

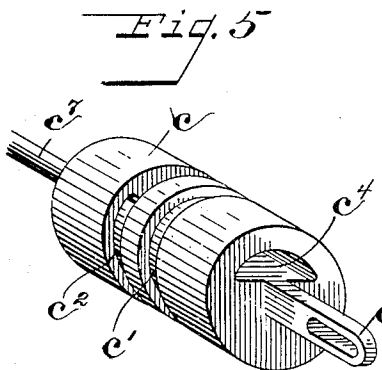
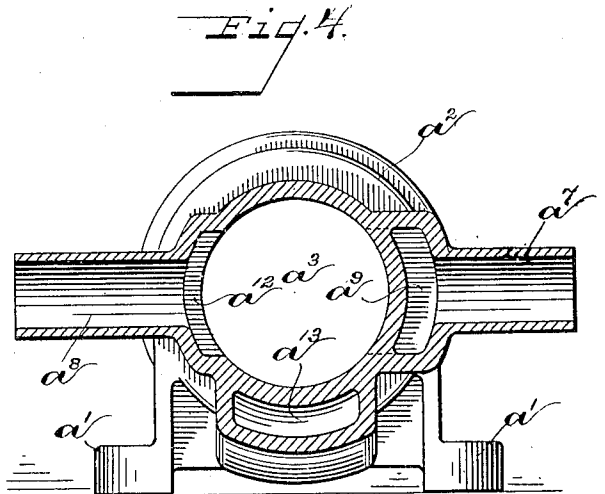
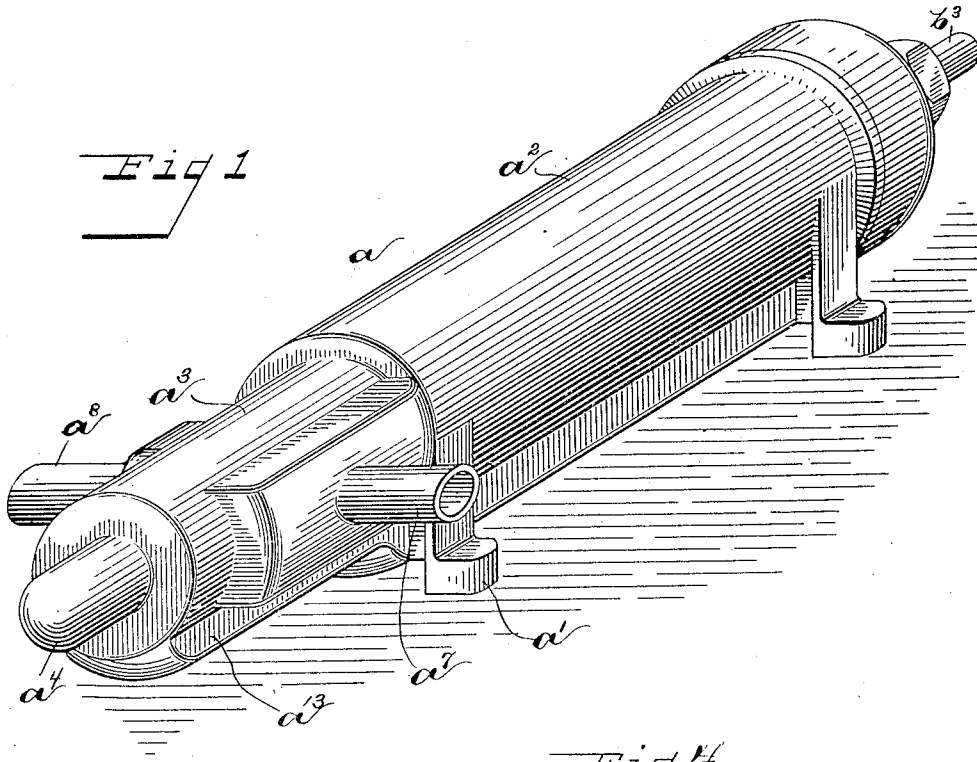
No. 869,568.

PATENTED OCT. 29, 1907.

T. M. HIESTER.
WATER MOTOR.

APPLICATION FILED MAR. 7, 1906.

2 SHEETS—SHEET 1.



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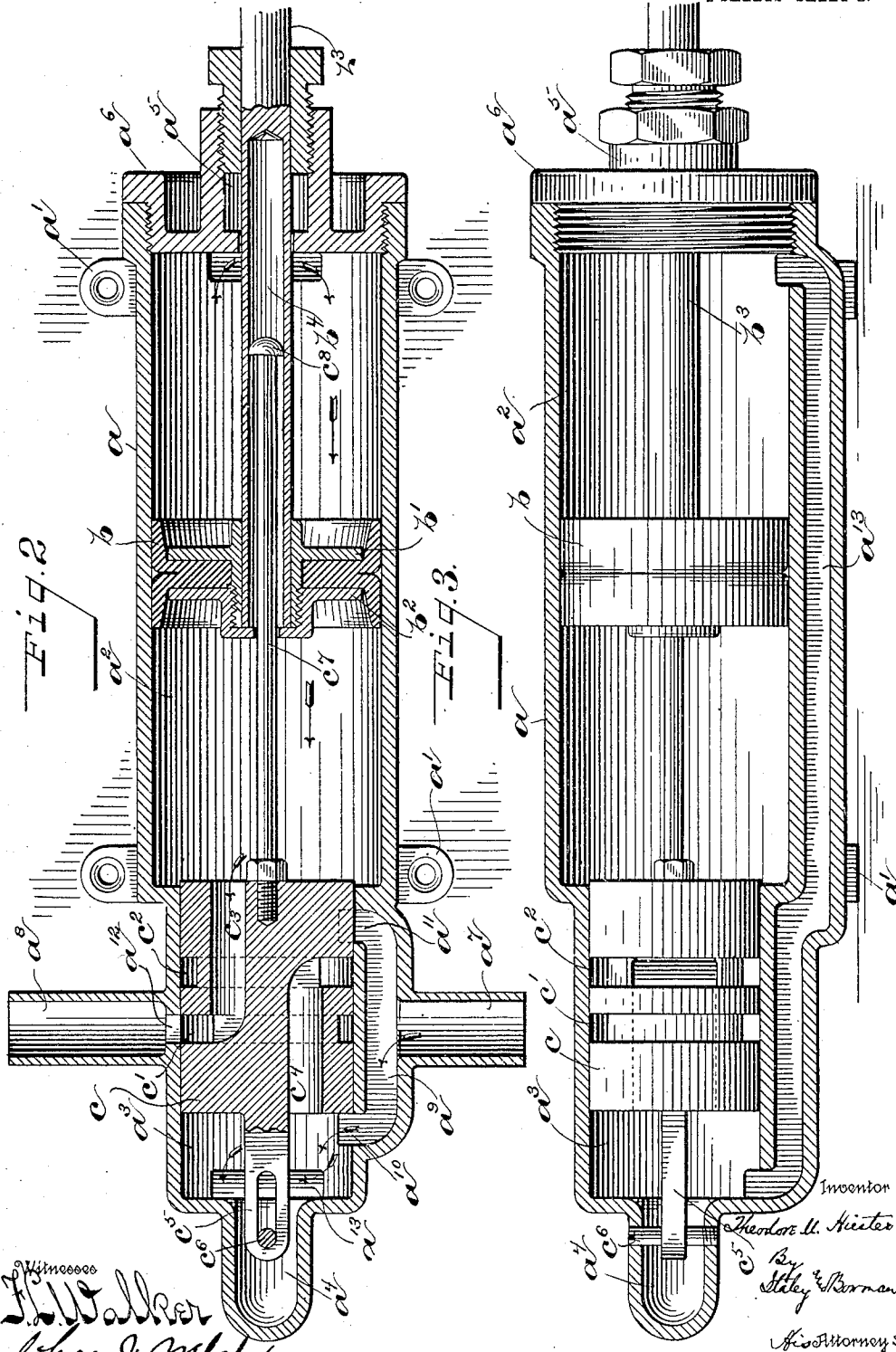
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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

THEODORE MILTON HIESTER, OF DAYTON, OHIO.

WATER-MOTOR.

No. 869,568.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed March 7, 1906. Serial No. 304,643.

To all whom it may concern:

Be it known that I, THEODORE MILTON HIESTER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

My invention relates to motors, and particularly to hydraulic motors, but is not limited to the use of water as an operating medium.

The object of the invention is to greatly simplify the construction, as well as the means and mode of operation of such machines whereby they are not only cheapened in construction, but are rendered unlikely to get out of order, and are economical in operation.

A further object is to provide a structure in which the valve will be instantly reversed, changing the water pressure from one side of the piston to the other at the limit of the piston stroke.

A further object is to provide a structure in which the valve will be automatically operated by the water pressure after receiving an initial movement by the action of the piston.

A further object is to provide a structure in which the water necessary for the operation of the valve will not be lost but will subsequently be utilized to operate the piston.

With the above primary and other incidental objects in view, as will appear from the specification, my invention consists of the means, mechanism, construction and mode of operation hereinafter described and set forth in the claims.

In the drawings, Figure 1 is a perspective view of the device. Fig. 2 is a horizontal longitudinal sectional view. Fig. 3 is a vertical longitudinal sectional view. Fig. 4 is a transverse sectional view through the inlet and outlet pipes. Fig. 5 is a detail perspective view of the valve hereinafter described.

Referring by letter to the drawings, *a* represents a casing provided with suitable supporting feet, *a*¹, and having a continuous cylindrical chamber therein, preferably in three sections of different diameter, as indicated at *a*², *a*³ and *a*⁴ respectively. It is to be noted that the various sections named are only distinguished by their variation in diameter, and are devoid of any dividing walls or bulkheads.

Within the section, *a*², is located a piston, preferably formed by a crimped leather disk, *b*, secured between two interengaging flanges, *b*¹ and *b*². There is secured to the piston a piston-rod, *b*³, hollow throughout a portion of its length, as indicated at *b*⁴. The piston-rod, *b*³, extends through a stuffing-box, *a*⁵, located in the head, *a*⁶, screwthreaded in the end of the cylinder, *a*. Extending laterally from diametrically opposite points upon the portion, *a*³, are inlet and outlet pipes, *a*⁷ and *a*⁸, respectively. The inlet-pipe, *a*⁷, terminates in a two-way conduit, *a*⁹, having inlet ports,

*a*¹⁰ and *a*¹¹, through which the water under pressure is discharged into the portion, *a*³, on opposite sides of the valve hereinafter described.

An outlet port, *a*¹², leads from the portion, *a*³, to the outlet pipe, *a*⁸. There is also provided in the casing, *a*, a longitudinal conduit, *a*¹³, which connects the opposite ends of the said casing, and forms means of communication between the extreme sides of the piston and valve respectively. The piston valve, by means of which the flow of water through the structure is controlled, is located within the section of the casing, *a*, hereinbefore indicated by *a*³. It consists essentially of a cylinder, *c*, having in the periphery thereof two peripheral grooves or channels, *c*¹ and *c*².

The cylinder, *c*, forms substantially a movable head for the cylinder portion, *a*², of the casing, *a*, and is capable of a limited movement, as hereinafter described.

Extending longitudinally into the cylinder, *c*, and from opposite ends thereof, are conduits, *c*³ and *c*⁴, communicating at their inner ends with the peripheral grooves, *c*¹ and *c*², respectively. Extending forwardly from the extreme side of the valve, *c*, is a slotted arm, *c*⁵, which projects into the portion, *a*⁴, of the casing, *a*. A pin, *c*⁶, extends diametrically through said portion, *a*⁴, and through the slot of said arm, *c*⁵, and limits the longitudinal movement of the piston valve, *c*. Secured to the opposite end of the valve, *c*, is a valve stem, *c*⁷, which projects within the hollow portion, *b*⁴, of the piston rod, *b*³. The valve stem, *c*⁷, is provided with a head or collar, *c*⁸, adapted to be engaged when the piston moves in one direction by the bottom of the open portion, *b*⁴, of the piston rod, *b*³. When the piston moves in the opposite direction, the head, *c*⁸, is adapted to be engaged by the flange, *b*², forming part of the piston, as hereinbefore described.

The operation of the device is as follows: With the parts in their various positions, as indicated in Figs. 2 and 3, the water under pressure entering the inlet pipe, *a*⁷, would follow the course indicated by the arrows passing through the inlet port, *a*¹⁰, at the extreme side of the valve, *c*, thence through the longitudinal conduit, *a*¹³, would enter the cylinder, *a*², at the extreme side of the piston, causing the piston to move toward the valve, *c*. The water forming the previous charge, contained within the cylinder, *a*², between the piston and piston valve, *c*, will escape, as indicated by the arrows, through the conduit, *c*³, and the outlet port, *a*¹². As the piston approaches the limit of its stroke in the direction of the valve, *c*, the end wall of the opening, *b*⁴, of the piston rod, *b*³, will contact the head, *c*⁸, of the valve stem, *c*⁷, and upon further movement of the piston, the valve, *c*, will be moved with said piston until the port, *a*¹¹, is partially opened, and the channel, *c*², brought partially in registry with the outlet port, *a*¹², and the channel, *c*³, and inlet port, *a*¹⁰, completely closed. The water under pressure then rushing

through the partially opened port, a^{11} , into the space between the piston and piston valve, c , will automatically complete the operation of the valve, c , by moving it to its extreme position, independent of further movement of the piston, thus bringing the peripheral channel, c^2 , into complete registry with the outlet port, a^{12} , and completely opening the inlet port, a^{11} . The piston under the pressure of the water entering through the port, a^{11} , will be caused to move in the opposite direction. The spent water from the previous charge, escaping through the longitudinal conduit, a^{13} , in the direction contrary to the arrows, flows into the portion, a^3 , at the extreme side of the piston valve, c , thence through the conduit, c^4 , and the peripheral groove, c^2 , to the outlet port, a^{12} . As the piston approaches the limit of its stroke to the right, as indicated in the drawings, the central portion of the flange, b^2 , will engage the head, c^8 , and will give to the piston valve, c , an initial movement partially uncovering the inlet port, a^{10} , after which the water pressure will complete the operation of the valve, and bring the parts again to the positions, as indicated in the drawings, and the complete cycle of operations will be repeated. It will thus be seen that the controlling valve is automatically operated by the water used to operate the piston, and that, further, the said valve is positively controlled by the movement of the piston, and cannot be operated until the piston approaches the limit of its stroke, and that when the piston approaches the limit of its stroke, the said valve will receive a positive initial movement sufficient to bring it to position to be operated upon by the water pressure.

From the above description it will be apparent that there has thus been produced a hydraulic motor possessing the various features of advantage hereinbefore enumerated as desirable, which consists of a minimum number of parts, which is economical in its use of water or other operating medium, and which obviously is susceptible of modification in its form, proportion, detailed construction and arrangement of parts, without departing from the principle involved or sacrificing any of its advantages.

Having thus described my invention, I claim:

1. In a motor, as described, a cylinder, a piston therein, a piston valve, inlet ports adapted to discharge on opposite sides of said valve, an outlet port, peripheral grooves in said valve, alternately registering with said outlet port as said valve is operated, conduits in said valve extending from the opposite ends and communicating with the respective grooves, substantially as and for the purpose specified.

2. In a motor as described, a cylinder, a piston therein, a single integral valve-head, an inlet port adapted to discharge alternately on opposite sides of said valve-head, an outlet port, conduits in said valve-head adapted to alternately register with said outlet port, and means for operating said valve-head to give thereto an initial movement in either direction by the action of the piston and completing said movement by water pressure, substantially as specified.

3. In a motor as described, a cylinder, a piston therein, a piston valve, inlet ports controlled by said valve, and an outlet port, peripheral grooves in said valve alternately registering with said outlet port, conduits extending into said valve and communicating with the respective peripheral grooves, substantially as specified.

4. In a motor as described, a main cylinder, a piston in said cylinder, a valve chamber at one end of said cylinder, a valve-piston in said valve-chamber, an inlet port at each end of said valve-chamber and an outlet port in said chamber, a discharge passage-way extending from either end of said valve-piston adapted to form a communication with said outlet port, and a sliding connection between said main-cylinder piston and said valve-piston adapted to impart to said valve-piston an initial movement near the limit of stroke of said main-cylinder piston in either direction sufficient to partially open one of said inlet ports, substantially as specified.

5. In a motor as described, a cylinder, a piston therein, a single integral movable head in said cylinder, a conduit leading from the extreme side of said movable head to the extreme side of said piston, an inlet port leading to said cylinder intermediate said head and piston, an inlet port communicating with said conduit, and means to impart to said head a limited movement at the limit of the stroke of said piston in either direction to cause said movable head to alternately partially open and close said inlet ports to permit the water pressure to move said head to the limit of its movement, substantially as and for the purpose specified.

6. In a motor as described, a cylinder, a piston therein, a single integral movable valve-head in said cylinder, an inlet port on either side of the path of movement of said valve-head, said inlet ports communicating with opposite sides of said piston, a conduit extending through said valve-head from each end thereof, an outlet port adapted to alternately register with said conduits, and a sliding connection between said piston and valve-head adapted at the end of the movement of said piston in either direction to operate said valve-head to partially open one of said inlet ports, completely close the other inlet port and one of said conduits, and to partially open the other conduit to permit the water-pressure to effect the complete operation of said valve-head so as to fully open the said first-mentioned inlet port and cause the partially opened conduit to completely register with the outlet port, substantially as and for the purpose specified.

In testimony whereof, I have hereunto set my hand this 3rd day of March A. D. 1906.

THEODORE MILTON HIESTER.

Witnesses:

HELEN L. SACHS,
JOHN C. SHEA.