No. 770,324. PATENTED SEPT. 20, 1904.

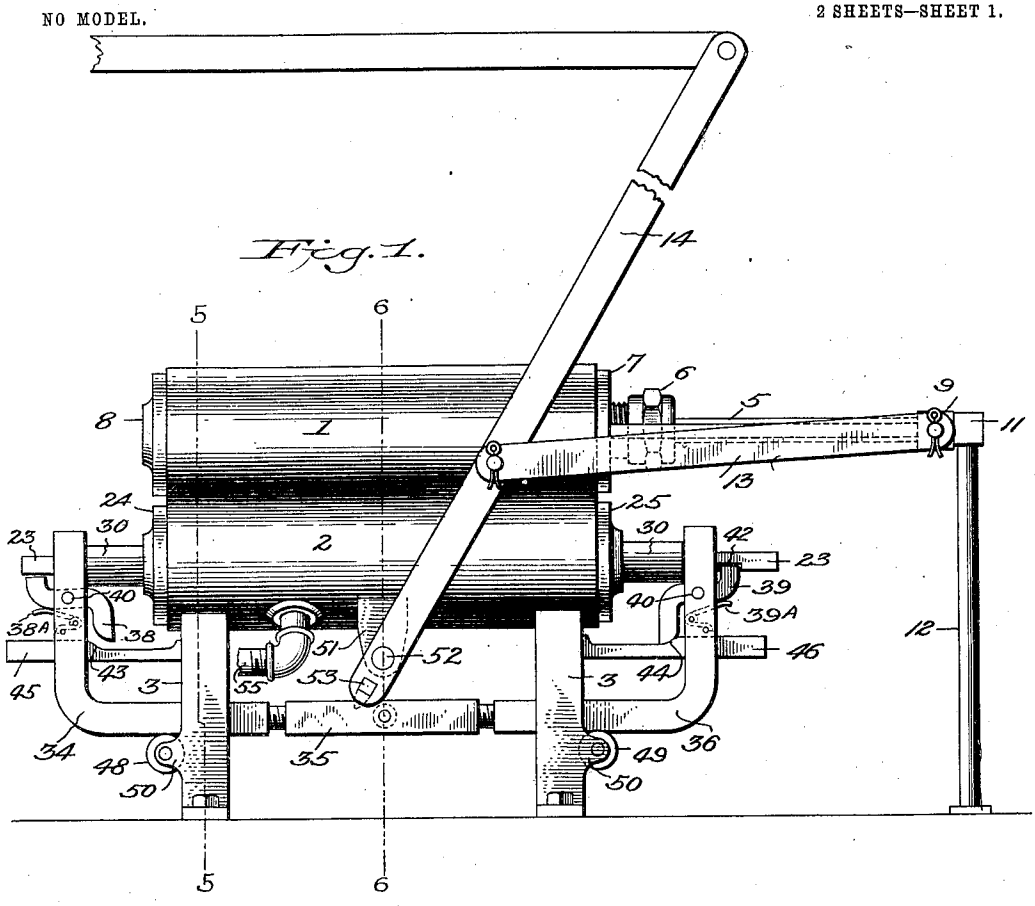
J. P. SHEVLIN.

WATER MOTOR.

APPLICATION FILED JAN. 18, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



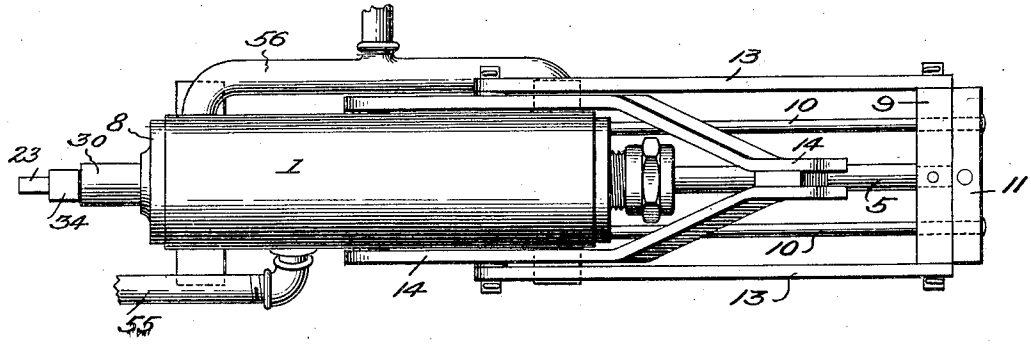


Fig. 2.

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APPLICATION FILED JAN. 18, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

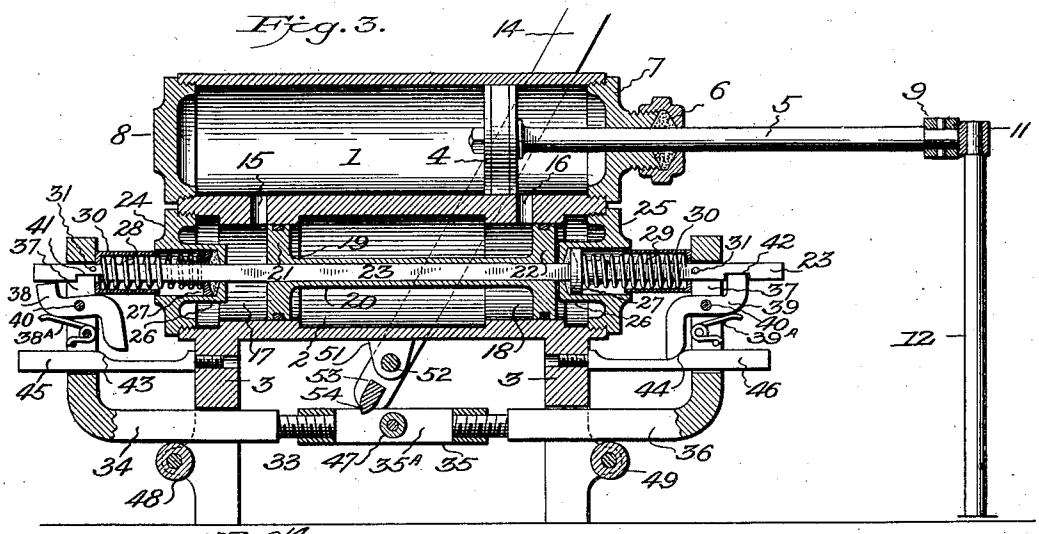


Fig. 4.

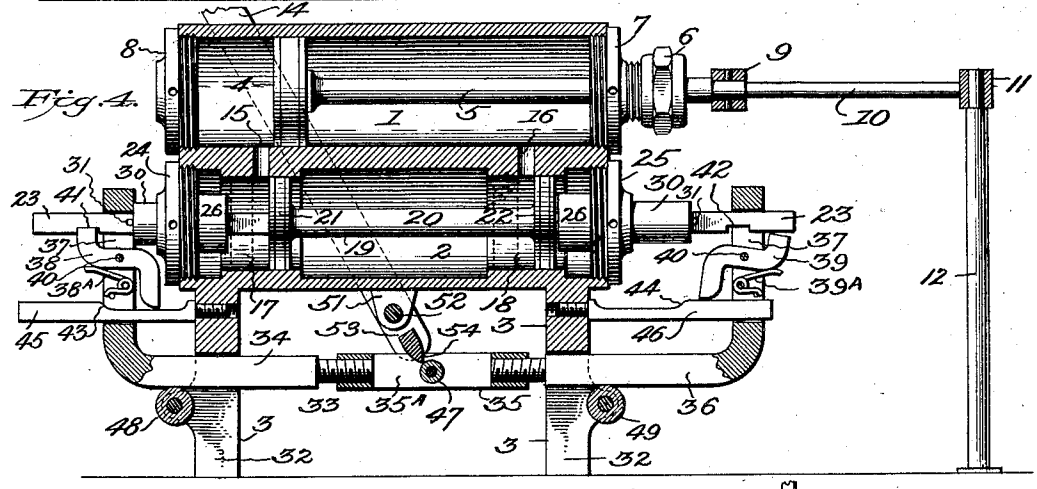


Fig. 5.

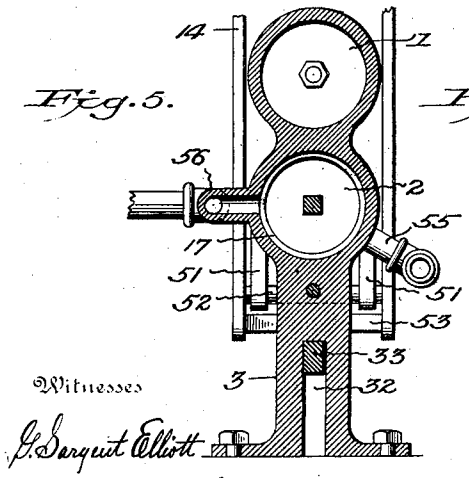
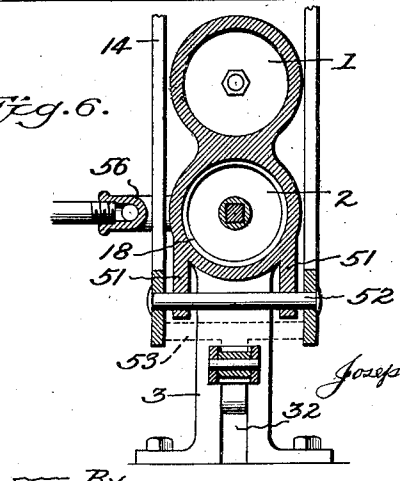


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

JOSEPH P. SHEVLIN, OF DENVER, COLORADO.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 770,324, dated September 20, 1904.

Application filed January 18, 1904. Serial No. 189,599. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH P. SHEVLIN, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Water-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 figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in water-motors.

The object of the invention is to provide a motor having a reciprocating-piston which connects with an operating-lever, the said lever also being connected with mechanism which controls the movement of a valve which regulates the flow of water to the piston-chamber.

The invention further consists in an improved manner of operating the water-regulating or cut-off valve, so that the same shall be instantaneously shifted to admit water under pressure through one port and permit the escape of exhaust-water through another port simultaneously as the operating piston reaches the limit of its movement at each stroke, thus permitting the full pressure of the water to be exerted upon the piston throughout its entire forward and backward movement.

I accomplish these ends by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved motor. Fig. 2 is a plan view thereof. Fig. 3 is a longitudinal vertical sectional view of the same, showing the operating-piston at the limit of its movement in one direction, the cut-off valve having just been shifted to admit the water behind the piston and to allow it to exhaust in front of the piston. Fig. 4 is a similar view showing the operating-piston almost at the limit of its opposite movement, the valve-operating mechanism being in the position it assumes just prior to shifting the said valve. Fig. 5 is a transverse vertical sectional view through the motor, taken on the line 5 5 of Fig. 1; and Fig. 6 is a similar view on the line 6 6 of Fig. 1.

Referring to the accompanying drawings, the numeral 1 indicates the piston-chamber, and 2 the valve-chamber, of my improved water-motor. The two chambers form an integral structure and are arranged one above the other, the piston-chamber being uppermost. These chambers are supported upon standards 3, preferably integral therewith, though they may be separate castings, if desired. A piston 4 has a reciprocating movement in the chamber 1 and is secured upon one end of a piston-rod 5, which extends through a suitable packing-box 6 in the rear cylinder-head 7, the opposite end of the cylinder being closed by a head 8. The other end of the piston-rod is suitably secured to a cross-head 9, which travels upon a pair of guides 10, secured at one end to the cylinder-head 7 and at the other end to a cross-piece 11, supported upon a standard 12. Upon each end of the cross-head 9 is pivotally secured a connecting-arm 13, the other end of each of said arms being pivotally connected to the operating-lever 14 of the motor, as will be more fully hereinafter described. Ports 15 and 16 extend through the wall separating the two chambers, the port 15 connecting the chambers near their forward ends, while the port 16 connects the chambers near their rear ends, the extreme movement of the piston in each direction being between these two ports. The valve-chamber 2 is cast with a short bore near each end of slightly less diameter than the remaining portion of the chamber, and in these bores 17 and 18, respectively, the heads of the water-regulating valve 19 move. The valve 19 has a short throw, as will presently appear, and only that portion of the chamber traveled by the heads of the valve requires a smooth finish. For this reason the bores 17 and 18 are formed and finished, while the remaining portion of the cylinder is left rough or unfinished. The ports 15 and 16, respectively, connect the two chambers at points centrally of the lengths of the bores 17 and 18, and the valve moves just far enough in each direction to bring its heads first on one side of the ports and then on the other.

The valve 19 comprises a hollow stem 20, of suitable length, at each end of which is formed a head, the said heads 21 and 22 each

being provided with an annular groove in which a suitable packing is housed. The stem 20 is rigidly secured upon a rod 23, which is preferably rectangular in cross-section and which extends through the heads 24 and 25 of the valve-chamber and a suitable distance beyond them. The heads 24 and 25 are each formed with an inwardly-extended cylindrical housing 26, the inner ends of which are closed save for an opening through which the rod 23 passes, and upon each end of the rod is slipped a packing-disk 27, having a short stem portion which prevents the disk from wabbling. A suitable packing is placed between the disks 27 and the closed ends of the housings, and coiled springs 28 and 29, respectively, are passed over the ends of the rods and against the packing-disk, the portions of the said springs which extend outside the housings being inclosed by thimbles 30, which are also slipped upon the ends of the rod and extend slightly within the housings of the heads 24 and 25. The thimbles are prevented from moving outwardly upon the rods beyond the position shown in Fig. 3 by pins 31, which pass through the rods and against the thimbles or by any other suitable means.

The standards 3, which support the cylinders, are each divided centrally to form guideways 32, in which an adjustable reciprocating bar 33 moves. This bar comprises three members 34, 35, and 36, the central member 35 being practically in the form of an ordinary turnbuckle, its ends being provided with threaded holes, the hole in one end having a left-hand thread, while the hole in the opposite end has a right-hand thread. The members 34 and 36 are alike in construction, each comprising a bar which is bent to form members which are at right angles to each other. One end of each of these angled members is threaded to engage one of the threaded ends of the member 35, and when the three members are united they form an adjustable bar having upturned ends, each of the said ends being provided with a slot 37, in one of which is pivoted a dog 38, while the slot in the other end carries a similar pivoted dog 39. Each of the dogs comprises a horizontal portion through which the pivot-pin 40 passes, the outer end of said horizontal portion being bent up at right angles, while the inner end is bent down at right angles. The upturned ends of the dogs are designed at a predetermined time to engage notches in the under side of the rod 23, the ends of which pass through the slots 37, the said notches 41 and 42 being formed near the ends of the said rod above the dogs 38 and 39, respectively, while the downturned ends of the dogs are positioned to engage inclined faces 43 and 44, which are formed upon horizontal arms 45 and 46, the arm 45 passing through the slot 37 in the member 34 of the reciprocating bar and being suitably secured to the adjacent standard 3, while the arm 46 is secured to the other standard and passes through the slot in the member 36 of the reciprocating bar. The dogs 38 and 39 are caused to engage the notches 41 and 42 by springs 38^A and 39^A, respectively, which exert an upward pressure upon the said dogs and force them into the said notches. A slot 35^A, of suitable length and width, is formed in the member 35 of the reciprocating bar, and centrally of this slot is a pin upon which a roller 47 is mounted. The members 34 and 36 of the bar rest upon rollers 48 and 49, which are mounted on pins which pass through ears 50, formed upon the standards 3. The reciprocating bar, with its dogs 38 and 39, effects the movement of the water-regulating valve 19 to admit the water to the piston-chamber alternately behind and in front of the operating-piston, and the movement of the said bar is accomplished in the following manner: Upon the under side of the valve-chamber 2 and centrally of its length is formed a pair of depending ears 51, which support a pin 52, the ends of which extend a short distance beyond the said ears, and upon each of these extended ends is pivoted one of the members of the yoked portion of the operating-lever 14, previously mentioned. The yoke portion of the lever straddles the cylinders, and its upper end is pivotally secured to one end of a pitman or connecting-rod, by which the power generated by the motor is transmitted to the machine or mechanism to be operated. The lower ends of the yoke extend a short distance below the pivot-pin 52 and are connected by a rod 53, which lies just above the middle member 35 of the reciprocating bar 33. This rod is formed centrally with a depending finger 54, which lies within the slot 35^A of the member 35 and is designed to engage the roller 47 as the lever 14 is rocked upon its pivot, the said lever being rocked through its connection with the cross-head 9 of the piston-rod by means of the connecting-arms 13, which are pivoted to the said cross-head and to the lever. Water under pressure enters the valve-chamber 2 through a pipe 55, which enters the said chamber at a point between the two heads of the valve 19 and escapes alternately at each end of the chamber through an exhaust-pipe 56, which connects with the said chamber at each end beyond the limit of movement of the heads of the valve, as will now be fully explained.

The operation of my improved water-motor is as follows: Assuming that the parts are in the relative position shown in Fig. 3, water under pressure fills the valve-chamber 2 and enters the piston-chamber 1 rear of the piston 4 through the port 16. The piston then moves forward, carrying with it the cross-head 9, which is secured to the outer end of the piston-rod. The cross-head 9 moves the connecting-arms 13, which in turn rock the operating-lever 14 and cause the finger 54 at its

lower end to engage the roller 47 of the reciprocating bar 33. As the lever 14 continues its movement the bar 33 is shifted to one side and the upturned end of its dog 39, which at the beginning of the movement engaged the notch 42 in the rod 23, escapes the said notch by the engagement of the depending end of the dog with the incline 44 of the arm 46, thus allowing the bar to pass. As the lever 14 reaches the position shown in Fig. 4 the dog 38 will engage the notch 41 in the forward end of the rod 23 and the spring 28 meantime will have been compressed by the upturned end of the bar, and a slightly farther movement of the lever will cause its finger 54 to escape the roller 47, when the spring 28 will recoil, throwing the bar 33 forward and shifting the valve 19 to the position shown in dotted lines, Fig. 4, by the engagement of dog 38 with rod 23; but before the bar 33 reaches the limit of its throw the depending end of dog 38 will engage the incline 43 of arm 45 and release the head of the dog from the notch 41, thus permitting the bar under the force of the recoil of the spring to go beyond the limit of its normal position after the valve has reached the limit of its throw without bringing any strain upon the dog. This excessive movement of the bar will cause its opposite upturned end to partially compress the spring 29 on the opposite end of rod 23, and the recoil of this spring will bring the bar to its normal position and the dog 38 will engage notch 41. During this operation and while the piston is moving forward the water in front of it will exhaust through port 15 into the forward end of the valve-chamber between the valve-head and the cylinder-head and will escape through the pipe 56. Immediately upon the shifting of the valve the water under pressure passes up through port 15 and enters the piston-chamber in front of the piston, which immediately begins to move rearward, and the exhaust-water rear of the piston passes down through port 16 into the rear end of the valve-chamber and escapes through the pipe 56. As the piston moves rearward the operating-lever 14 is again rocked and the former operation repeated. As water does not operate expansively, it is necessary that the piston should receive the full pressure of the water throughout its entire stroke, and this can only be accomplished by releasing the valve instantaneously and simultaneously with the arrival of the piston at the limit of its stroke in each direction. This I accomplish by the mechanism herein illustrated and described.

By turning the member 35 of the reciprocating valve-actuating bar the said bar may be lengthened or shortened as may be desired, so that the dogs 38 and 39 may be adjusted to the proper position with respect to the notches 41 and 42 of the valve-rod.

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

1. In a water-motor, the combination of a valve-chamber, a piston-chamber and ports connecting said chambers near their ends; a piston in said piston-chamber secured upon one end of a rod, a cross-head upon the outer end of said rod, an operating-lever pivoted to said motor and arms connecting the lever with the cross-head; a rod which passes through the valve-chamber, a double-headed valve secured upon said rod; a reciprocating bar actuated by the operating-lever having dogs which engage the valve-rod to shut said valve at a predetermined point in the travel of the piston; a water-inlet in the valve-chamber between the heads of the valve and an outlet at each end of the chamber beyond the valve-heads, substantially as shown.

2. In a water-motor, the combination of a valve-chamber, a piston-chamber and ports which connect said chambers near their ends; a piston in said piston-chamber, a rod to which said piston is secured, the outer end of which carries a cross-head; an operating-lever having a forked end which straddles the motor and is pivoted thereto, and arms which connect said lever with the cross-head; a rod which passes through the valve-chamber having a notch upon its under side near each end and a double-headed valve secured upon said rod; means for instantaneously shifting the valve at a predetermined point in the travel of the piston, consisting of an adjustable reciprocating bar, having dogs which engage the notches of the valve-rod at a predetermined time, said bar being spring-controlled in both directions and being actuated by the operating-lever; a water-inlet to the valve-chamber between the heads of the valve, and an outlet at each end of said chamber, beyond the heads of the valve, substantially as shown.

3. In a water-motor, the combination with a valve-chamber, a piston-chamber and ports connecting them, an operating-lever, a piston, means for connecting the piston and operating-lever and a water-controlling valve, of means for instantaneously shifting the said valve at a predetermined point in the travel of the piston, consisting of a rod which extends through the valve-chamber upon which the valve is secured, said rod having a notch near each end upon the under side thereof; an adjustable spring-controlled reciprocating bar having slotted upturned ends, through which the ends of the valve-rod extend and spring-actuated dogs in the slots of said upturned ends; said bar being moved a predetermined distance in each direction by the operating-lever, so that the said dogs shall alternately engage the notches of the valve-rod, the bar being thrown by the recoil of its spring when it escapes the operating-lever, thereby throwing the valve, substantially as shown.

4. In a water-motor, a piston-chamber, a

valve-chamber below said piston-chamber, and ports connecting the said chambers; a rod extending through the valve-chamber and a double-headed valve secured upon the rod; a head in each end of said chamber, an inwardly-extending housing upon each head, through which the ends of the said rod extend, and a coil-spring in each of said housings around the extended ends of the rod; a reciprocating piston in the said piston-chamber, an operating rocking lever, connected with the piston; and a bar having upturned slotted ends, through which the ends of the said valve-rod pass, which upturned ends bear upon the outer ends of the said coil-spring, and dogs which engage the ends of the rod; the said bar being alternately shifted back and forth, by the action of the operating-lever, against the pressure of the said coil-springs, and being adapted to escape the lever, and to be thrown by one or the other of the springs at a predetermined point in the movement of the piston thereby to shift the valve; and means for admitting water to the valve-chamber between the valve-heads and for permitting its escape at each end of the chamber, beyond the said valve-heads, substantially as shown.

5. In a water-motor, the combination with a valve-chamber, having a double-headed valve, and a valve-rod which extends beyond the end of said chamber, a piston-chamber having a reciprocating piston and rod, and ports connecting said chambers; of a cross-head secured upon the outer end of the piston-rod, an operating rocking lever having an engaging finger at its lower end, arms connecting the cross-head with the operating-lever, and a bar having dogs which engage the extended ends of the valve-rod, the said bar having a roller which is engaged by the finger upon the lower end of the operating-lever, to shift said bar back and forth, said finger being adapted to escape the roller as the lever reaches the limit of its movement in each direction; and springs which are alternately compressed by the back-and-forth movement of the bar, and which throw the said bar by the force of their recoil, when the bar is released by the lever, thereby shifting the position of the valve, at a predetermined point in the movement of the piston, substantially as shown.

6. In a water-motor, the combination with a piston-chamber having a reciprocating piston, a valve-chamber having a double-headed valve secured upon a rod which extends beyond each end of said chamber, which rod has a notch upon its under side near each of its ends, and ports connecting the two chambers of a longitudinally-adjustable valve-operating bar, having upturned, slotted ends through which the ends of the valve-rod pass, dogs within said slots which alternately engage the adjacent notches in the ends of the valve-rod, a roller upon said bar, a rocking lever operated by the said piston, having a finger at its lower end which engages the said roller so as to shift the bar back, and forth, and to escape the roller at the limit of the lever's movement in each direction; springs which are alternately compressed by the back-and-forth movement of the bar, and which throw the said bar by the force of their recoil, as its roller is released by the finger of the rocking lever, thereby shifting the valve at a predetermined point in the travel of the piston, and projections which engage depending ends of said dogs, as the bar approaches the limit of its throw in each direction, and releases them from the notches of the valve-rod, substantially as shown.

7. In a water-motor, the combination with a piston-chamber having a reciprocating piston and rod, a valve-chamber having a double-headed valve secured upon a rod which extends beyond each end of said chamber, ports connecting said chambers at each end, and a spring-controlled bar having dogs which engage the said valve-rod, and a roller which is located centrally of the length of the said bar; of a forked rocking lever, the members of which straddle the said chambers and are connected at their extremities by an arm having a depending finger which is designed to engage the roller of the spring-controlled bar to move the said bar back and forth against the pressure of its springs, and to escape the said roller at the limit of movement of the rocking lever in each direction, the said bar being thrown in each direction, alternately by the recoil of the springs as the finger escapes the roller, thereby instantaneously shifting the position of the valve at a predetermined point in the movement of the piston in each direction, substantially as shown.

8. The combination with a water-motor comprising a piston-chamber having a reciprocating piston, a valve-chamber having a valve which is secured upon a rod which extends beyond each end of said chamber, and ports which connect the chambers near their ends, of means for shifting the position of said valve at a predetermined point in the movement of the piston, consisting of a longitudinally-adjustable spring-controlled bar, comprising a central member having a threaded hole in each end, in which holes are screw members having upturned slotted ends, through which the ends of the valve-rod pass, and dogs in said slotted ends which engage the ends of the valve-rod, a roller carried by the central member of the bar, and a lever connected with the piston, for engaging the said roller, and moving the bar back and forth against the action of its springs, the said lever permitting the roller to escape it at a premeditated time, thereby causing the bar to be thrown by the recoil of its springs, substantially as shown.

9. In a water-motor, the combination with a water-controlling valve having a notched

rod, of a longitudinally-adjustable spring-controlled bar, having slotted, upturned ends through which the ends of the valve-rod pass and dogs in said slots, which engage the notches in the valve-rod, and means for shifting the bar in each direction against the pressure of its springs and for permitting the said bar to be thrown by the recoil of said springs to instantaneously shift the valve at a premeditated time, substantially as shown.

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

JOSEPH P. SHEVLIN.

Witnesses:

G. SARGENT ELLIOTT,

MORRIS SELIGSOHN.