No. 882,025. PATENTED MAR. 17, 1908.

G. W. SPOELSTRA.

WATER MOTOR.

APPLICATION FILED DEC. 26, 1906.

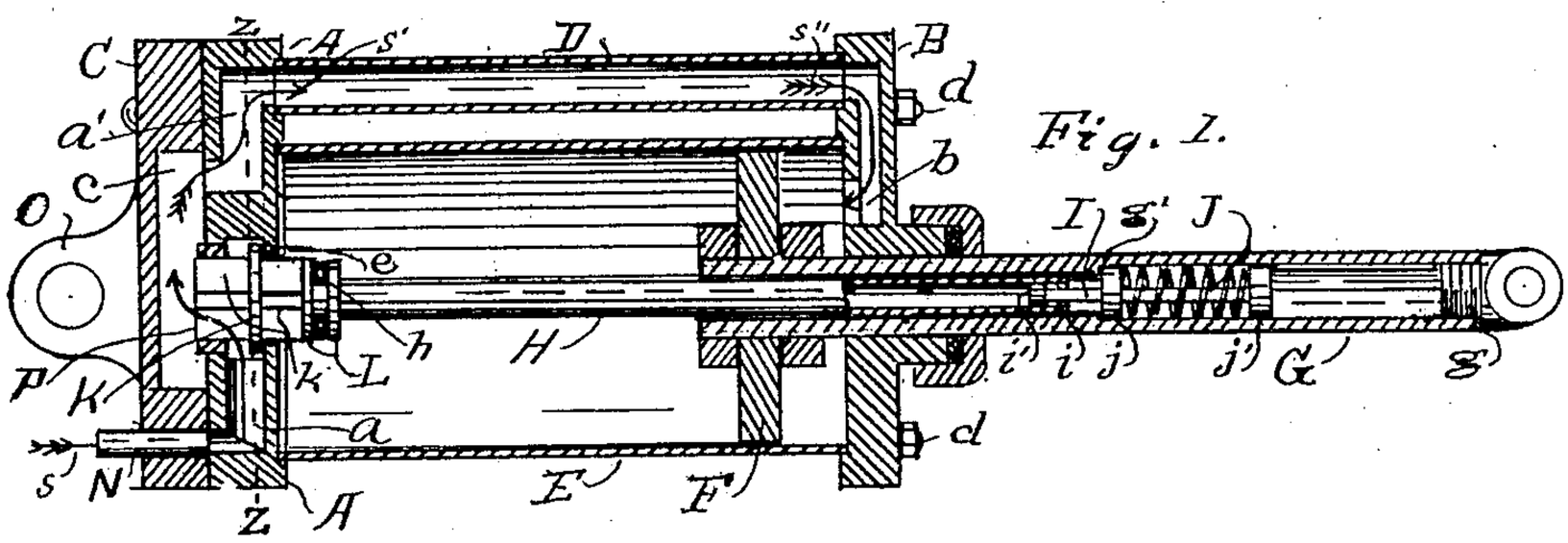



Fig. 1.

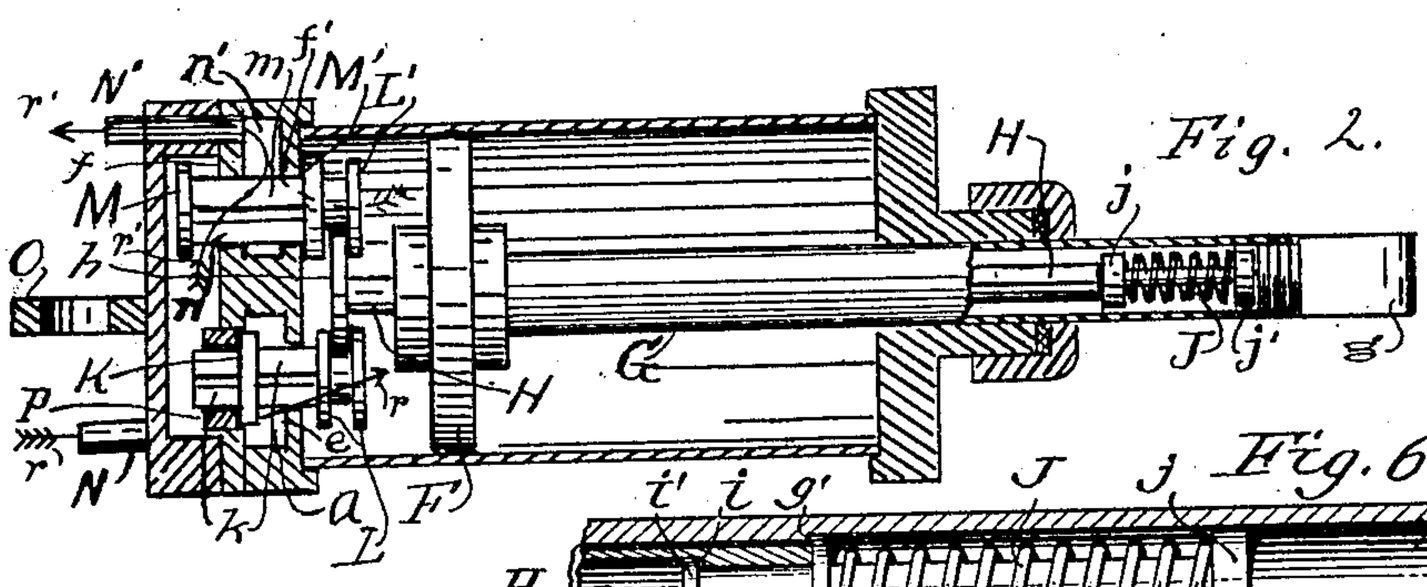



Fig. 2.

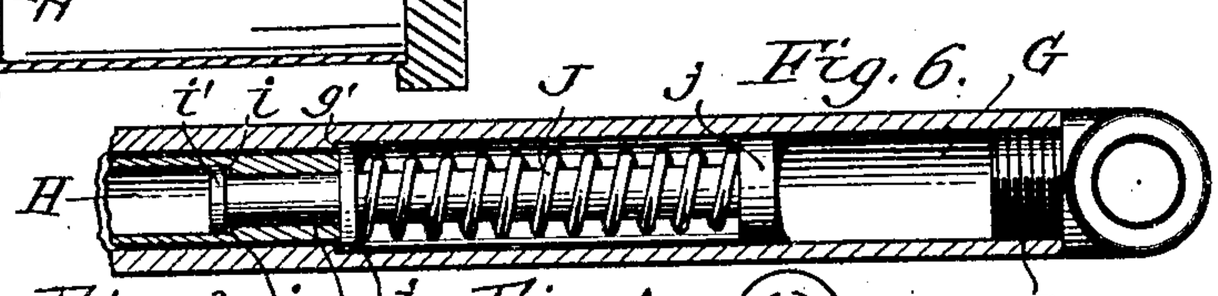



Fig. 6.

Fig. 3.

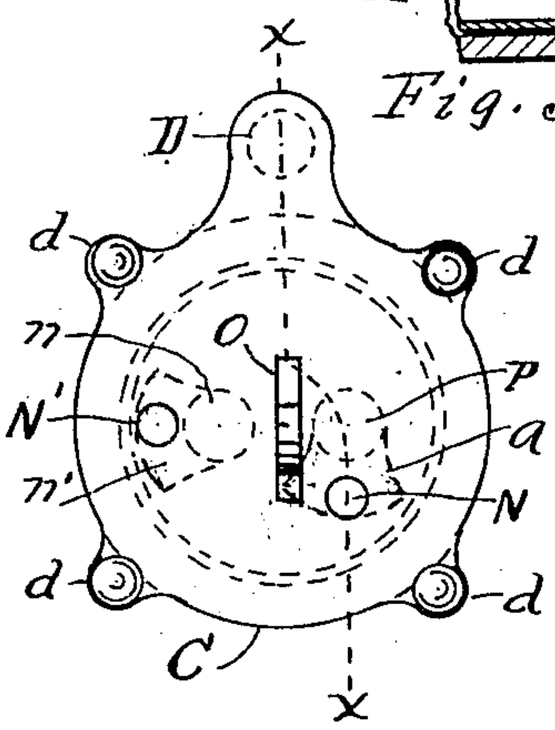



Fig. 4.

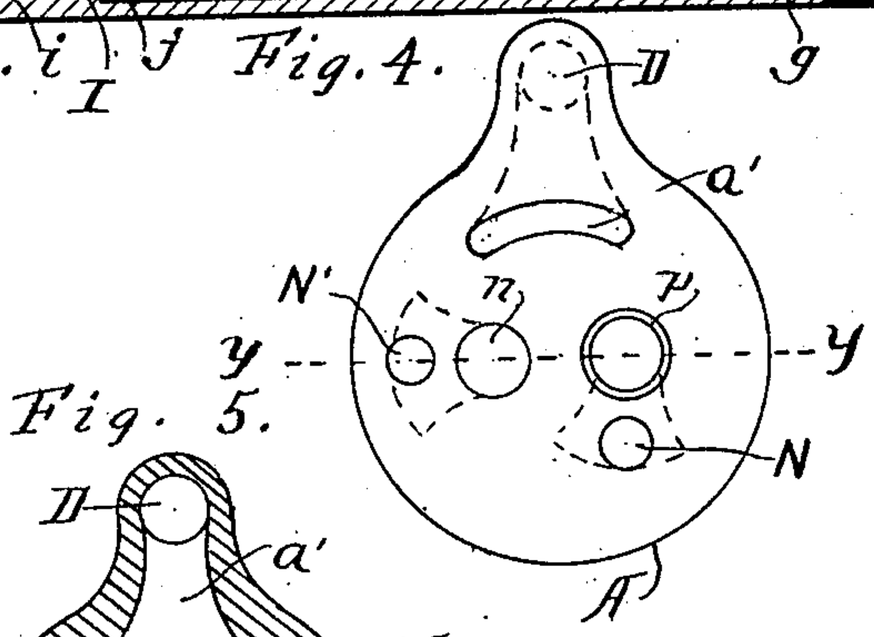
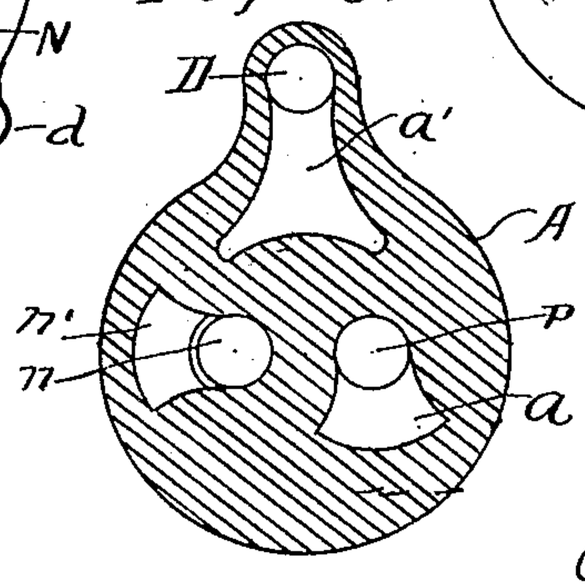



Fig. 5.




Inventor

Witnesses

Louie Cilley

Cecil C. Cilley

By George W. Spoelstra

Ethril J. Cilley

Attorney

# UNITED STATES PATENT OFFICE.

GEORGE W. SPOELSTRA, OF GRAND RAPIDS, MICHIGAN.

## WATER-MOTOR.

No. 882,025. Specification of Letters Patent. Patented March 17, 1908.

Application filed December 26, 1906. Serial No. 349,575.

*To all whom it may concern:*

Be it known that I, GEORGE W. SPOELSTRA, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

My invention relates to improvements in water motors for use in driving churns, washing machines, &c., and its object is to provide a water motor that may be connected with any domestic water supply system under pressure, and will adjust itself to the position of the machine. I attain this object by the mechanism illustrated in the accompanying drawing in which

Figure 1 is a sectional elevation of the motor on the line *x x* of Fig. 3; Fig. 2 is a like view on the line *y y* of Fig. 4; Fig. 3 is an end elevation of the motor; Fig. 4 is the same with the head piece or cap removed, and Fig. 5 is a sectional elevation of the same on the line *z z* of Fig. 1 and Fig. 6 is a detailed view of the outer end of the piston rod and its connections.

Similar letters refer to similar parts throughout the several views.

A represents the head of the machine in which the several valves and ports are formed by means of which the flow of water is alternately directed, first to one end of the motor and then to the other end.

B is the opposite head of the motor, and C is the cap that unites with the head A to complete the valve and port system of the motor.

The cylinder of the motor consists of a tube F clamped between the heads A and B in position to form water tight joints at both ends, and in this cylinder is placed a piston F, mounted upon a hollow piston rod G which passes out through the cylinder head B and terminates with a bearing *g* that is designed to connect the piston rod with whatever machine it is desired to drive with the motor. The rod G has a shoulder *g'* some little distance back from the outer end, as indicated in Fig. 1, designed to actuate the spring J as hereinafter more fully described.

The head A has two port holes formed through it as at P and *n* for the reception of the valves K and M; the valve K being designed to be actuated to control the flow of water into the cylinder, is made with a central valve seat K that is made to seat upon the well or thimble P when it is desired to direct the flow of water directly into this end of the cylinder E, when the water will flow in as indicated by the arrow *r* to force the piston F back to the right, from the position shown in Fig. 2 to that shown in Fig. 1. To reverse this motion and force the piston back to the position shown in Fig. 2, a pipe D is placed between the heads A, B in position to form a free water channel between the ports *c* and *b*, so that a free flow of water may be forced through this channel as indicated by the arrows *s*, *s'*, *s''* to the opposite end of the cylinder E, and the valves K and M are drawn back so that the valve K will seat on the wall *e* and the valve M will seat on the wall *f*, which closes the inflow port to the cylinder at this end, and opens the outflow or exhaust port M' so that water in this end of the cylinder, when the piston starts back from its extreme right hand position, will flow out of the valve port *n'*, as indicated by the dotted outline of the arrow *r'* until the piston F has reached its extreme left hand position when the valve K will be forced against the seat P allowing the water to again enter this end of the cylinder and force the piston back to the right, when water from the right hand end of the cylinder will be forced back through the pipe D and out of the exhaust port, as indicated by the full lines of the arrow *r'* in Fig. 2.

I provide for actuating the valves K and M by forming a double collar, L on the intake valve stem K and L' M' on the exhaust valve M M', so arranged that the disk *h* will engage them. This disk is mounted upon the rod H, which, in turn, is made to slide freely in the piston rod G, and for actuating the valves without too much jar or strain I place a rod I in the hollow rod G, the end of which passes into the end of the rod H, which is, also, hollow, and has a head thereon, as at *i'*, that is engaged and held by the flange *i* in the end of the rod H. The rod I may slide down into the rod H but cannot be drawn out. The rod I has a head *j'* securely fastened to one end, and a head *j* slidingly fastened to the other end with a spring J between them in such a position that when the piston is to the extreme right hand end of the cylinder the head *j* will engage the shoulder *g'* in the rod G, and force the spring back until its tension will become sufficient to draw the valves K M and M' back to the right to open the intake port to the pipe D and the exhaust port to exhaust from the left hand end of the cylinder, and when the piston has reached the ex-

treme left end of the cylinder the end *g* of the rod G will engage the head *j'* on the rod I and will press the rod back until the tension of the spring will force the valves to the left, opening the opposite port holes and allowing the water to flow into and out of the cylinder in the opposite direction, thus alternating the pressure of water upon the piston F and causing it to reciprocate from end to end and back, in the cylinder E.

It will be readily seen that, with the construction hereinbefore described, the intake valve K and the exhaust valves M M', while acting in unison, are each actuated, practically, independent of the other. That is to say: when seated in either direction by the disk *h*, the valves, not being rigidly connected by an integral arm or body, may each have a slight longitudinal movement independent of the other, thus insuring a perfect seating of both valves, which cannot be positively attained with valves that are rigidly connected.

*k* represents the web of the valve K, and must be made to extend each way from the valve to balance it in its bearings, and *m* is the web that connects and supports the valves M and M' and must be of sufficient length between the valves to allow of considerable movement to the valve.

N represents the inflow pipe and N' represents the exhaust pipe and they are so arranged that water flowing in through the pipe N will reach the valve K, and its ports, through the chamber *a*, and water leaving the cylinder will pass through the valve ports *n* and *n'* to the exhaust pipe N', and out of the motor.

O represents a loop by means of which the motor may be anchored to some sustaining object in such a way that it may oscillate to meet any necessary variation in the position of the opposite end of the cylinder by reason of transmitting motion to any revoluble or oscillating object, as a churn, washing machine, &c. and the motor is assembled and held firmly together, longitudinally, by means of bolts *d*, or any other suitable and available device.

In Fig. 1 I have shown the rod H cut away at the outer end to show the manner of connecting the rod I, and in Fig. 2 I have shown the rod G cut away at the outer end to show the action of the spring J, &c., at this position in the stroke of the piston F of the motor.

One of the most desirable features of this invention lies in the ease with which the spring J can be reached and repaired, it being accessible by simply unscrewing the bearing *g* and removing it from the piston rod, with the piston at the left hand end of the cylinder, which is not possible with other springs of the kind.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a water motor, a cylinder, cylinder heads secured thereto and having intake and exhaust ports, a valve seated in the intake port constructed with a central valve plate and a web extending each way from said plate, valve seats some distance apart each side of the valve plate, an exhaust valve seated in the exhaust port, a hollow piston rod projecting out of one end of the cylinder, a piston mounted thereon within the cylinder, a removable bearing in the outer end of the rod and a shoulder in the rod some distance from the end, a hollow rod passing through the piston rod, a flange at one end thereof engaging the valves each independent of the other, a rod slidingly secured in the opposite end of the hollow rod, a permanent head and a sliding head on said rod and a spring between them, substantially as and for the purpose set forth.

2. In a water motor, a cylinder, cylinder heads secured thereto, one of said cylinder heads having an intake port with a reversible valve therein, and an exhaust port with a reversible valve therein, said valves and ports arranged to change the direction of the flow of water through the cylinder, a piston in the cylinder, a hollow rod connected therewith and projecting out through the back head of the cylinder, a removable bearing in the end and a shoulder some distance in therefrom, a hollow rod passing through the piston rod, a disk on the hollow rod engaging each valve independent of the other, a spring actuated rod arranged to engage the bearing and shoulder in the piston rod to actuate the valves, substantially as and for the purpose set forth.

3. In a water motor, a cylinder, cylinder heads on the cylinder, and a connecting pipe between said heads, a piston within the cylinder, a hollow piston rod supporting the piston, and passing out through one of the heads, said rod having a bearing at the end and a shoulder a short distance therefrom, a hollow rod within the piston rod, a short rod connected with the outer end of the hollow rod, a spring connected therewith in position to engage the bearing and the shoulder in the piston alternately, the opposite head of the cylinder having intake and exhaust ports, reciprocating valves in said head, and means for actuating said valves each independent of the other with the hollow rod that passes through the piston rod, and with the spring mounted thereon, substantially as and for the purpose set forth.

Signed at Grand Rapids Michigan December 17, 1906.

GEORGE W. SPOELSTRA.

In presence of—

A. ALLGIER,

ITHIEL J. CILLEY.