W. G. STOWELL.

WATER MOTOR.

APPLICATION FILED SEPT. 27, 1909.

956,225. Patented Apr. 26, 1910.

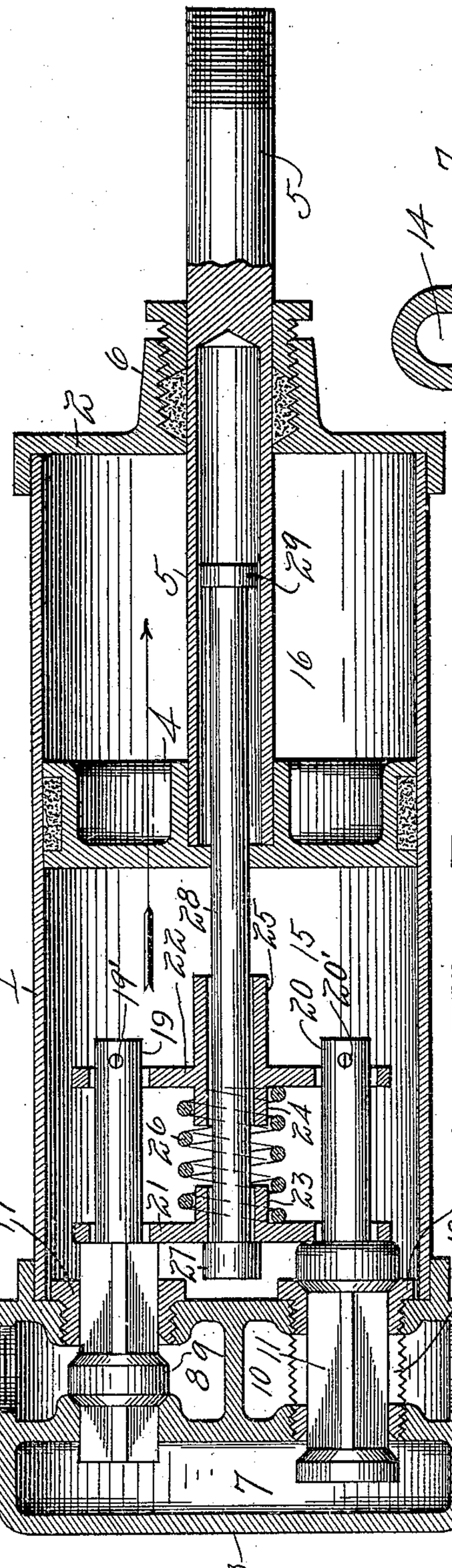

FIG. 2.

FIG. 3.

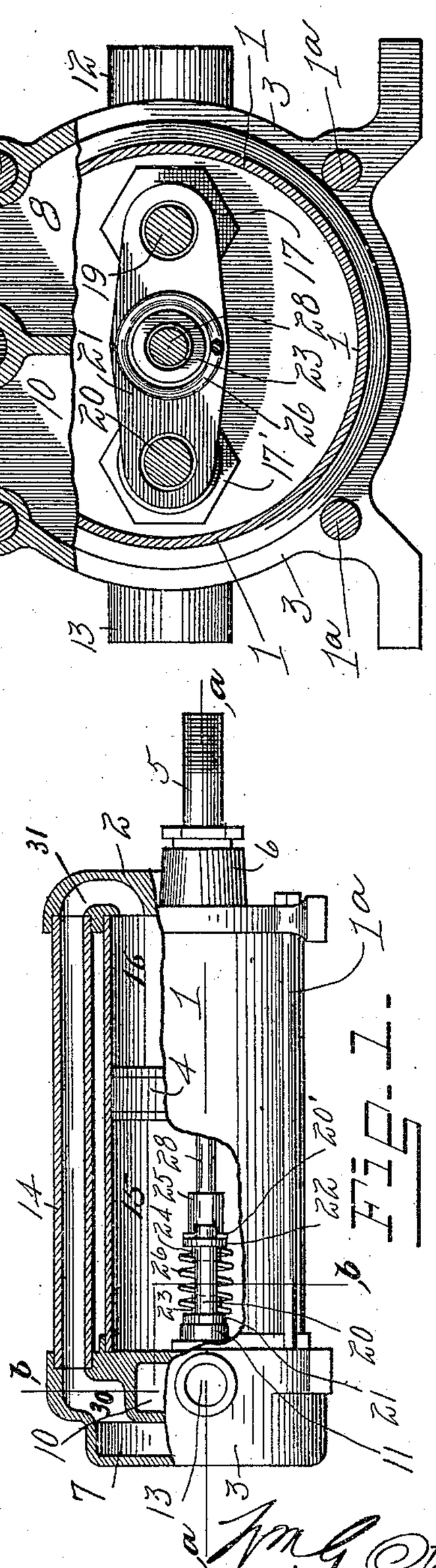

FIG. 4.

FIG. 1.

Witnesses

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WATER-MOTOR.

956,225. Specification of Letters Patent. **Patented Apr. 26, 1910.**

Application filed September 27, 1909. Serial No. 519,781.

To all whom it may concern:

Be it known that I, WILLIAM G. STOWELL, 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; 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 reciprocating water motors of the type especially adapted for running light machines, such for example, as washing machines.

Among the special objects of the invention is, first, to provide a construction which prevents unnecessary compression of the spring which performs the function of completing the movement of the valves after said valves have been unseated by other means. By thus preventing the spring from compressing unnecessarily or coil upon coil, crystallization and breakage of said spring is avoided, and as a consequence, the effective life of the spring is considerably prolonged. Secondly, an object of the invention is to provide a water motor of the above type with as few packed joints as possible, and to thus correspondingly increase the efficiency of the motor. With this object in view, a detachable valve housing is provided which forms one end of the motor cylinder, and dispenses with a packed joint on one side of the valve.

Other features of advantage, such as accessibility to the valves and adjunctive devices will appear in the following description in connection with the annexed drawings, of which—

Figure 1, is a side elevation of my improved water motor with a portion of the cylinder wall broken away. Fig. 2, is an enlarged horizontal section on the line *a a* of Fig. 1. Fig. 3, is a sectional elevation on the line *b b* of Fig. 1.

In the following description of the invention, similar reference characters indicate corresponding parts.

The cylinder 1 is inclosed at one end by a head 2, and at the other end by a valve housing 3, said head and valve housing being held rigidly on the ends of the cylinder by rods 1ª which are fitted with the usual heads and nuts. The valve housing 3 is in a single casting which eliminates the necessity of employing two packed joints, one on each side of the valve. The said valve housing has a pulsation chamber 7, and inlet and outlet chambers 8 and 10 respectively, which communicate with the pulsation chamber 7, and the main chamber of the motor through double puppet inlet valve 9 and double puppet exhaust valve 11.

It will be understood that the communication between the inlet and exhaust chambers 8 and 10 and the pulsation chamber 7, and the main chamber 15 of the motor, takes place alternately to reverse the current of the energizing fluid to drive back and forth the piston 4 which will be again referred to. The double puppet inlet valve 9 seats against opposite seats, one of which is formed on the interior of the valve housing, and the other of which is formed in a detachable bushing 17 which is screwed into the valve housing as shown. The double puppet exhaust valve 11 is provided with both of its seats in a single bushing 17′ which is screwed into the valve housing across the outlet or exhaust chamber 10 and affords a communication between the exhaust chamber 10 and the pulsation chamber 7 and main chamber 15 through a suitable number of ports 18 in the sides of said bushing. The chambers 8 and 10 are provided with an inlet and outlet 12 and 13 respectively. The pulsation chamber 7 communicates with the space or chamber 16 between the piston 4 and head 2 of the cylinder by means of a passage way extending through a pipe 14 which connects with ports 30 and 31 in the valve housing 3 and head 2. It is obvious that the inlet valve 9 may be extracted from the housing 3 by detaching the bushing 17, and also the exhaust valve 11 may be extracted by removing the bushing 17′ from the valve housing.

From the description thus far given, it will be understood that if the valves 9 and 11 are in one of their positions, for example, that shown in Fig. 1, the motive fluid will pass out of the valve chamber 8 into the chamber 15, the position of the inlet valve 9 establishing such a communication, and the exhaust fluid will pass out of the chamber 16

through the passage way 14, pulsation chamber 7, and through the exhaust chamber 10, and the piston will travel in the direction of the arrow—Fig. 2. If the positions of the valves are reversed, the direction of the flow of the motive and exhaust fluids will be likewise reversed, and the piston will travel in a reverse direction. The piston 4 is connected to a hollow piston rod 5 which extends through a packing gland 6 in the head 2 of the motor. The means for reversing the positions of the valves in order that the piston may travel back and forth within the motor cylinder, will now be described.

The inlet valve 9 and the exhaust valve 11 are provided with stems or extensions 19 and 20 which lie in the direction of the piston 4. Upon these extensions are mounted trip plates 21 and 22 which extend from one valve stem to the other and are held upon said stems by pins 19′ and 20′. Lying between the said trip plates 21 and 22 is a helical spring 26 which is instrumental in completing the movement of the valves after they have been unseated by other means presently described. This spring 26 is prevented from being compressed coil upon coil by abutments 23 and 24 which extend inwardly from the trip plates 21 and 22. The end coils of the spring fit over the these abutments substantially as is shown in the drawings. Passing through the apertures in the trip plates 21 and 22 is a rod 28 which is provided with a head 27 which lies on the outer side of the trip plate 21. The said rod 28 extends into or through the piston 4 and into a chamber or bore 5′ in the end of the piston rod 5. The end of the rod 28 so extended into the piston rod is provided with a head 29. It will thus be seen that the heads 27 and 29 of the rod 28 will engage, respectively, the trip plate 21 and the piston 4 when said piston is moving in the direction of the arrow, Fig. 2. When the piston reaches the end of the stroke, it will engage the head 29, and the head 27 will engage the trip plate 21 and the spring 26 will be compressed until the abutments 23 and 24 come in contact. At this time the valves are being held rigidly by the pressure of the motive fluid, and the trip plate 22 is being held by the pins 19′ and 20′. The continued movement of the piston, after the abutments 23 and 24 come in contact, will unseat the valves and throw them into a balanced position, owing to the pressure of the motive fluid being equal on both sides of the piston. It will be apparent that further compression of the spring 26 cannot take place after the abutments 23 and 24 have made contact, and that the spring is thus prevented from compressing coil upon coil in a manner that would materially curtail its usefulness. After the piston has reached the limit of its movement in which the spring is compressed by the engagement of the heads 27 and 29 as described, the compressed spring 26 will expand and will complete the movement of the valves to reverse the direction of the flow of the motive fluid, and thus reverse the travel of the piston.

It will be understood that the valves 9 and 11 are not given their initial movement until the abutments 23 and 24 engage, and that the movement then given is not a completed movement, but the action of the compressed spring instantaneously completes the movement. When the piston reaches the end of its stroke in the other direction, or in the direction opposite that which is indicated by the arrow in Fig. 2, the said piston will strike the projection 25 extending from the trip plate 22, and the spring 26 will be compressed until the abutments 23 and 24 engage. At this time, the valves will be given their initial movement in the opposite direction and the compressed spring will complete such movement, and thus the piston 4 will continue its travel back and forth in the cylinder in a manner that is readily understood by those familiar with reciprocating water motors. It will also be understood that the power is transmitted from the motor through the piston rod 5 which is usually geared to the machine to be driven. This manner of connecting the motor with the machine to be operated thereby, is well known and requires no illustration or description.

I claim:

1. In a motor of the type specified, a cylinder, an integral valve housing forming one head of said cylinder, double puppet inlet and double puppet exhaust valves mounted in said valve housing, said valves having extensions, valve actuators mounted on said extensions, said actuators having portions forming bumpers or abutments adapted to engage each other in the movement of said actuators to unseat the valves, a spring mounted between said actuators and adapted to be compressed until said bumpers on abutments engage, and to impart to the valves their final movement, and means operated from the piston for shifting said actuators to compress the spring and unseat the valves.

2. In a water motor, a cylinder, a piston, a valve housing joining said cylinder, inlet and exhaust valves mounted in said housing, valve actuators mounted on said valves, said actuators provided with abutments which engage each other to unseat said valves, a spring mounted on said abutments and adapted to be compressed by said actuators and to seat said valves, and means under the control of the piston and adapted to compress the spring, and to cause the engagement of the abutments on the actuators and to thereby unseat the valves.

3. In a motor of the type specified, inlet and outlet valves, actuators connected to said valves, and adapted to unseat said valves, said actuators having abutments whereby they are moved in unison to unseat the valves, an abutment on one of said actuators engaged by the piston to impart movement to said actuators in one direction, and means actuated by the piston to impart movement to said actuators in the opposite direction, and a spring compressed by said actuators to a point where said actuators are caused to abut by the movement of the piston, said spring imparting to the valves their final movement.

4. In a water motor, the combination with a cylinder, a piston within said cylinder, a valve housing joined to one end of said cylinder, and inlet and exhaust valves having extensions, of valve actuators loosely supported on said extensions and connecting the valves, said actuators having abutments, one of said abutments limiting the independent movement of either of the actuators, and the other of said abutments engaged by the piston, and whereby movement of the actuators in one direction is obtained, a rod engaged by the piston to impart to the actuators movement in the other direction, and a spring interposed between the actuators to impart to the valves their final movement after the completion of each movement given the valves by the actuators.

5. In a water motor, a cylinder, a valve housing in one end of said cylinder, inlet and exhaust valves in said housing, said valves having extensions, valve actuators slidingly mounted on said extensions and connecting the valves, said actuators being adapted to impart the initial movement to the valves in both directions, an abutment interposed between said actuators to cause them to move in unison after one or the other of said actuators has been given an independent initial movement, a spring mounted between said actuators and adapted to be compressed to the point where the actuators move in unison, thereby limiting the extent of compression of the spring, said spring when so compressed being adapted to impart the final movement to the valves after they have received their complete initial movement from the actuators, a rod projected freely through the actuators and adapted to actuate the valves in one direction when said actuators are moved in unison by said rod, a piston, and an abutment interposed between one of the actuators and said piston and engaged by said piston to impart to said actuators a similar movement in the opposite direction, and to thereby impart to said valves their initial movement in the other direction, and to compress said spring for the final movement of the valves in such direction.

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

WILLIAM G. STOWELL.

Witnesses:
MATTHEW SIEBLER,
R. J. MCCARTY.