F. J. OSTERHOLTZ.

HYDRAULIC MOTOR.

APPLICATION FILED JAN. 26, 1914.

1,139,995.

Patented May 18, 1915.

4 SHEETS—SHEET 1.

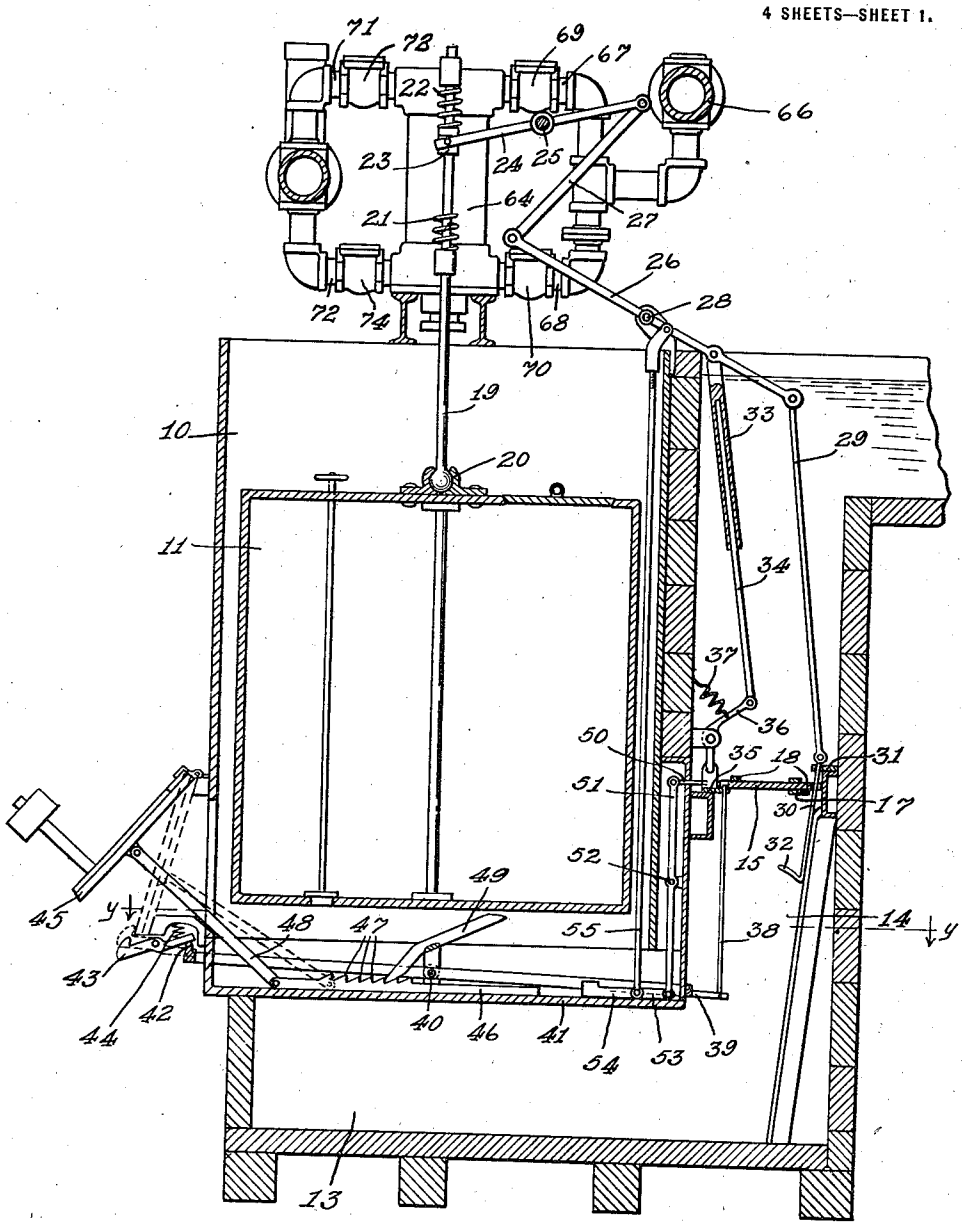

Fig. 1

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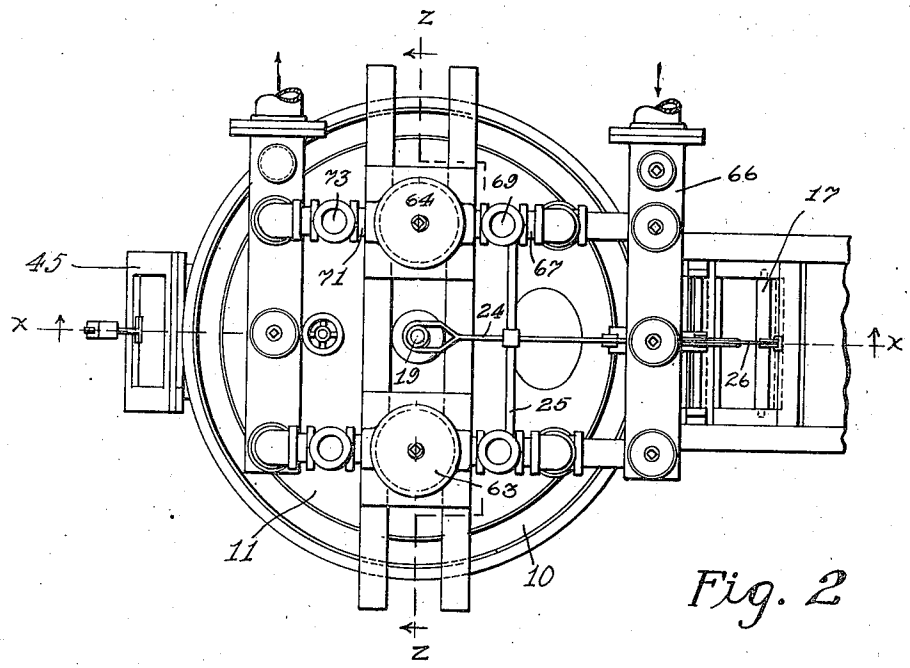
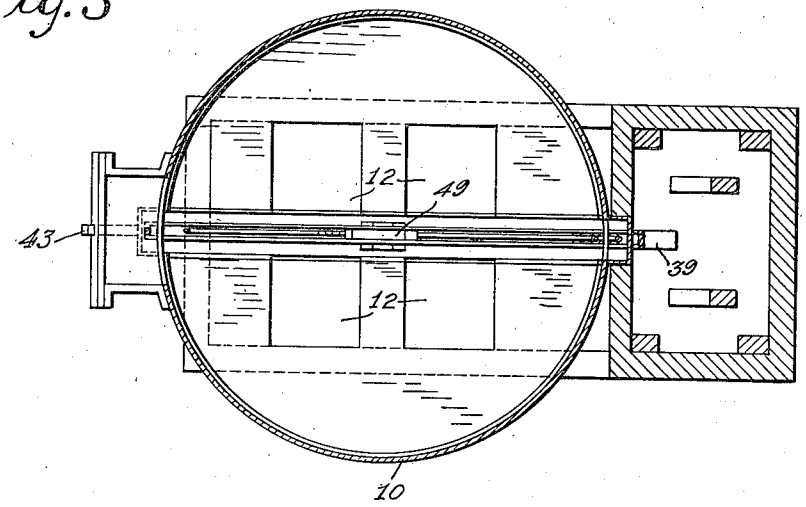


Fig. 2

Fig. 3



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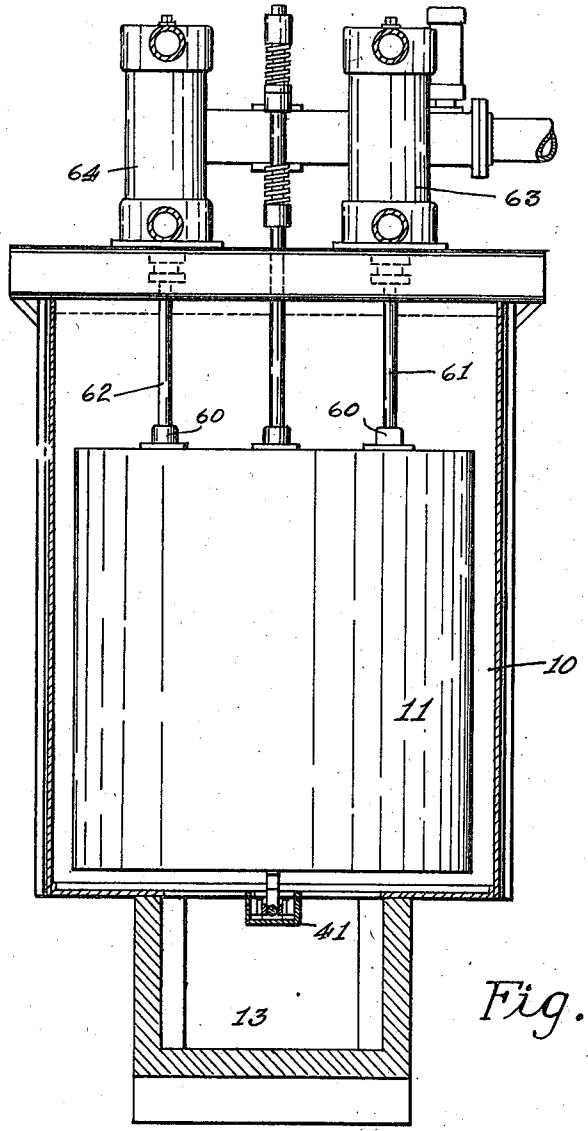

Fig. 4

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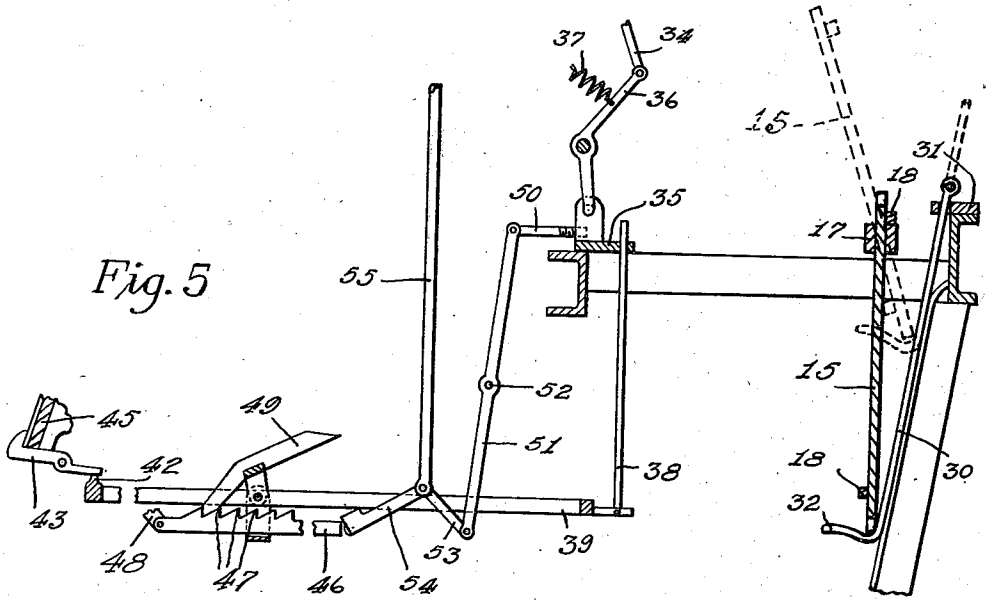
4 SHEETS—SHEET 4.

Fig. 5



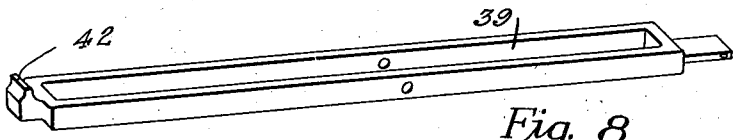


Fig. 8

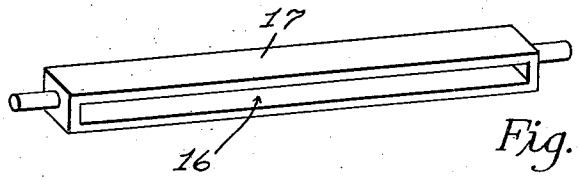


Fig. 6

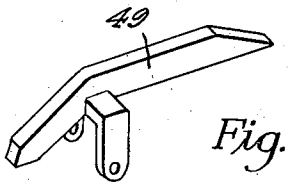


Fig. 7

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UNITED STATES PATENT OFFICE.

FREDERICK J. OSTERHOLTZ, OF BUCODA, WASHINGTON, ASSIGNOR TO ALASKA HYDRAULIC MOTOR COMPANY, OF TACOMA, WASHINGTON, A CORPORATION.

HYDRAULIC MOTOR.

1,139,995. Specification of Letters Patent. Patented May 18, 1915.

Application filed January 26, 1914. Serial No. 814,587.

To all whom it may concern:

Be it known that I, FREDERICK J. OSTERHOLTZ, citizen of the United States, residing at Bucoda, in the county of Thurston and State of Washington, have invented a certain new and useful Improvement in Hydraulic Motors, of which the following is a specification.

My invention relates to improvements in motors which are adapted to be operated by water power and more particularly it relates to hydraulic motors that may be operated by power due to the pressure of a low head of water which may be controlled to act intermittently to raise buoyant actuating members thus to impart reciprocal vertical movements to the pump pistons; and the object of my invention is to provide a motor of this class with simple, reliable and efficient mechanical means for automatically controlling the action of water upon the movable actuating member which operates the piston or pistons of said pump. I accomplish this object by devices illustrated in the accompanying drawings in which—

Figure 1 is a view in vertical section on broken line x, x of Fig. 2 showing a structure embodying my invention; Fig. 2 is a plan view of the same; Fig. 3 is a view of the same in horizontal section on broken line y, y of Fig. 1; Fig. 4 is a view of the same in vertical section on broken line z, z of Fig. 2; Fig. 5 is a fragmentary view illustrating different positions that the intake gate and its associated parts may assume, and Figs. 6, 7 and 8 are views in perspective of details of my invention.

Referring to the accompanying drawings, throughout which like reference numerals indicate like parts, 10 is a casing or chamber within which is disposed a float 11 that is adapted to be raised by the buoyant force of water that may be admitted to said chamber 10, said float 11 being adapted to move downwardly by its own weight when water is permitted to flow out of the chamber 10 such float being adapted to be connected with suitable mechanism by which its rising and falling movements may be made to do useful work.

The bottom side of the chamber 10 is provided with inlet openings 12, 12 through which water may pass upwardly from a water reservoir 13 that is disposed therebelow which reservoir 13 communicates with a gate-controlled water intake 14 that is connected with a source of water supply whereby water may be admitted to the chamber 10 to rise therein and lift the float 11.

A gate 15, more clearly shown in Figs. 1 and 5, is adapted to slide within a slot 16 which is provided in a bar 17, more clearly shown in Fig. 6, which bar 17 is pivotally mounted in the side walls of the intake 14, as more clearly shown in Fig. 2, and which is adapted to support the outer end of the gate 15, such gate 15 being provided near each of its ends with a cleat 18 which prevents it from sliding entirely out of the slot 16, thus adapting it, when closed, to rest its inner end on a movable plate 35, which plate 35 is adapted by suitable mechanism, to be automatically withdrawn when the float 11 is lowered to the bottom of the chamber 10 thereby permitting said gate 15 to drop downwardly into the position shown in Fig. 5 thus permitting water to flow downwardly through the intake 14 to rise in the chamber 10.

A vertical rod 19 is concentrically secured to the top of the float 11 by a universal joint mechanism 20 to adapt it to move upwardly and downwardly with such float 10 and such rod 19 is provided with two helical compression springs 21 and 22 that are spaced apart and adapted at different times to engage with a sleeve 23 that is slidably mounted on said rod 19 between the ends of the springs 21 and 22, such sleeve being pivotally connected with one end of a lever 24 that is fulcrumed on a bearing shaft 25 and has its other end articulated, by a link 27, with one end of another lever 26. The lever 26 is fulcrumed on a suitable pivot 28 and has its outer end connected by a link 29 with a gate lifter 30 that is adapted to slide vertically through a guide 31 and is provided on its lower end with a hook 32 which hook 32 is adapted, when the gate lifter 30 is raised, to engage the lower edge of the gate 15, if such gate 15 is in a lowered position and to raise it into a position, as shown by

broken lines in Fig. 5, from which latter position it may be moved by water to its closed position.

A tubular bar 33 is articulated with the lever 26 at a point between the pivot point 28 and the outer end of such lever 26, within which tubular bar 33 is slidably disposed the upper end of a rod 34, the lower end of the rod being articulated with one end of a bell crank lever 36 that is fulcrumed in a suitable bracket and has its lower end connected with the movable plate 35 whereby when the tubular bar 33, in response to a downward movement of the float 11, is moved downwardly farther than a certain predetermined point then the telescoping end of the rod 34 will engage with the end wall of the tubular bar 33 and thereby be moved downwardly thus turning the bell crank lever 36 about its fulcrum and moving the plate 35 to the left against the tension of a helical spring 37 to permit a trip rod 38 to extend upwardly past the edge of the gate 15, as shown in Fig. 1, whereupon other mechanism shall be actuated as hereinafter described to move the plate 35 still farther to the left and thus permit the gate 15 to fall downwardly into the position shown in Fig. 5, said gate turning end over end thus permitting water to flow downwardly through the intake 14 to fill the chamber 10. As the water raises the float 11 in the chamber 10 the rod 19 moves upwardly and the spring 21 engages with the bottom side of the sleeve 23 to move such sleeve 23 and the end of the lever 24 upwardly thus acting through the lever 26 and the links 27 and 29 to raise the gate lifter 30 and the gate 15 into a position substantially as shown by broken lines in Fig. 5, whereupon the gate 15 will be caught by the downward flow of water in the intake 14 and will be carried downward until its edge again rests on the movable plate 35 which has been replaced to catch such gate 15 by the operation of the spring 37 and its associated mechanism. As the gate 15 is closing it engages the top end of the vertically movable trip bar 38 which is articulated with one end of a lever 39 that is fulcrumed on a pivot 40 intermediate of its length, which lever 39 is adapted to lie within a channel bar 41 that extends crosswise of the bottom of the chamber 10, such lever 39 being provided with an upwardly projecting lug 42 at its outer end which lug 42 is adapted to engage with the lower surface of the inner end of a gate hook 43 which is fulcrumed in a suitable bracket and normally adapted to be held in its correct position by a spring 44, the lever 39 being adapted, when the bar 38 is moved downwardly, to move the gate hook 43 and cause it to release a discharge gate 45 thus permitting such discharge gate 45 to swing outwardly to allow water that may be contained in the chamber 10 to flow outwardly therethrough.

A ratchet bar 46, which is provided with ratchet teeth 47 and disposed to slide lengthwise within the channel 41, is connected with the gate 45 by a link 48, as shown in Fig. 1, and is adapted to have its ratchet teeth 47 engaged by a pawl 49 in such manner that the bar 46 is permitted to move outwardly as the gate 45 opens but is prevented from moving inwardly to permit the gate 45 to close until the float 11 shall have approached near to the bottom of the casing 10 and, by engaging with an upwardly projecting end of the pawl 49 shall have raised such pawl out of engagement with the teeth of such ratchet bar 46.

The movable plate 35 is connected by a link 50 with the upper end of a vertical lever 51 that is fulcrumed on a pivot 52 intermediate of its length and has its lower end connected with one end of a pair of toggle links 53 and 54 that are pivotally connected with each other and with a vertical bar 55, the outer end of the link 54 being left free of all connections and adapted, when the links 53 and 54 are in approximate alinement, to be engaged by the squared end 56 of the ratchet bar 46 whereby when the gate 45 closes the toggle links 53 and 54 may be moved to the right thus to move the lever 51 and cause it to withdraw the plate 35 and to allow the gate 15 to open. The bar 55 passes upwardly in chamber 10 and has its upper end articulated with the lever 26, in a manner clearly shown in Fig. 5, whereby when the outer end of the lever 26 is raised said bar 55 will be raised to lift the central pivot of the toggle links 53 and 54 above the center line of the bearing points of such links thus releasing the lever 51 to permit the mechanism associated with the gate 15 to be actuated.

In the preferred form of my motor as herein illustrated and described, I have shown my float 11 to be connected by universal joints 60, 60 with two upwardly projecting piston rods 61 and 62 that are connected with pistons (not shown) disposed in the cylinders 63 and 64 which are supported on I beams that extend crosswise of the top of the casing 10, such cylinders being alike connected by valve controlled pipes with a source of water supply and with discharge pipes, as illustrated in Fig. 1, wherein 66 is the supply pipe which is connected with the top and bottom portion of the cylinder 64 by pipes 67 and 68, respectively, the pipes 67 and 68 being provided with check-valves 69 and 70 which permit water to be drawn inwardly therethrough to the cylinder 64 but which prevent water from passing backwardly therethrough.

Discharge pipes 71 and 72, similar to the

pipes 67 and 68 and similarly connected with the top and bottom of the cylinder 64, are provided with check-valves 73 and 74, respectively, which permit water to pass outwardly therethrough from the cylinder 64 but which prevent water from being drawn inwardly therethrough to the cylinder 64.

The operation of my hydraulic motor may be described as follows: When the gates are in the positions shown in Fig. 1, the water is permitted to flow out of the chamber 10, and the float 11 is thus permitted to move downwardly until it engages the upper end of the pawl 49 to release such pawl 49 from its engagement with the ratchet teeth 47 and permit the discharge gate 45 to close. At the same time the tubular bar 33 which has been moving downwardly with the float 11 has engaged with the link 34 to move the bell crank 36 to withdraw the plate 35, on which the edge of gate 15 rests, to permit the bar 38 to move upwardly past the edge of the gate 15 thus releasing the lever 39 and permitting the hook 43 to move upwardly in its normal position to engage with the lower edge of the gate 45. As the gate 45 closes the end of the ratchet bar 46 strikes the end of the toggle link 54 which has approached alinement with its connected link 53, as shown in Fig. 1, and moves both of such links and the lower end of the lever 51 to the right thus entirely withdrawing the plate 35 to permit the gate 15 to drop and allow water from the intake to flow into the chamber 10 to raise the float 11.

As the float 11 is raised the gate lifter 30 moves upwardly and carries with it the gate 15 as shown in Fig. 5 until the gate 15 shall approach a position where it will be caught by the downward current of water and be automatically closed thereby and said gate 15 in closing strikes on the top of the bar 38 to open the discharge gate thus permitting the water to flow outwardly and the float 11 again to be lowered and such float by its reciprocating motion serves to operate the pumps to pump water as explained.

Obviously numerous changes may be made in details and form of construction of the various parts embodied in my device without departing from the spirit of my invention or sacrificing any of its advantages.

What I claim is:

1. In a structure of the class described, the combination with a casing having an opening in the bottom thereof, of a float disposed in said casing, a water intake connected with said opening, a slotted bar pivotally mounted in said water intake, a plate slidably disposed in said intake opposite said slotted bar, a gate adapted to slide within the slot in said bar, said gate being adapted when closed to rest one of its edges on said plate, a discharge gate provided at the bottom of said casing, means associated with said discharge gate for moving said sliding plate to release said intake gate, and means whereby the closing of said intake gate shall release said discharge gate and permit it to open.

2. In a structure of the class described, the combination with an inclosure having an opening in the bottom side thereof, of a float disposed in said inclosure, an intake for water connected with said opening, a gate provided in said intake, means adapted to open said gate in response to the falling of said float, a discharge gate provided in one side of said inclosure, a toothed ratchet bar connected with said discharge gate, a pawl adapted to engage with the teeth of said ratchet bar to hold said discharge gate open, said pawl being adapted when engaged by said float to release said ratchet bar to permit said discharge gate to close when said float falls to the bottom of said inclosure.

3. In a structure of the class described, the combination with a tank adapted to contain water and having an inlet passageway through its bottom, of a float disposed in said tank, an intake conduit for water connected with said inlet and a gate provided in said intake said gate being adapted to swing downwardly to permit water to flow through said intake and being further adapted to be slidingly raised edgewise in the operation of closing said intake whereby said gate may offer but little resistance to the downwardly flowing water in said intake.

4. In a hydraulic motor the combination with a conduit which is adapted to conduct water, of a shaft disposed therein and journaled to extend from one side to the opposite side thereof to adapt it to revolve, a gate valve slidably mounted on said shaft to adapt it to be reciprocally movable edgewise thereon, detent means disposed in the wall of said conduit and adapted to engage with an edge portion of said gate valve to support said gate valve in a position to stop the flow of water through said conduit, mechanism adapted to slidably move said gate valve in an edgewise direction and mechanical means associated with said mechanism and with said detent means which mechanical means is adapted to operate said mechanism to slidably move said gate valve at required instants of time and further adapted to actuate said detent means to release said gate valve at other and different instants of time in response to changes in the altitude of water that has passed by said gate valve in said conduit.

5. In a hydraulic motor the combination with a conduit which is adapted to conduct

water, of a shaft disposed therein and journaled to extend from one side to the opposite side thereof to adapt it to revolve, a gate valve slidably mounted on said shaft to adapt it to be reciprocally movable edgewise thereon, detent means disposed in the wall of said conduit and adapted to engage with an edge portion of said gate valve to support said gate valve in a position to stop the flow of water through said conduit, and mechanism adapted to slidably move said gate valve as required, and further adapted to actuate said detent means to release said gate valve as required.

In witness whereof, I, hereunto subscribe my name this twelfth day of January A. D. 1914.

FREDERICK J. OSTERHOLTZ.

Witnesses:
FRANK WARREN,
F. C. MATHENY.