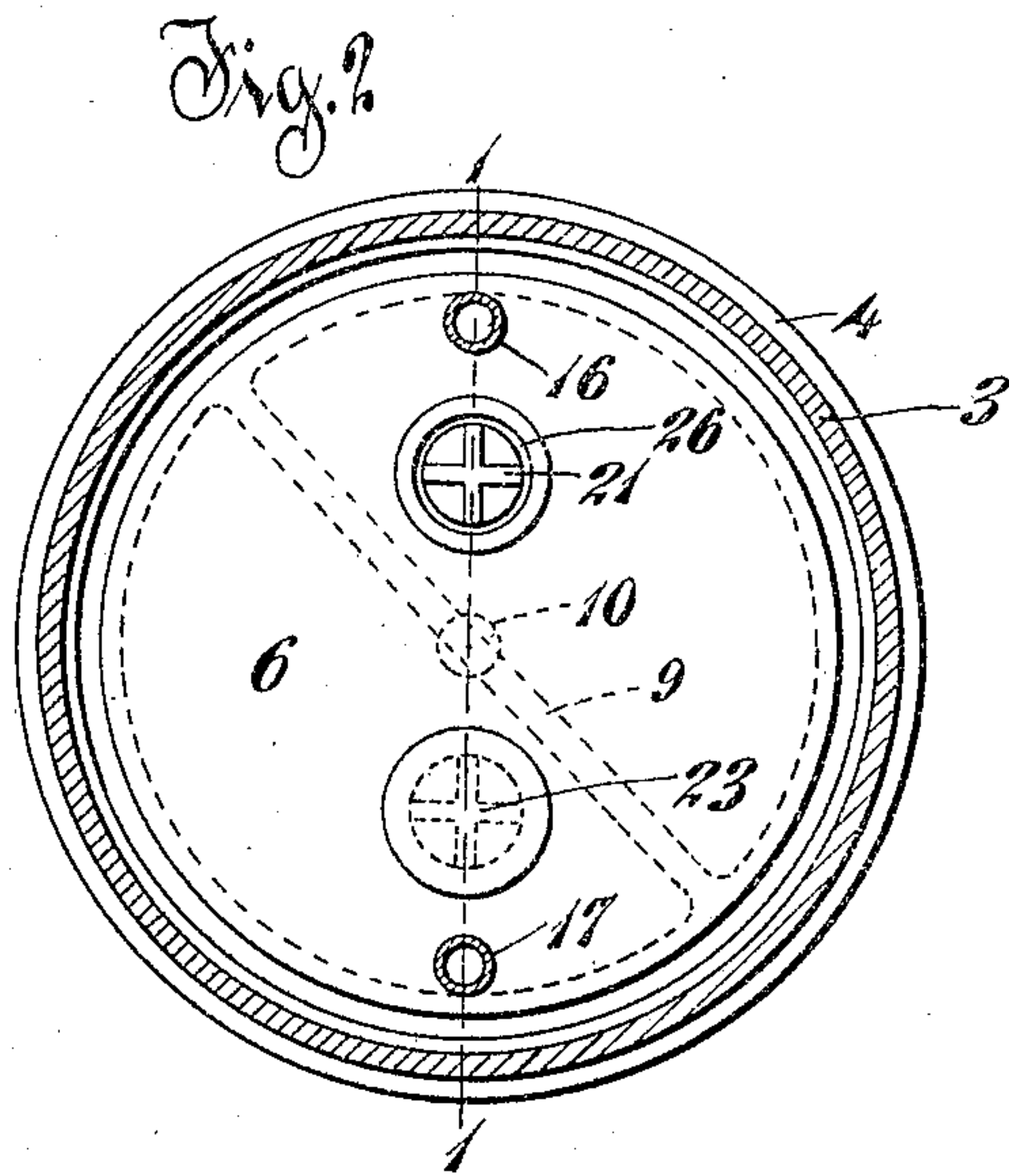
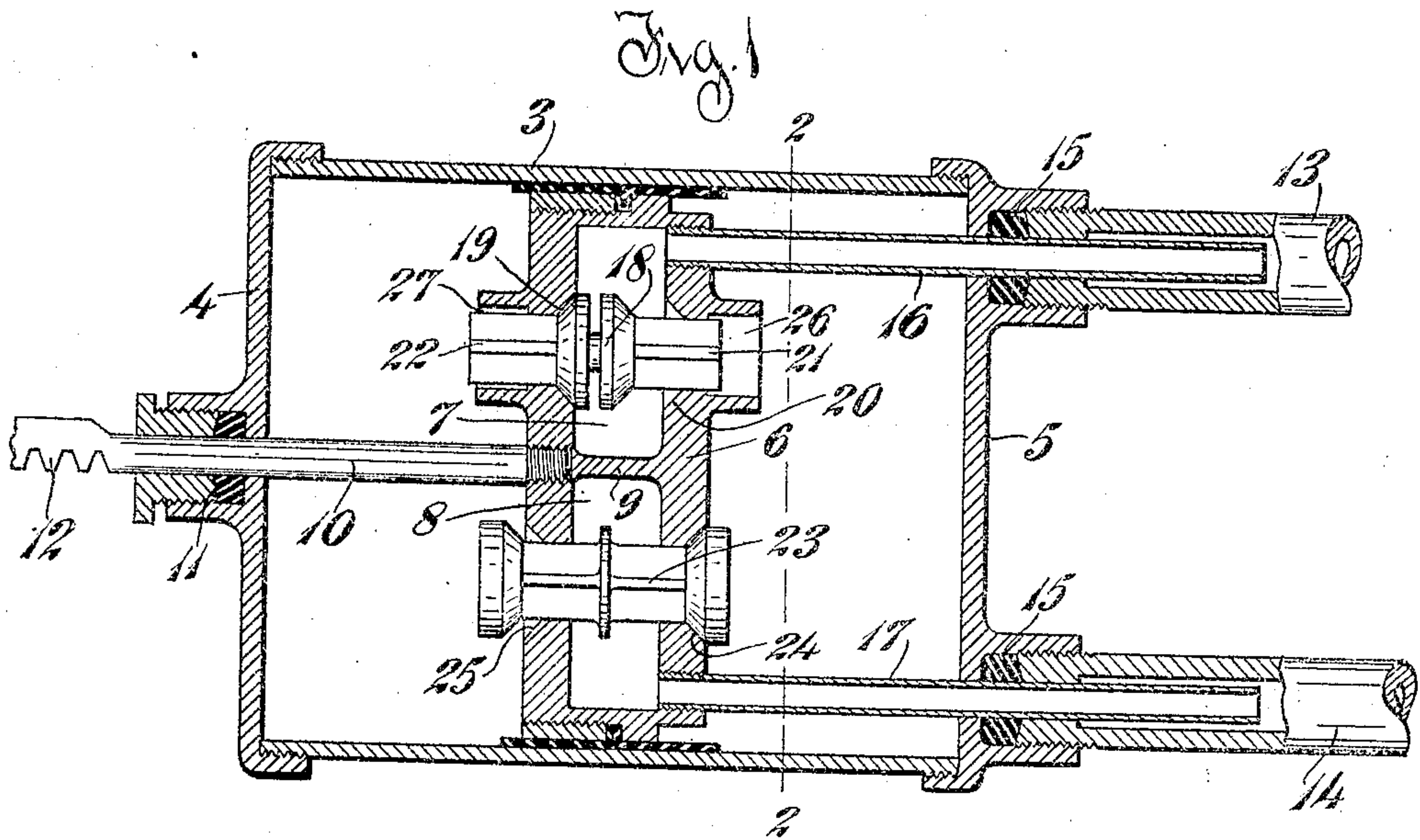


H. R. IRWIN & H. C. CHAMBERS.  
WATER MOTOR.

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Witnesses  
Arthur H. Ewald  
Bessie A. Beall.

Inventors  
Harry R. Irwin  
Henry C. Chambers  
by Alfred M. Allen  
att'y



# UNITED STATES PATENT OFFICE

HARRY R. IRWIN, OF NEWPORT, KENTUCKY, AND HENRY C. CHAMBERS, OF CINCINNATI, OHIO; SAID CHAMBERS ASSIGNOR TO SAID IRWIN.

## WATER-MOTOR.

951,913.

Specification of Letters Patent.

Patented Mar. 15, 1910.

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*To all whom it may concern:*

Be it known that we, HARRY R. IRWIN, a citizen of the United States, residing in Newport, county of Campbell, and State of Kentucky, and HENRY C. CHAMBERS, a citizen of the United States, residing in Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Water-Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our improvements relate to water motors for driving light machinery and the like, and the improvements are especially designed for that class of water motors in which a hollow piston divided into non-communicating compartments is provided, the piston carrying the inlet and exhaust valves, and this whether the piston is arranged to reciprocate in the motor chamber or to oscillate as in the rotary type of motors.

The object of the invention is to avoid the use of springs for the inlet and exhaust valves which have heretofore been found necessary in this type of motor.

In the drawings Figure 1 is a longitudinal section of our improved motor, taken on the lines 1, 1 of Fig. 2. Fig. 2 is a cross section taken on the lines 2, 2 of Fig. 1.

3 is the motor cylinder provided with the heads 4, 5, which are properly secured on the ends of the cylinder.

6 is the piston which is constructed with a central hollow space divided into two non-communicating chambers 7, 8, by the partition wall 9.

10 is the piston rod passing through the head 4, with suitable stuffing box 11, and provided on its outer end with a rack bar 12, or any other suitable connection for communicating power.

13 is the supply pipe for the water, and 14 the exhaust, which pipes are secured to the head 5, and provided with suitable stuffing boxes 15, 15.

16 is the tube for conveying the supply water to the inlet chamber of the piston, and 17 the exhaust tube for taking off the exhaust water. These tubes are secured to

the piston 6, and as the piston is moved the tubes slide back and forth in the stuffing boxes 15.

18 is the double puppet inlet valve with valve seats 19, 20 on the inside of the inlet chamber 7, in the piston, and with the stems 21, 22 of the valve projecting through the walls of the piston on each side.

23 is the double puppet exhaust valve with seats 24, 25 on the outside of the piston in the exhaust chamber 8.

Surrounding the valve stems 21, 22 of the inlet valve and integral with or properly secured on the outer face of the piston on each seat are the cups 26, 27. The side walls of these cups are of such a height that the inlet valve stem when the valve is closed on that side, will extend slightly beyond the upper edge of the wall of the cup.

In the operation of the motor the inlet valve as the piston moves back and forth is thrown slightly off of its seat by coming in contact with the head of the cylinder. The cup surrounding the valve stem then makes a seat against the head of the cylinder and the live water filling into the cup accumulates sufficient pressure to project the valve across the chamber in the piston and forcibly seat it in the opposite wall of the piston. In this way the use of springs to throw the valves are obviated, and the pressure accumulating in the cups is sufficient to prevent any balancing of the valve, and consequently stoppage of the motor. The inlet valve is thus shifted to its seat in the opposite wall of the piston before the exhaust valve is actuated. The water being entirely cut off from one end of the cylinder by the reversal of the inlet valve, there is instantly a very strong suction around the open exhaust valve which, without any preliminary unseating, unseats the exhaust valve, and this unseating of the exhaust valve in the opposite side of the cylinder allows water to start exhausting from that side, while the full pressure of the water in the other end of the cylinder closes the exhaust valve on that side.

The water enters through the tube 16 into the inlet chamber 7 in the piston 6 and passes out through the open valve into the right hand side of the cylinder, as shown in



Fig. 1, closing the exhaust valve on that side and driving the piston to the left. The moment the valve stem of the inlet valve comes in contact with the head 4 of the cylinder, the inlet valve is shifted from its seat 19 and the cup seats itself, or almost seats itself on the head. This inclosing in of the water passing around the seat of the inlet valve creates sufficient back pressure to suddenly throw the valve to the opposite side. The right hand end of the cylinder is therefore cut off from the inrush of water, and the pressure is transferred to the left hand end of the cylinder, which pressure in the left hand end of the cylinder is sufficient to unseat the exhaust valve and force it to its opposite side. The exhaust valve is therefore opened on the opposite side of the cylinder and the piston head is driven to the right, and thus the motor drives the piston back and forth in the cylinder. In the oscillating rotatory type of motor, where the piston is mounted as a wing on the rocking or oscillatory piston rod, the valves are mounted in the same way to come in contact with the rotatory oscillation of the motor cylinder.

Having thus described our invention what we claim as new and desire to secure by Letters Patent, is:

30 1. In a water motor, a motor chamber, with a piston movable therein, means for supplying water to both sides of said piston, a double inlet valve to control said supply, and an exhaust valve to control the exhaust, a fixed contact surface to shift the inlet valve from its seat, and means independent of the valve and forming a part of the piston to accumulate water pressure beyond the valve seat in the rear of the valve to fully actuate the same.

40 2. In a water motor, a motor chamber, with a piston movable therein, means for supplying the water to both sides of said piston, a double inlet valve to control said supply, and an exhaust valve to control the exhaust, a fixed contact surface to shift the inlet valve from its seat, and a chamber independent of the valve and formed by a part of the piston beyond the valve seat to

accumulate pressure in the rear of the valve 50 to fully actuate the same.

3. In a water motor, a motor chamber, with a piston movable therein, means for supplying the water to both sides of said piston, a double inlet valve to control said supply, and an exhaust valve to control the exhaust, a fixed contact surface to shift the inlet valve from its seat, and cups inclosing the valve stems formed on the piston beyond the valve seats to form with the cylinder head a chamber for the accumulation of pressure in the rear of the valve to fully actuate the same.

4. In a water motor, a motor chamber, with a hollow piston having an inlet and an exhaust chamber, and double puppet inlet and exhaust valves therefor, a fixed contact surface to shift the inlet valve from its seat on either side, and means independent of the valve and forming part of the piston to accumulate water pressure beyond the valve seat in the rear of the valve to fully actuate the same.

5. In a water motor, a motor chamber, with a hollow piston having an inlet and an exhaust chamber, with double puppet inlet and exhaust valves therefor, a fixed contact surface to shift the inlet valve from its seat on either side, and a chamber independent of the valve and formed by a part of the piston beyond the valve seat to accumulate pressure in the rear of the valve to fully actuate the same.

6. In a water motor, a motor chamber, with a hollow piston having an inlet and an exhaust chamber with double puppet inlet and exhaust valves therefor, and cups on the piston surrounding the inlet valve stems beyond the valve seats to form with the cylinder head chambers for the accumulation of pressure in the rear of the valves to fully actuate the same.

HARRY R. IRWIN.

HENRY C. CHAMBERS.

Witnesses:

ARTHUR H. EWALD,  
BESSIE A. BEALL.