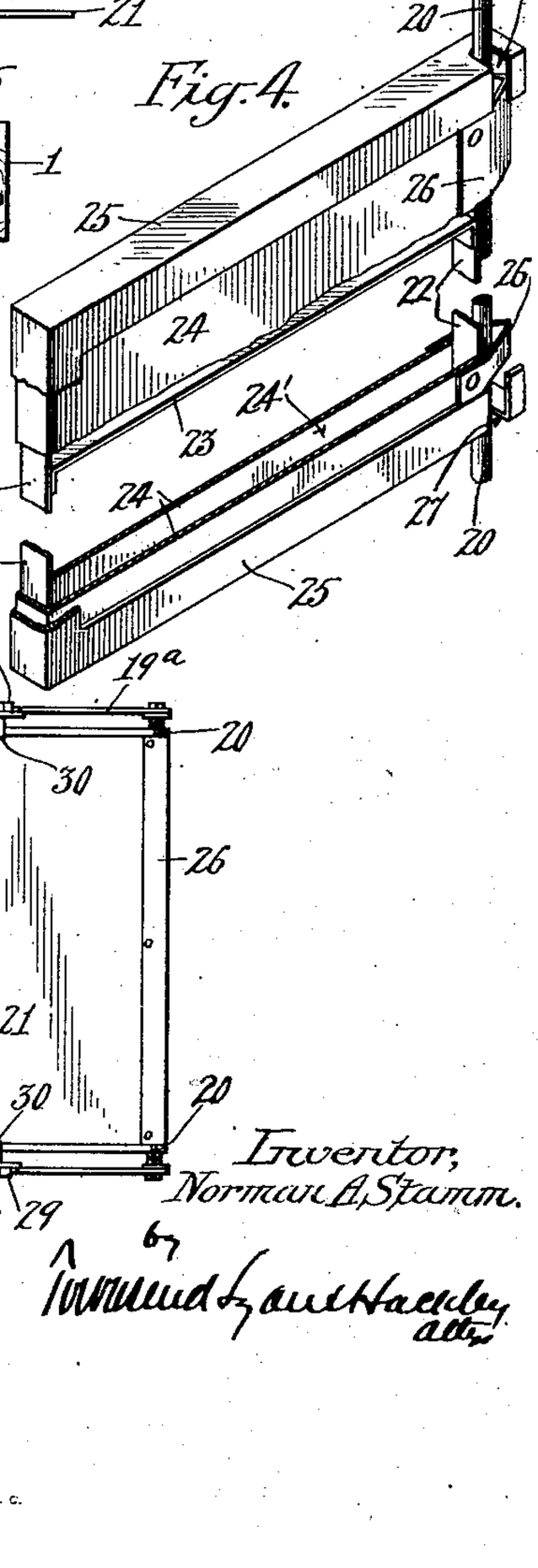

Fig. 2.

Witnesses:-

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2 SHEETS—SHEET 2.

Fig. 5.

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UNITED STATES PATENT OFFICE.

NORMAN A. STAMM, OF GLENDORA, CALIFORNIA.

WATER-MOTOR.

973,823. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed May 10, 1909. Serial No. 495,188.

To all whom it may concern:

Be it known that I, NORMAN A. STAMM, a citizen of the United States, residing at Glendora, in the county of Los Angeles and State of California, have invented a new and useful Water-Motor, of which the following is a specification.

This invention relates to a water motor and one of the objects of the invention is to provide a water motor which may be set in a stream and operated by the current, and to provide means for moving the motor out of the current if desired.

The invention embodies a plurality of units which revolve around a vertical axis, each unit consisting of a series of gates, and another object is to hold the gates in position for receiving the force of the stream while moving through the working part of their cycle, and to let the gates swing free and independent of each other so that they will feather the water when moving through the idle part of their cycle.

A further object of the invention is to provide means for causing the gates to receive the force of the current to operate the motor, or to swing free in line with the current to stop the motor.

Another object of the invention is to provide means whereby the current may be deflected so as to concentrate the force of the current at the working portion of the motor and to provide a plurality of such deflecting means for the more perfect regulation of the flow of the stream through the motor and to provide for adjusting each of said deflecting means independently of the other.

The gates of each unit in passing through the working part of their cycle receive the force of the stream being held by certain lugs and in passing through the idle part of their cycle the gates swing freely away from said lugs and lie parallel with the course of the stream. These lugs may be moved out of position, so that the gates may swing free throughout the entire cycle. These two positions of the lugs being secured by controlling devices, which controlling devices are in turn capable of being manually regulated, and a further object is to provide for the manual regulation of such controlling devices without producing any friction between the manual regulation means and the controlling devices after the regulation has been effected, so that when the lugs are moved into position to hold the gates against the water action the controlling devices which hold them in such position are not frictionally engaged by the manually operated device which was employed to shift the controlling devices into a position where the latter would of themselves hold the lugs in operative position.

A further object is to provide a novel form of gate of great strength and buoyancy.

Other objects and advantages will be brought out in the following description.

Referring to the drawings: Figure 1 is a plan view of the complete invention showing it in position in a stream. Fig. 2 is an enlarged vertical section of the motor on line x^2—x^2 Fig. 1. Fig. 3 is an enlarged vertical section through a gate showing the device for operating the lugs which control the gate, the section being taken on line x^3—x^3 Fig. 2. Fig. 4 is a perspective view of a gate in detail, part of the gate being broken away to show the detail construction. Fig. 5 is a perspective view of the complete motor.

1 designates posts forming supports or abutments for supporting the motor. The frame of the motor comprises upper and lower frame sections 2 and 3 of similar construction, each frame section comprising horizontal parallel bars 4 and 5 which are secured at one end to horizontal bars 6, the horizontal bars 6 being connected at each end by vertical bars 7. The parallel bars 4 and 5 are connected at their opposite ends by short bars 7′ and by vertical bars 8. A pair of diagonal braces 9 and 10 extend between the bars 6 and 4.

11 designates the main shaft, the upper end of which is mounted in a journal 12 on the bar 4 and the lower end being mounted in a step bearing 13 on the lower bar 4. The upper end of the bearing block 13 is shouldered and a flanged sleeve 14 is slipped over the shaft and upper end of the journal 13 and serves to house a ball race 15 in the interior of the bearing and prevent the entrance of water.

Secured to the shaft 11 near its lower end is a sleeve 16 having a lower disk 17 and an upper disk 18, and bolted to the upper disk 18 is a plurality of horizontal bars 19, each bar 19 forming the lower bar of a unit to be described, and being firmly supported by a brace 20 which extends to the disk 17.

Near the upper end of the shaft 11 is a similar sleeve 16ª having an upper disk 17ª and a lower disk 18ª, and secured to the disk 18ª is a plurality of horizontal bars 19ª, each bar 19ª lying directly above and parallel with a lower bar 19. A series of vertical rods 20 extending between each pair of bars 19 and 19ª, each rod 20 forming a pintle for a gate 21. Braces 19ᵇ extend from the outer ends of the bars 19ª to intermediate points on the adjacent bars 19ª. Each gate comprises a pair of vertical flat bars 22 which are united by horizontal bars 23 which form braces. Covering the rectangular frame work formed by the bars 22 and 23, is a sheet metal casing 24, which forms an air-tight, buoyant compartment or gate 24′. A three sided gate frame 25 formed of channel bars is so constructed that it is adapted to slidably receive the compartment 24′ so that when placed in position between the horizontal bars 19, 19ª, the inner vertical bar 22 of each gate lies against the adjacent pintle rod 20 and a channel bar 26, V-shaped in cross section, incloses the pintle rod 20 and is secured to the adjacent edges of the cover 24, thereby pivoting the gate on the pintle 20. Each channel bar 25 is slotted at 27 to receive the pintle 20 and permits the removal of the gate from the pintle after the channel bar 26 has been removed. It is thus possible to remove the gate without disconnecting the pintle 20, the gate being removable sidewise from the pintle after being disconnected as described. The gates while constructed of metal are indestructible and of great strength, and being hollow, are buoyant so that their weight is not thrown on the step bearing and friction at that point is avoided largely. This relieves the horizontal bars 19 and 19ª of strain.

Extending along the edge of each bar 19 and 19ª is a lug shaft 28, each lug shaft 28 being journaled at intervals in blocks 29 which are secured to the bars 19 and 19ª. Each lug shaft 28 is rotable in its supporting block 29, and rigidly secured to each lug shaft is a series of lugs 30 which lugs are adapted to stand behind the gates 21 and parallel therewith when the lug shafts are in one position as shown in full lines in Fig. 3, or the lugs may be folded forward flat against the bars 19 and 19ª as indicated in dotted lines in Fig. 3 by rotating the respective lug shafts 28 through a quarter of a revolution, and when the lugs 30 are so folded forward the gates 21 escape the lugs 30 and are free to swing on their respective pintles 20, stops 29′ abutting the lugs.

The lug shafts 28 are operated by mechanism in such a manner that while the gates 21 are moving through the working portion of their cycle the lugs 30 stand behind such gates and cause the gates to receive the pressure of the stream and thus impart rotation to their supporting units through the medium of lugs 30, while when the gates are moving through the idle part of their cycle, the lug shafts 28 are turned so that the lugs 30 will be folded back and free from the gates so that the gates are free to swing naturally and independently of each other into a position parallel with the course of the stream and thus not exert any opposing pressure which would in the least negative the effective work which is being performed by the other gates which are moving through the working part of their cycle.

The mechanism for controlling the lug shafts 28 whereby this result is secured comprises a plurality of levers 31 fixed to the respective upper lug shafts 28 adjacent the disk 18ª. A series of arms 32 are secured to the inner ends of the lower lug shafts 28 and the arms 32 are connected by rods 33 with the arms 31. Each arm 31 is connected to a vertical arm 34, the latter having a pin 35 which projects through a slot 36 formed in an arm 37 of an individual weight 38, each arm 37 being pivoted at 39 to the disk 17ª. The weights 38 normally tend to depress the arms 34. Resting upon the inner ends of the arms 37 is the lower end of an intermediate weight 40, which near its upper end is provided with a flange 41 which flange is adapted to be engaged by a pair of hook shaped arms 42 depending from a pivoted frame 43 on which a controlling weight 44 is slidably mounted. When the controlling weight 44 is shifted into the position shown in Fig. 2, the inner end of the frame 43 is tilted downwardly so that the arms 42 are out of engagement with the flange 41, that is, the arms 42 are adapted to move slightly lower than the flange 41, so that when in such position the arm 42 does not touch the flange 41 and the intermediate weight 40 is allowed to rotate freely. When the weight 40 is lowered the ends of levers 37 are tilted and elevate the individual weights 38 and through the vertical arms 34, arms 31, rods 33, arms 32 and lug shafts 28 hold the respective lugs 30 overlapping the respective gates 21 as indicated in Fig. 2, so that while moving through the idle part of their cycle the gates 21 are free to swing away from the lugs 30 and feather the stream. As the gates 21 approach the working part of their cycle, the gates swing back against the lugs 30 and the latter hold the gates so that they receive the pressure from the water. In this manner the lugs 30 are held in position by means of the weight 40 and intermediate connections. When it is desired to stop the motor from operating, the weight 44 is shifted to the left thereby tilting the frame 43 in the opposite direction, whereupon the arms 42 lift the weight 40 and the latter relieves the arms 37, thereby permitting the individual weights 38 to drop and push down

the arms 34 and thereby rock the upper lug shafts 28, and the rods 33 acting upon arms 32, rock the lower lug shafts 28 so that the lugs 30 are folded forward thereby permitting all the gates of all of the units to swing freely and permit the stream to flow directly through the motor without exerting any pressure against the face of the gates. The motor then stops. The outer edge of each gate is provided with the V-shaped bar 26 to form a cut-water to relieve opposing pressure against the edge as much as possible. A drum 45 surrounds the lower part of the weight 40 and covers the individual weights 38 and adjacent parts as clearly shown in Fig. 2. The frame 2 of the motor is preferably hinged at 46 to permit the motor to be swung up out of the stream when so desired.

A deflector 47 is arranged near each side of the motor, each deflector being journaled to a vertical shaft 48 mounted in brackets 49, the outer edge of each deflector 47 is secured by cables 50 which are wound on sheaves 51 mounted on a shaft 52. Thus by turning shaft 52 the associated deflector may be moved into the position shown in full lines in Fig. 1 at an angle with the direction of the current so that the water will be deflected and delivered at a tangent to the motor and thus strike the gates in working position at nearly right angles, thus concentrating the stream and applying it to the motor at the most favorable angle for giving the greatest amount of power. By unwinding the cables 50 the deflectors may be allowed to swing into position shown in dotted lines, which position they will naturally assume, and when in this position the water will flow straight by the deflectors without being diverted against the motor. In order to hold the shafts 52 in any position in which they may be set a pawl 53 and ratchet 54 may be employed.

To facilitate starting the motor, a hand lever 55 may be journaled on the main shaft 11 and by means of a pawl 56 and ratchet 57, may be used to impart rotation to the shaft 11 and thereby start the motor, the ratchet 57 being adapted to run ahead of the pawl 56 as the motor gathers headway.

To clear the stream of driftwood or debris which might damage the motor, a grid 59 is provided having horizontal rods 60 fastened to end pieces 61 which are bolted to the posts 1 on the upstream side of the motor.

A drum 62 is secured to the disks 17 and houses the rods 33.

What I claim is:

1. In a water motor, a main shaft, a series of units connected with the main shaft, each unit comprising a series of pivoted gates capable of complete rotation with respect to their pivots, a lug shaft radial of the main shaft extending along each unit, a series of lugs on each lug shaft adapted to hold the adjacent gates from swinging in one direction, and weight controlled means for operating said lug shafts.

2. In a water motor, a main shaft, a plurality of units connected to the main shaft, each unit comprising a series of pivoted gates, a lug shaft extending along each edge of each unit, a plurality of lugs on each lug shaft adapted to hold the gates from swinging in one direction and permitting the gates to swing in the other direction, an arm on each lug shaft, a rod connecting said arms, an individual weight for each unit having a connection with one of said arms, an intermediate weight for controlling said individual weight, and means for controlling the intermediate weight.

3. In a water motor, a vertical shaft, a plurality of units connected to the shaft, each unit comprising a series of gates, a frame supporting each series of gates, each frame comprising a pair of horizontal bars, vertical rods connecting said bars and forming pintles for said gates, a lug shaft extending along each bar and journaled thereto, lugs on each lug shaft adapted to stand back of the respective gates or to be folded forward to permit the gates to swing in either direction, and weight controlled means for turning said lug shafts.

4. In a water motor, a vertical shaft, a pair of sleeves on said shaft, each sleeve having upper and lower disks, a series of units secured to a disk of each sleeve, each unit comprising a pair of parallel bars, vertical rods extending between said bars and forming pintles, a gate hung on each pintle, each gate comprising vertical bars with horizontal bars connecting the same, a sheet metal cover for said bars, channel bars forming caps for the top and bottom edges of the gate, and a channel bar secured to the inner edge of the gate and embracing the adjacent pintle rod, said top and bottom channel bars being notched to receive said pintle bars, lug shafts extending along the horizontal bars of each unit, lugs on each lug shaft adapted to hold the gates from movement in one direction or to permit the gates to swing in the other direction, and weight controlled means for turning said lug shafts.

5. In a water motor, a vertical shaft, a series of units connected to the shaft, each unit comprising a series of pivoted gates, lug shafts extending along each unit, lugs on each lug shaft for controlling the position of the gates, an arm on the inner end of each lug shaft, a rod connecting said arms, an arm extending above the upper arm, a flanged sleeve on the main shaft, a series of individual weights pivoted on said flanged sleeve and loosely engaging the last named vertical arms, an intermediate weight slidable on said main shaft, and resting

against the inner ends of the arms of the individual weights, and means for controlling the elevation of said intermediate weight.

6. In a water motor, a vertical shaft, a series of units connected to the shaft, each unit comprising a series of pivoted gates, lug shafts extending along each unit, lugs on each lug shaft for controlling the position of the gates, an arm on the inner end of each lug shaft, a rod connecting said arms, an arm extending above the upper arm, a flanged sleeve on the main shaft, a series of individual weights pivoted on said flanged sleeve and loosely engaging the last named vertical arms, an intermediate weight slidable on said main shaft and resting against the inner ends of the arms of the individual weights, a pivoted controlling frame, a control weight slidable on the controlling frame, a pair of arms depending from said frame and engaging a flange on the upper end of the intermediate weight.

7. In a water motor, a vertical shaft, a series of units connected to the shaft, each unit comprising a series of pivoted gates, lug shafts extending along each unit, lugs on each lug shaft for controlling the position of the gates, an arm on the inner end of each lug shaft, a rod connecting said arms, an arm extending above the upper arm, a flanged sleeve on the main shaft, a series of individual weights pivoted on said flanged sleeve and loosely engaging the last named vertical arms, an intermediate weight slidable on said main shaft and resting against the inner ends of the arms of the individual weights, a pivoted controlling frame, a control weight slidable on the controlling frame, a pair of arms depending from said frame and engaging a flange on the upper end of the intermediate weight, and a drum surrounding said shaft secured to the said units and inclosing the mechanism between the intermediate weight and gates.

8. In a water motor, a vertical shaft, a series of units connected to the shaft, each unit comprising a series of pivoted gates, lug shafts extending along each unit, lugs on each lug shaft for controlling the position of the gates, an arm on the inner end of each lug shaft, a rod connecting said arms, an arm extending above the upper arm, a flanged sleeve on the main shaft, a series of individual weights pivoted on said flanged sleeve and loosely engaging the last named vertical arms, an intermediate weight slidable on said main shaft and resting against the inner ends of the arms of the individual weights, a pivoted controlling frame, a control weight slidable on the controlling frame, a pair of arms depending from said frame and engaging a flange on the upper end of the intermediate weight, a ratchet on said shaft, a hand lever swiveled on said shaft, and a pawl on said hand lever engaging said ratchet.

9. In a water motor, a vertical shaft, a series of units connected to the shaft, each unit comprising a series of pivoted gates, lug shafts extending along each unit, lugs on each lug shaft for controlling the position of the gates, an arm on the inner end of each lug shaft, a rod connecting said arms, an arm extending above the upper arm, a flanged sleeve on the main shaft, a series of individual weights pivoted on said flanged sleeve and loosely engaging the last named vertical arms, an intermediate weight slidable on said main shaft and resting against the inner ends of the arms of the individual weights, a pivoted controlling frame, a control weight slidable on the controlling frame, a pair of arms depending from said frame and engaging a flange on the upper end of the intermediate weight, a step bearing at the bottom of the main shaft and said step bearing being shouldered, a hollow sleeve on the said shaft fitting the shouldered end of said step bearing, and a ball race within said hollow sleeve.

10. In a water motor, a main shaft, a series of units connected with the main shaft, each unit comprising a series of pivoted gates, a lug shaft extending along each unit, a series of lugs on each lug shaft adapted to hold the adjacent gates from swinging in one direction, blocks forming journals for said lug shafts and stops formed on said blocks to hold said lugs rigidly back of said gates when the lug shaft is turned to operative position, and weight controlled means for operating said lug shafts.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 1st day of May 1909.

NORMAN A. STAMM.

In presence of—
G. T. HACKLEY,
FRANK L. A. GRAHAM.