W. G. BRIGGER.

WATER MOTOR.

APPLICATION FILED JUNE 19, 1919.

1,370,003.

Patented Mar. 1, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

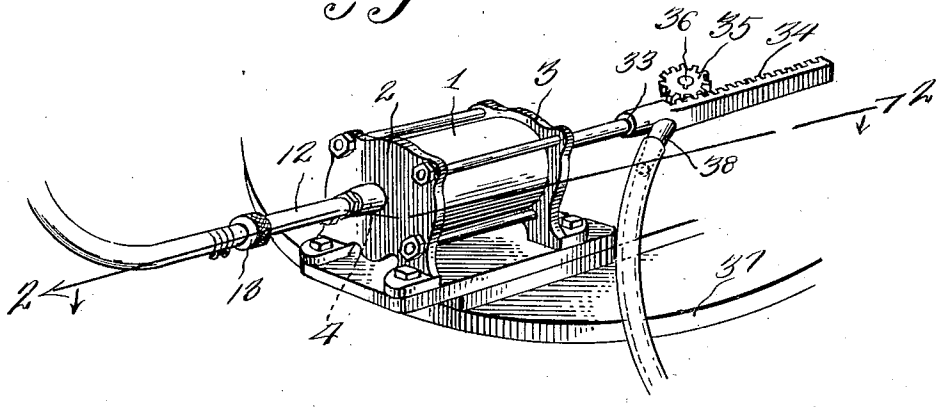
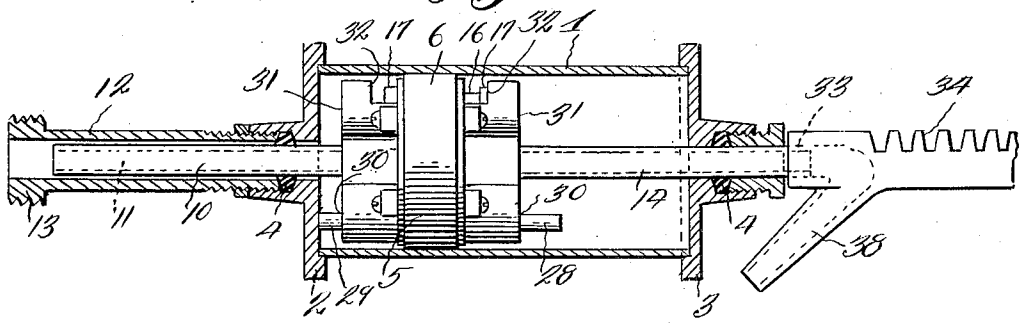


Fig. 2.



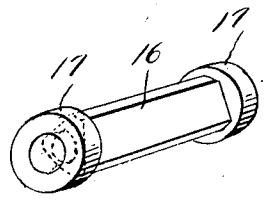


Fig. 7.

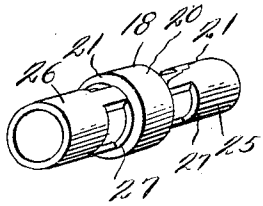


Fig. 8.

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2 SHEETS—SHEET 2.

Fig. 3.

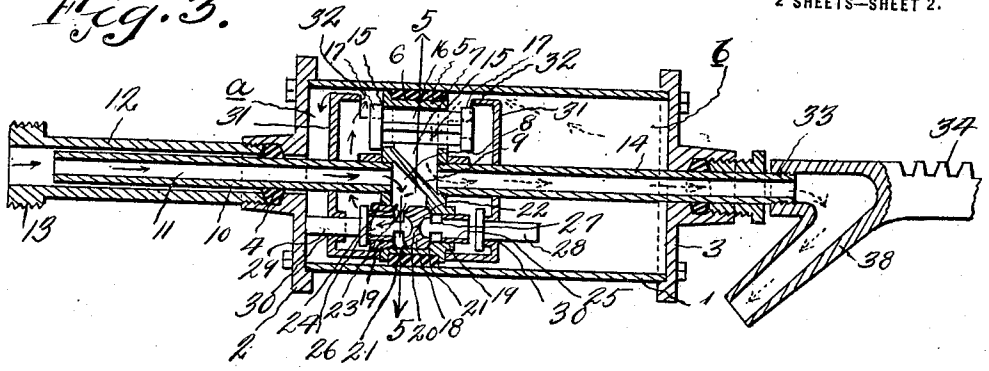
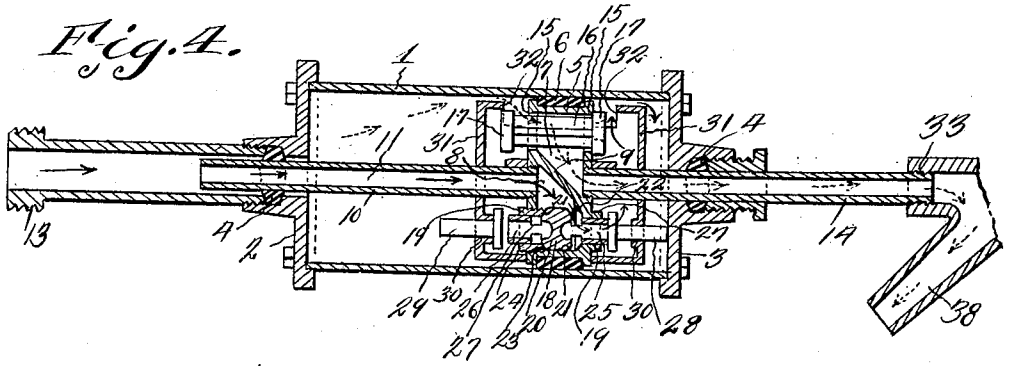


Fig. 4.



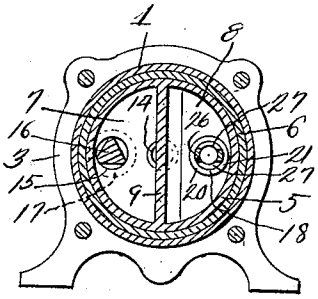


Fig. 5.

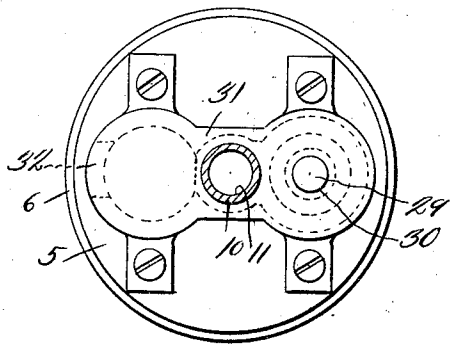


Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM G. BRIGGER, OF WASHINGTON, DISTRICT OF COLUMBIA.

WATER-MOTOR.

1,370,003. Specification of Letters Patent. Patented Mar. 1, 1921.

Application filed June 19, 1919. Serial No. 305,419.

To all whom it may concern:

Be it known that I, WILLIAM G. BRIGGER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification, reference being had therein to the accompanying drawing.

The invention relates to watermotors and has for its object to provide a motor of this character wherein the piston of said motor is reciprocated by fluid supplied and passing through said piston under pressure.

A further object is to provide a water motor of this character wherein water is admitted under pressure to a chamber of the piston, thence through a hollow valve stem to a chamber formed by a casing on one face of the piston and thence into one end of the cylinder, said passing of the fluid through the chamber of the casing closing a valve transversely disposed in the piston and at the same time opening an exhaust port on the other side of said piston thereby allowing the fluid in the other end of the cylinder to pass into a chamber of the piston and thence discharge through the piston rod at the opposite side to the intake.

A further object is to provide each chamber of the piston with opposite registering ports, said ports having slidably mounted therein valves adapted to coöperate with valve seats at said ports, one of said slidable valves forming an exhaust valve on both strokes of the piston and the other valve forming means for directing the fluid under pressure to either side of the piston according to the direction in which the piston is moving. Also to provide housings having ports therein on the faces of said pistons, and arching the ends of the slidable valves, and to slidably mount in said housings pilot valves, which pilot valves are adapted to engage the cylinder heads, thereby moving the intake control valve longitudinally at the ends of the strokes so as to reverse the direction of reciprocation of the piston.

With the above and other objects in view the invention resides in the combination and arrangement of parts as hereinafter set forth, shown in the drawings, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings:

Figure 1 is a perspective view of the water motor showing a conventional form of use of the motor for driving a washing machine.

Fig. 2 is a horizontal sectional view taken on line 2—2 of Fig. 1, showing the piston in elevation.

Fig. 3 is a horizontal sectional view showing the piston at one end of its stroke.

Fig. 4 is a horizontal sectional view showing the piston at the other end of its stroke.

Fig. 5 is a vertical sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is an end view of the piston.

Fig. 7 is a perspective view of the discharge control valve.

Fig. 8 is a perspective view of the intake control valve.

Referring to the drawings, the numeral 1 designates a cylinder, and 2 and 3 the cylinder heads, said cylinder heads being provided with packing glands 4. Disposed in the cylinder 1 and adapted to be reciprocated therein is a piston 5, which piston is provided with a conventional form of packing 6 for preventing the leakage of water from one side of the piston to the other side. The piston 5 is hollow and is divided into compartments 7 and 8 by means of a diagonally disposed wall 9. Threaded into one side of the piston 5 is a piston rod 10, which piston rod is hollow and is provided with an intake passage 11, whereby water under pressure is conducted to the chamber 8, said piston rod 10 reciprocating in the packing gland 4 and within an intake pipe 12 to which any suitable water supply pipe may be coupled as at 13.

A discharge pipe 14 which forms a piston rod is threaded into the opposite wall of the piston and preferably in axial alinement with the intake piston rod, its inner end being in communication with the discharge chamber 7 of the piston. The side walls of the piston are provided with ports 15, which ports are in communication with the discharge chamber and have slidably mounted in said ports a valve 16, which valve is triangular in cross section and is provided with headed members 17 forming valves, adapted to coöperate with the faces of the sides of the piston so as to admit and prevent the entrance of fluid into the discharge chamber according to the direction in which the piston is moving.

An intake control valve 18 is slidably

mounted in bearings 19 in the walls of the piston, at opposite sides of the intake chamber 8, said valve 18 being provided with a central solid portion 20, having on its opposite faces ground surfaces 21 which are adapted to coöperate with seats 22 and 23. The seat 23 is carried by a bushing 24, which bushing is threaded into one wall of the piston, said bushing being provided for the purpose of allowing the enlarged central portion of the valve to be placed within the chamber 8. It has been found that during the grinding and turning of the intake valve 18 and also during the assembling of the valve that the valve seats thereof vary in relation to their distances from the ends of the valve, hence when assembling the valve it is necessary that the valve be not put into the piston end for end. To avoid this difficulty, the portion of the valve that has a bearing in the bushing 24 is preferably of a larger diameter than the end 25, so that it will be impossible when assembling the parts to get the valve end for end. The portion 25 and the portion 26 are cylindrical and hollow and are provided with ports 27 so that water may be admitted to the hollow ends of the valve when said ports 27 are uncovered. Ends 25 and 26 project beyond the faces of the piston and are adapted to be coöperated with by pilot valves 28 and 29, which are in axial alinement with the valve 18 and are slidably mounted in bearings 30 of housings 31, which incase the ends of the valves 16 and 18 and are in communication with the ends of the cylinders by means of ports 32. The passages through the housings provide means whereby the force of the water is applied directly to the ends of the valves 16, thereby causing the action of the same to be immediate and positive, which is not the case where the water enters the end of the cylinder, then exerts its pressure between the cylinder head and the end of the exhaust valve.

The outer end of the discharge piston 14 has threaded thereon as at 33 a rack 34, which rack is adapted to engage a pinion 35 which is keyed or otherwise secured on a shaft 36, said shaft extending downwardly into a washing machine 37, and may have secured thereto any conventional form of agitator. The discharge piston discharges into an integral hollow lug 38, to which may be attached a hose, so that the water as it passes through the motor and is discharged therefrom may be conveyed to a sewer or other point of discharge.

The operation is as follows, the water enters through the piston rod 10 and enters the chamber 8, then it passes through the end 26, of the valve 18 exerting a pressure against pilot valve 29, reversing valve 18 to its opposite seat, then it passes through the chamber of the housing directing a direct pressure on the head of valve 16 thereby closing the same and then the water enters the end *a* through the port 32, said water being under pressure will fill the end *a* and will cause the piston to be forced toward the end *b* of the cylinder, however as the piston starts to move the valve end 26 is uncovered from the head of the pilot valve 29. When the piston reaches the end *b* of the cylinder, the pilot valve 28 hits cylinder head which closes the gap, strikes the end of inlet valve 18 and moves the same about half way, then the water pressure forces valve to opposite seat allowing the water under pressure to rush out and into the chamber of the housing 31, moves through the housing chamber and exerts a direct pressure on the head 17 of the exhaust valve 16 before water pressure escapes into end *b* of the cylinder through port 32. From the above it will be seen that the exhausting of water from the end *b* of the cylinder will be cut off and that the head 17 of the valve 16, will uncover the exhaust port 15 on the other side of the piston so that the water in the end *a* of the cylinder may pass through the port 15 into chamber 7, thence through piston 14 to its final discharge point. The operation of intaking and discharging may be continued and the piston caused to reciprocate within the cylinder. In the various figures the arrows in full lines show the course of the water to the driving side of the piston, those in dotted lines show the course of the water as it exhausts after performing its function of driving the piston.

It will be seen that a structure is provided wherein the action of the parts is positive, and wherein the working parts are reduced to a minimum.

The invention having been set forth what is claimed as new and useful is:—

1. In a motor of the character described, the combination with a cylinder, of a reciprocatory piston and piston rod mounted in the cylinder, exhaust and inlet chambers in said piston, inlet and exhaust valve members movably mounted in the piston and disposed in the exhaust and inlet chambers thereof, said valves having their ends extending beyond the faces of the piston, said inlet valve comprising a member having its ends hollowed and its central body enlarged, said central body being provided with surfaces for engaging valve seats in the walls of the intake chamber of the piston, ports of communication between the intake chamber and the hollow end of the intake valve, housings carried by the piston and housing the valve ends, ports in the housings adjacent the ends of the exhaust valve, and means supported in the housings for engagement with the ends of the cylinder whereby the enlarged central body portion of the inlet valve may be thrown into and out of en-

gagement with the valve seat, and the water admitted through the ports in the intake valve to one side or the other of the piston.

2. In a motor of the character described, the combination with a cylinder, of a reciprocatory piston and piston rod mounted in the cylinder, exhaust and inlet chambers in said piston, inlet and exhaust valve members movably mounted in the piston and disposed in the exhaust and inlet chambers thereof, said inlet valve comprising a member having its ends hollowed and its central body enlarged, said central body being provided with surfaces for engaging valve seats in the walls of the intake chamber of the piston, ports of communication between the intake chamber and the hollowed ends of the intake valve, housings carried by the opposite faces of the piston and arching the ends of the intake and exhaust valves, said housings having discharge ports adjacent the ends of the exhaust valve whereby the fluid will engage the ends of the exhaust valve before entering the cylinder thereby exerting its initial force on the exhaust valve and hammer members slidably mounted in bearings of the housings for coacting with the ends of the cylinder for moving the intake valve longitudinally, thereby directing the flow of fluid into the housing to one side or the other of the piston.

3. In a motor of the character described, the combination with a cylinder, of a reciprocatory piston and piston rod mounted in the cylinder, exhaust and inlet chambers in said piston, inlet and exhaust valve members movably mounted in the piston and disposed in the exhaust and inlet chambers thereof, said inlet valve comprising a member having its ends hollowed and its central body enlarged, said central body being provided with surfaces for engaging valve seats in the wall at one side of the inlet chamber, a reduced bushing surrounding the other hollowed end of the inlet valve and being provided with a seat with which the other side of the enlargement coöperates, ports of communication between the intake chamber and the hollowed ends of the intake valve, housings carried by the opposite faces of the piston and arching the ends of the intake and exhaust valves, said housings being provided with discharge ports adjacent the ends of the exhaust valves, slidable hammer members slidable in bearings in said housings and adapted to engage the ends of the cylinder for shifting the intake valve thereby changing the flow of water and causing the water to enter the housings and its initial force to be applied to the ends of the exhaust valve before passing through the housing ports and changing the direction of the movement of the piston, said hammers being in axial alinement with the intake valve.

4. The combination with a reciprocatory piston fluid operated, and provided with a slidable reversing valve and a slidable exhaust valve, of housings carried by the piston and arching the ends of the valves, said housings having discharge ports adjacent the ends of the reversing valve but positioned so that the water will come in contact with the ends of the reversing valve before passing through the ports, and hammer members slidably mounted in bearings of the housings and adapted to be moved for shifting the intake valve.

In testimony whereof I hereunto affix my signature.

WILLIAM G. BRIGGER.