914,745.

J. G. McDOWELL.

HYDRAULIC MOTOR.

APPLICATION FILED JULY 8, 1908.

Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

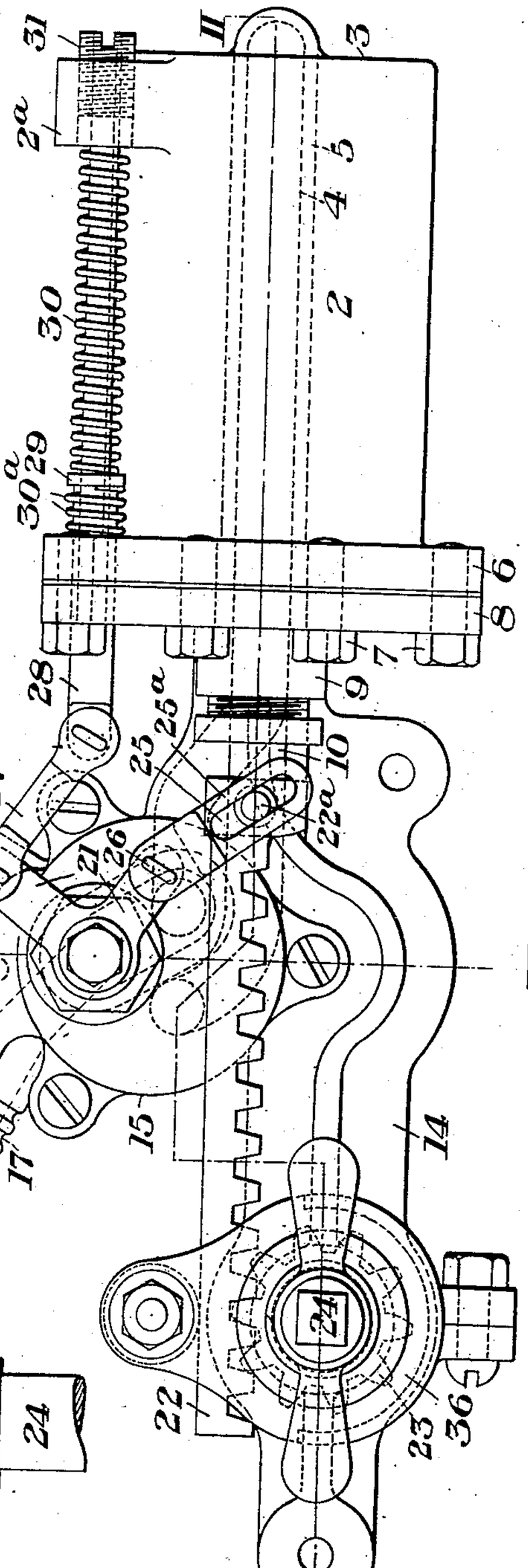
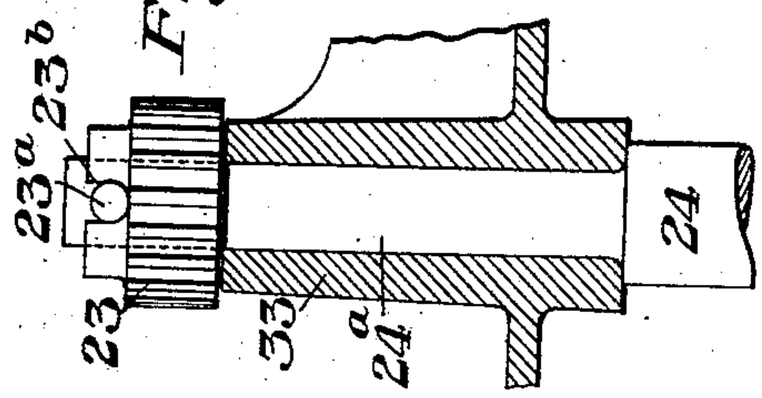


Fig. 5.



WITNESSES

R. A. Balderson.

W. W. Swartz

INVENTOR

J. G. McDowell,

by Bakewell, Byrnes & Lamsler,

his Attys.

J. G. McDOWELL.

HYDRAULIC MOTOR.

APPLICATION FILED JULY 8, 1908.

914,745.

Patented Mar. 9, 1909.

2 SHEETS—SHEET 2.

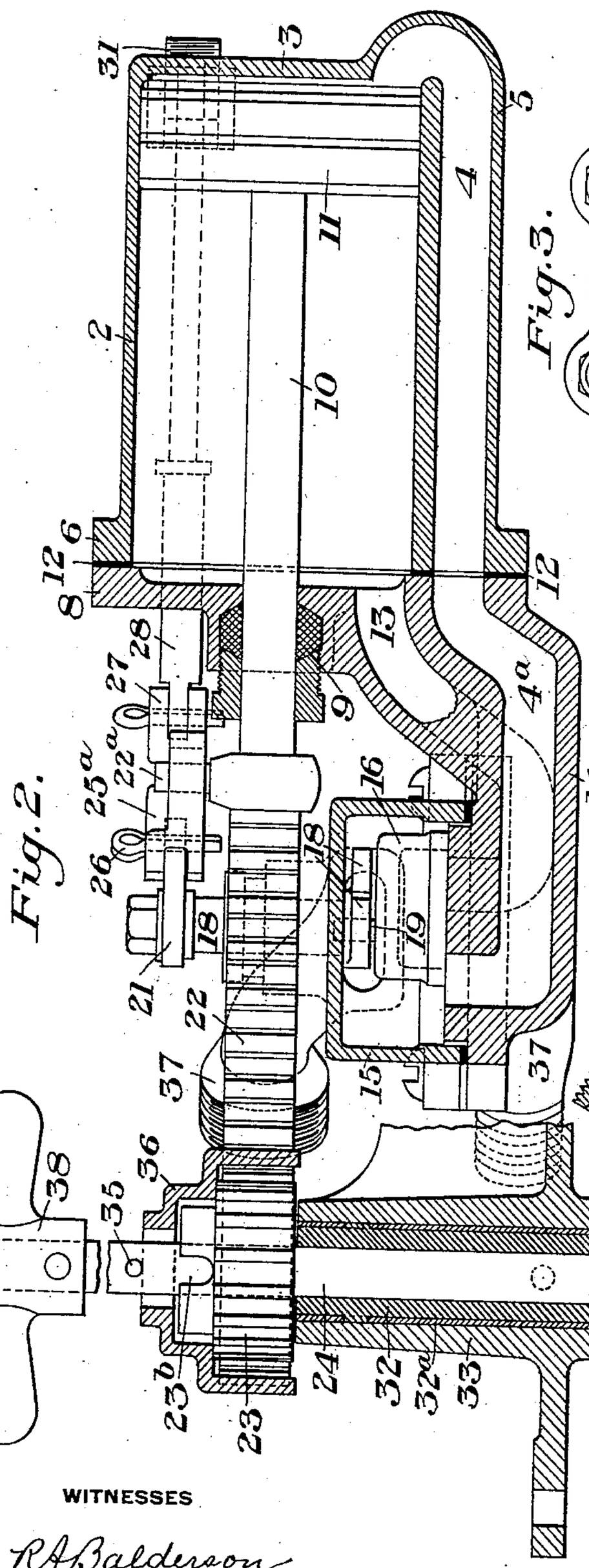


Fig. 2.

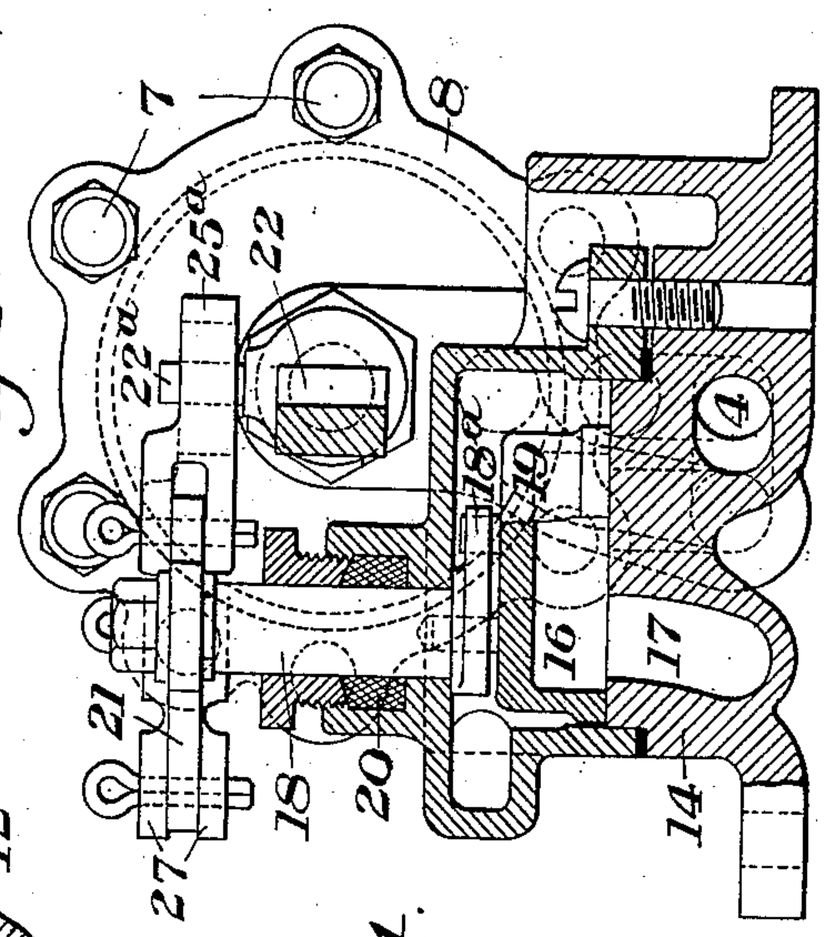


Fig. 3.

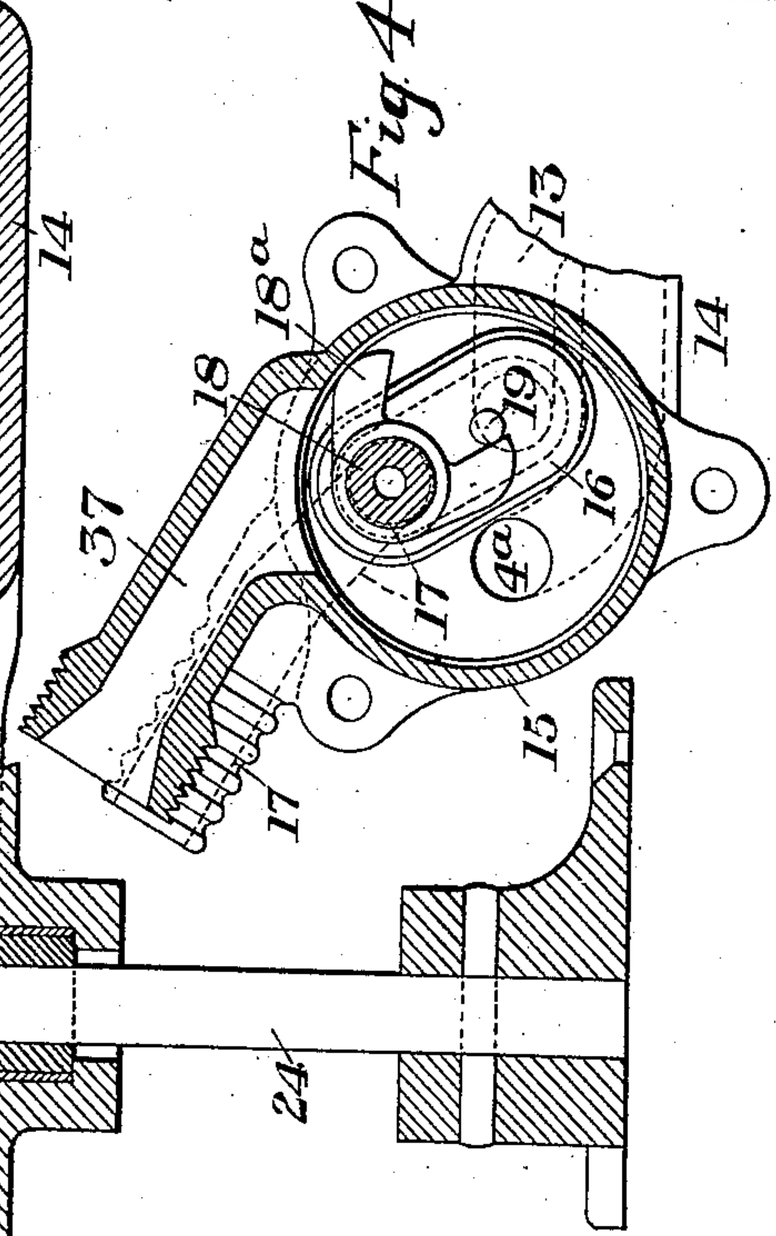


Fig. 4.

WITNESSES

R. A. Balderson

W. W. Swartz

INVENTOR

J. G. McDowell,

by Bakewell, Byrnes & Parmelee,

his Attys.

UNITED STATES PATENT OFFICE.

JOHN G. McDOWELL, OF PITTSBURG, PENNSYLVANIA.

HYDRAULIC MOTOR.

No. 914,745. Specification of Letters Patent. Patented March 9, 1909.

Application filed July 8, 1908. Serial No. 442,453.

To all whom it may concern:

Be it known that I, JOHN G. McDOWELL, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Hydraulic Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of a motor embodying my invention; Fig. 2 is a longitudinal section of the same on the line II—II of Fig. 1; Fig. 3 is a cross section on the line III—III of Fig. 1; Fig. 4 is a sectional plan of the valve chamber and valve; and Fig. 5 is a detail view showing a modification.

My invention has relation to the class of hydraulic motors, and is in some respects an improvement upon the motor described and claimed in my application, Serial No. 390,441, filed August 28, 1907.

The present invention is designed to provide a simple and efficient form of motor which can be manufactured at a comparatively low cost, and which is particularly adapted for household purposes, such as the operation of washing machines, etc., although it is not limited in this respect.

The precise nature of my invention will be best understood by reference to the accompanying drawings, in which I have shown one embodiment thereof, which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement by those skilled in the art, without departing from my invention, as defined in the appended claims.

In the drawings, the numeral 2 designates the motor cylinder which is preferably a hollow casting having an integral head 3 at one end and an inlet port 4 cored in a rib 5 at the under side of the cylinder and communicating with the cylinder through the integral head 3. The opposite end of the cylinder is provided with a flange 6, which is secured by bolts 7, or other suitable means, to a head 8 which carries a stuffing box 9, for the reciprocating piston rod 10 of the piston 11. 12 is a gasket or packing which is interposed between the flange 6 and the head 8. 13 designates the inlet port for the opposite end of the cylinder 2, this port and the port 4^a, which forms a continuation of the inlet port 4, being preferably cored in a casting 14, which is integral with the cylinder head 8, and which also forms the base of a valve chamber 15, both the ports 13 and 4^a opening upwardly through said base into the valve chamber.

16 designates a valve which is in the form of an inverted shallow cup and which is of sufficient length to connect the mouth of either of the ports 13 and 4^a with an exhaust port 17, which also leads outwardly through the valve chamber base. This valve is loosely mounted upon a shaft or spindle 18, and has a lost motion connection therewith, formed by fork 18^a secured to said spindle and adapted to engage a pin or projection 19 on the upper surface of the valve. The valve stem or spindle 18 projects upwardly through the top of the valve chamber, and through a stuffing box 20 carried thereby, and secured to the projecting upper end of this stem or spindle is a bell-crank or angle-lever 21. The extended end of the piston rod 10 carries a rack 22, whose teeth engage a pinion 23 on a vertical shaft 24, which is designed to be connected at its lower end to the agitator or dolly of the washing machine, or to any other apparatus to be operated by said shaft. The rack bar 22 has an upwardly projecting pin 22^a, which loosely engages an elongated slot 25 of a link 25^a and its opposite end is pivoted at 26 to one arm of the bell crank lever 21. The other arm of said lever is connected by a link 27 with one end of a rod 28, which extends through the cylinder head 8 and flange 6, and into a lug 2^a at the opposite end of the cylinder 2. Seated on this rod between a collar or washer 29 and the lug 2^a is a spiral spring 30, and seated between the opposite side of the collar and the flange 6 is a cushion spring 30^a, for cushioning the release movement of the rod. The lug 2^a is preferably counterbored to receive the end of this spring, and in order to provide means for properly tensioning the spring, a tubular adjusting sleeve 31 is threaded into said lug around the end of the rod to constitute the end bearing for the spring. This sleeve constitutes means whereby the tension of the spring can be adjusted to suit the water pressure in all cases.

In order to provide means whereby the motor may be readily adjusted to the machine being operated, the shaft 24 is preferably a squared shaft, which is arranged to slide vertically in its bearing 32, and also through the pinion 23. The bearing 32 is preferably formed by an outer sleeve 32^a of brass or other suitable material, into which

is poured a filling of Babbitt metal, the sleeve 32^a being perforated to allow the Babbitt metal to flow outwardly through the perforations and thus unite itself thereto. The sleeve 32^a is rotatably seated in a vertical counterbore of the post or standard 33 which is preferably an integral part of the casting which forms the cylinder head 8, and the valve chamber base.

In the normal operation of the motor, the sleeve 32^a with the shaft turns in the post 33, as the shaft is rotated by the rack 22 and pinion 23, and the shaft is free to move vertically in the bearing to adjust the dolly or dasher to the work being done. The upper end of the shaft has detachably secured thereto a handle 38, by means of which the shaft can be raised to lift the dolly or dasher in opening the machine. The hub portion of the handle by its engagement with the housing or cap 36, prevents the dasher from coming in contact with the bottom of the machine. A pin 35 may be inserted in the shaft, as shown in Fig. 2, to hold the shaft in its raised position.

For use with washing machines in which the dolly or dasher is slidable vertically on its shaft, so that vertical movement of the shaft 24 is unnecessary, the latter may have a plain bearing at 24^a in the support 33, as shown in Fig. 5. The same pinion can be used as in the case of the squared shaft, the connection between the pinion and shaft being effected by a pin 23^a, passing through the shaft and engaging recesses 23^b in the hub of the pinion.

The operation will be readily understood. With the parts in the position shown in Fig. 2, the water enters the valve chamber 15 through the inlet connection 37, leading into said chamber above the valve. In this position of the valve, the mouth of the port 4^a is uncovered, and water enters the cylinder through the port 4, thus moving the piston to the left: During this stroke of the piston, the valve 16 is in position to connect the mouth of the port 13 with the exhaust port 17. During the initial portion of the movement of the piston, the bell crank lever 21 will not be actuated, as the pin 22^a will move idly in the slot 25 of the link 25^a. As the piston approaches the end of its stroke, however, the pin will commence to act upon the link, and will actuate the bell crank lever, thereby tending to straighten the toggle formed by the link 27 and the arm of the bell crank lever to which said link is connected. This moves the rod 28 in a direction to compress the spring 30. At about the time one of the arms of the fork 18 comes into engagement with the pin 19 on the valve 16, the link 27 will be approximately in line with the center of the rod 28, and as the pinion is in position to reverse its stroke, the link 27 is moved past this center and the spring 30 immediately acts by its release to throw the valve to its reverse position. In this position it opens the mouth of the port 13 and connects the mouth of the port 4^a with the exhaust 17. During the reverse stroke of the piston, the operation is the same, the link 27 being first brought into line with the center of the rod 28 to compress the spring 30, and at the completion of the stroke, said link passing this center and the spring again acting to reverse the valve.

The means described for reversing the valve are extremely simple and effective, since they permit the valve to remain stationary until the end of the stroke when the reversal takes place with a quick sudden movement. The construction of the motor is extremely simple. As described, the cylinder head 8, the ports 13 and 4^a, the base of the valve chamber, and the post which forms the bearing for the shaft 24, are preferably all formed in a single integral casting in which the ports are cored. The body of the cylinder, its other head and the inlet port 4 are preferably formed by another integral casting. The construction is, therefore, made of but few parts, which are readily assembled, and which can be readily disconnected for access to all the parts. The provision of means by which the shaft can adjust itself to the work is also a feature of advantage. I do not, however, wish to limit myself to the precise construction and arrangement of the various parts which I have herein shown and described, as it is obvious that various changes may be made in the details of construction and arrangement, without departing from the spirit and scope of my invention as claimed.

What I claim is:

1. In a reciprocating motor, a cylinder, port connections therefor, a valve for controlling said connections, a piston rod connected to the piston, a bell crank secured to the stem of the valve and having a lost motion connection with the piston rod by one of its arms, a rod supported by the cylinder and having a link connection with the other arm of the bell crank lever, and a spring on said rod arranged to be compressed by endwise movement thereof in one direction, substantially as described.

2. In a reciprocating motor, the combination with a cylinder, a piston mounted to reciprocate therein and having a piston rod extending outwardly through the cylinder head, port connections for the cylinder, and a valve for controlling said connections, said valve having an upwardly extending stem with which it has a lost motion connection, of a bell crank lever secured to the said stem, a link connecting one arm of said lever with the piston rod, a rod slidably supported on the cylinder and having a movable connection with the other arm of the bell crank lever, and a spring on said rod arranged to be

compressed by movement thereof in one direction, substantially as described.

3. In a hydraulic motor of the class described, the combination with a valve for controlling the cylinder ports, of a valve stem or spindle having a lost motion connection with the valve, a bell crank lever secured to the stem or spindle, a lost motion connection between said bell crank lever and the piston rod of the motor, and a spring device movably connected to the other arm of the bell crank lever and supported by the cylinder, substantially as described.

4. In a reciprocating motor, a cylinder body having one head cast integral therewith, and a casting having a portion which forms the opposite head of the cylinder and also the base of a valve chamber and the bed plate or support of the motor, said casting and the cylinder body having ports cored therein, substantially as described.

5. In a reciprocating motor, the combination with a cylinder body open at one of its ends and having a port in its lower wall leading into the closed end of the cylinder, of a casting forming a bed plate for the motor, and having a head secured to and closing the open end of the cylinder body, said casting also having a valve-seating portion located on its bed plate portion and provided with ports therein opening through the valve-seating portion of the casting and which communicate respectively with the cylinder port and with the end of the cylinder which is closed by said head, said casting also having an exhaust port therein opening through the valve seat; substantially as described.

6. In a hydraulic motor, the combination with a cylinder body having an open end, of an integral casting formed with a head portion which is secured to and closes the open end of the cylinder, said casting also having a valve-seating portion forming the base of a valve chamber, and having ports therein, and also having an integral extension forming a seat for the bearings of a shaft operated by said motor, substantially as described.

7. In a reciprocating motor, a cylinder body, and a casting having a portion secured to and forming one head of the cylinder, said casting also forming the bed plate of the motor and the base of a valve chamber, the casting and the cylinder body having ports formed therein; substantially as described.

8. In a reciprocating motor, an angular shaft, a pinion mounted on said shaft and operated by the motor, the shaft being movable vertically in the pinion, a support, and a bearing for the shaft consisting of a babbitted sleeve rotatably mounted in said support and in which the shaft is movable, substantially as described.

9. In a reciprocating motor, an oscillating valve for controlling the cylinder ports, a stem with which the valve has a lost motion connection, a bell crank lever connected to said stem and having an operating connection with the motor piston, a rod connected to said lever, a spring arranged to be alternately compressed and released by the movement of said rod, and an adjustable seat for one end of said spring, said seat forming means for adjusting the tension of the spring, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOHN G. McDOWELL.

Witnesses:

GEO. H. PARMELEE,

H. M. CORWIN.