P. T. COFFIELD.

HYDRAULIC MOTOR.

APPLICATION FILED DEC. 19, 1910.

**1,018,961.** **Patented Feb. 27, 1912.**

2 SHEETS—SHEET 1.

Fig. 2.

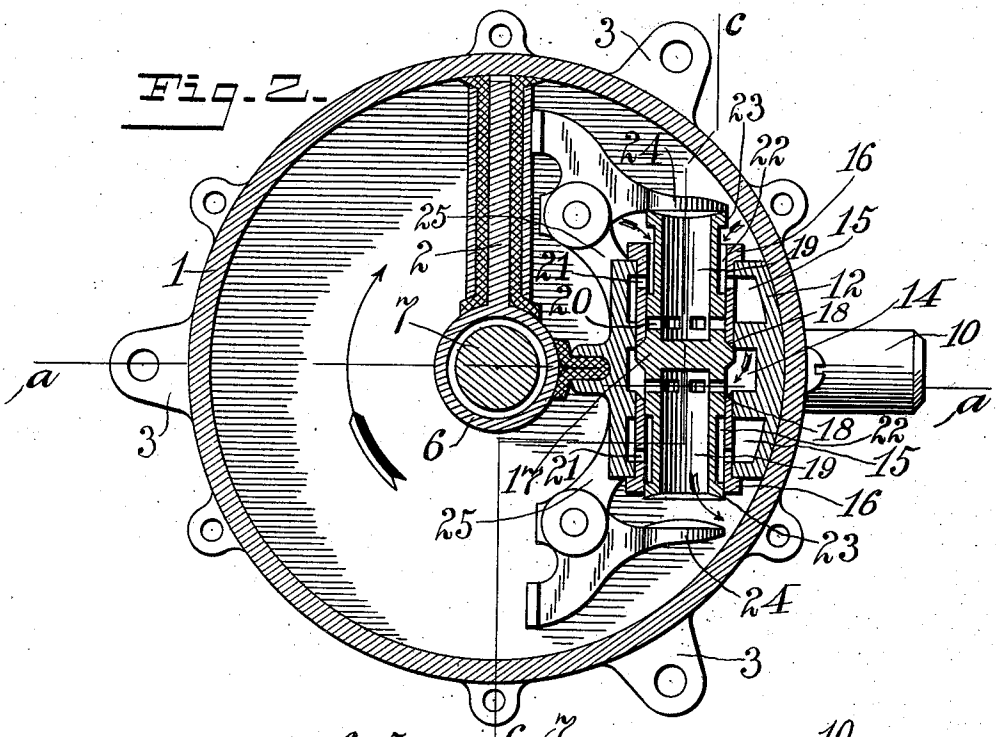
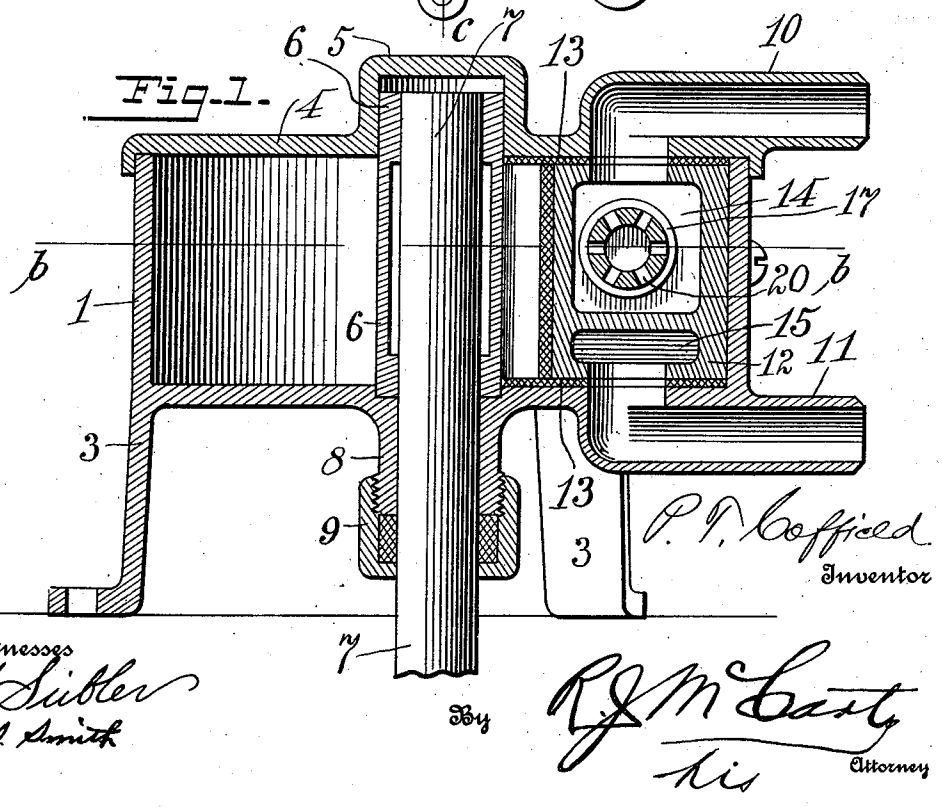



Fig. 1.




Witnesses

M. Sibley

H. A. Smith

P. T. Coffield

Inventor

By R. J. McCarty

Attorney

P. T. COFFIELD.

HYDRAULIC MOTOR.

APPLICATION FILED DEC. 19, 1910.

**1,018,961.** Patented Feb. 27, 1912.

2 SHEETS—SHEET 2.

Fig. 5.

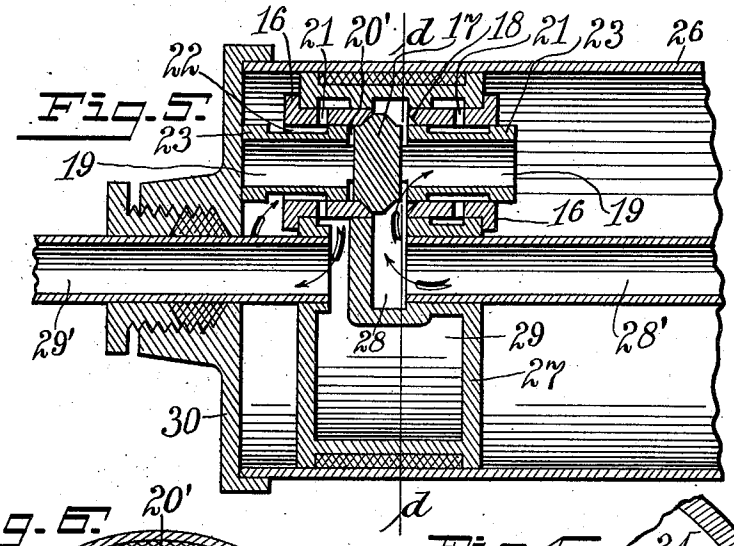



Fig. 6.

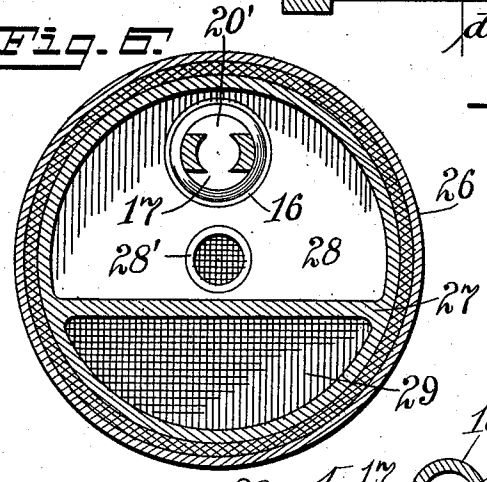



Fig. 4.

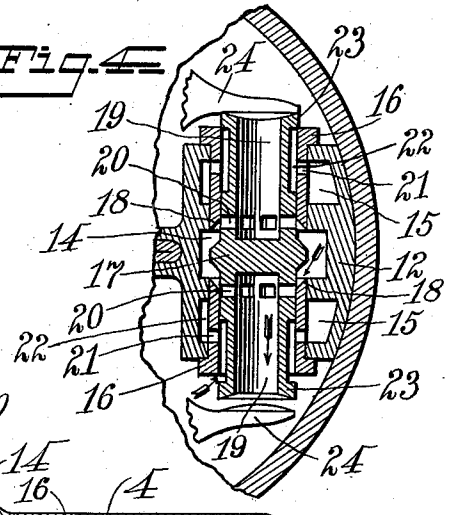
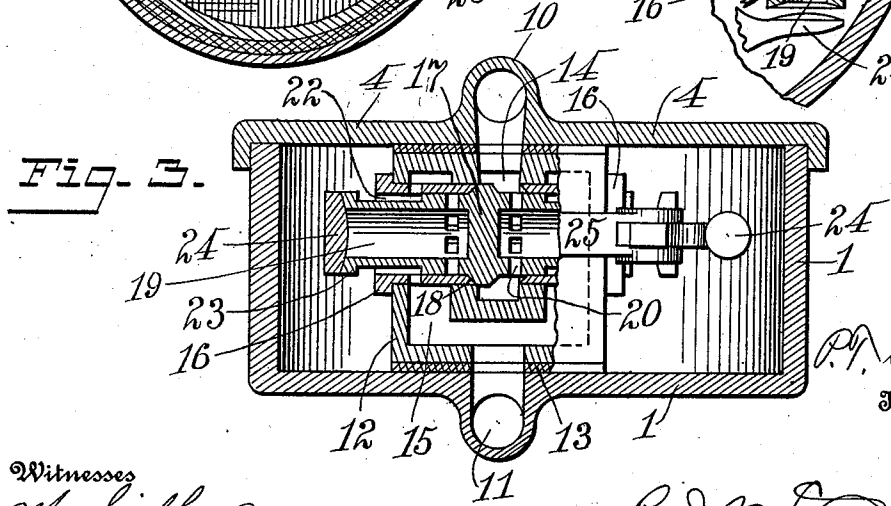



Fig. 3.




P. T. Coffield
Inventor

Witnesses
M. Sibler
H. S. Smith

By R. J. McCarty
Attorney

# UNITED STATES PATENT OFFICE.

PETER T. COFFIELD, OF DAYTON, OHIO, ASSIGNOR TO THE COFFIELD MOTOR WASHER COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

## HYDRAULIC MOTOR.

1,018,961. Specification of Letters Patent. Patented Feb. 27, 1912.

Application filed December 19, 1910. Serial No. 598,068.

*To all whom it may concern:*

Be it known that I, PETER T. COFFIELD, 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 Hydraulic 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 letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in hydraulic motors of the type especially adapted for running light machinery, such as the domestic washing machinery and various other devices which are directly attachable to the motor.

The object of the invention is to provide a springless motor of the above type which is highly efficient in its operation and of a most desirable character.

One of the important novel characteristics of the invention consists of a single valve which controls the inlet and outlet to and from the motor. The peculiarities of this valve will be more fully described in the following specification in connection with the accompanying drawings of which—

Figure 1 is a vertical sectional elevation of the motor on the line *a*—*a* of Fig. 2; Fig. 2 is a sectional view on the line *b*—*b* of Fig. 1; Fig. 3 is a sectional view on the line *c*—*c* of Fig. 2. Fig. 4 is a detail sectional view showing the extent of movement imparted to the valve by contact with the actuators or abutments; Fig. 5 is a sectional elevation of an end portion of a reciprocating type of motor to which my invention is equally applicable; and Fig. 6 is a sectional view on the line *d*—*d* of Fig. 5.

In a particular description of my invention, similar reference characters refer to the same parts throughout the drawings.

The motor as illustrated in Figs. 1 and 2 of the drawings is of the oscillatory reciprocating type in which the piston 2 travels in practically half of a circle before a reversal of its movement takes place. The casing 1 in which the piston and other mechanism are housed, is provided with suitable legs or standards 3 for attachment to the lid of a washing machine or other support upon which the motor is mounted. The top of the casing or motor is inclosed by a cap 4 which provides an end bearing 5 for the sleeve 6 and piston shaft 7. The bottom of the motor casing is recessed and extended in tubular extension 8 providing another bearing for said shaft, the latter bearing being fitted with a stuffing box 9. The extended end of the piston shaft 7 may be directly connected to the device to be driven. In case the motor is utilized for driving a washing machine, the shaft 7 may be an extended portion of the shaft to which the agitator of a washing machine is attached. The top and bottom of the motor casing are provided with tubular extensions 10 and 11 respectively for the inlet and outlet of the motive fluid. The valve casing 12 is secured on the interior of the motor and is provided with suitable packing 13 to prevent leakage from the separated portions of the interior of the casing. The casing 12 provides inlet and exhaust chambers 14 and 15, and receives bushings 16 in which the valve is mounted. The inlet portion 17 of said valve moves across the inlet chamber and engages seats 18 on the adjacent ends of the bushings to seal and open the water passage from said chamber to the space on opposite sides of the piston. Tubular portions 19 extend from each side of the inlet portion, and these tubular extensions are provided with a series of ports 20, on each side of said inlet portion. One series of ports 20 communicate with the inlet chamber 14, while the other series of ports are cut off in the reversed operation of said valve. The motive fluid entering the ports 20 from the inlet chamber, passes through one or the other of the tubular extended portions 19. Portions of the tubular extensions are reduced in diameter between the ports 20 and the ends to provide annular exhaust passages 22 between the bushings and said tubular portions. The exhaust passages 22 communicate with the exhaust chamber 15 alternately through two series of ports 21 in the bushings. The extreme ends 23 of the tubular portions 19 form piston exhaust valves in connection with the ends of the bushings to seal one of the tubular extensions from communicating with the space on one side of the piston while the space on the other side of the

piston is exhausting through the passage 21 and exhaust ports, and vice versa.

A valve actuator or movable abutment 24 is pivoted adjacent to the outer end of each tubular extension 19. Extensions 25 from the valve casing 12 afford convenient parts for the pivots of said actuators. These actuators or movable abutments 24 are suitably formed at their inner ends to contact with the opposite sides of the piston through which they are actuated, while their outer ends are suitably formed to engage the outer ends of the tubular extensions. When said actuators alternately engage the ends of the tubular extensions, they form seals which close the communication between the valve and space on the sides of the piston. The valve as a whole is initially moved through the force of the piston applied to one or the other of the movable abutments, and the seating or inlet portion 17 is moved from one or the other of its seats 18 according to the direction of movement given said valve. In Fig. 4 the extent of movement given the valve by either of the movable abutments or actuators is shown. The movable abutment in contact with the end of the valve has shifted said valve to this position under the force of the piston. At this point the action of the water moves the valve completely to its seat and away from the actuator, reversing the flow of the water and the travel of the piston. The live motive fluid entering the motor to drive the piston in one or the other of the directions of its travel escapes, after it has expended its force, through the unseated end 23 of one or the other of the tubular extensions, and thence into one or the other of the annular passages 21 and into the exhaust chamber 15.

Figs. 5 and 6 show my improved valve mechanism applied to a reciprocating type of motor in which the piston has a longitudinal reciprocating movement in a cylinder 26. The motive fluid is admitted to and discharged from the opposite sides of the piston. In this application of the invention the piston 27 is provided with inlet and exhaust chambers 28 and 29 respectively. The motive fluid is conducted into the inlet chamber through a conduit 28′ which forms one section of the piston rod, and the exhaust chamber discharges through a conduit 29′ forming the other section of the piston rod. Of course, it will be understood without illustration, that the conduit 28′ is suitably connected to a faucet or other valve controlled inlet, while the exhaust conduit 29′ is suitably connected to the moving part of the washing machine or other device to be driven. In the reciprocating type of motor, the heads 30 inclosing the ends of the cylinder act as rigid abutments to unseat the inlet portion 17 of the valve substantially as it is unseated in the oscillating type of motor, Figs. 1 and 2, thus allowing the motive fluid to complete the movement of the valve.

While I have described the structural features of my invention with some particularity, I do not wish to be understood as limiting myself to mere details. For example, the tubular extensions may be provided with individual ports 20, or slots 20′ may be provided on each side of the inlet portion 17 of the valve as in Figs. 5 and 6, and the initial operation of the valve as a whole may be imparted by rigid abutments or movable abutments, and it is possible that other changes of a detail character might be made without departing from the spirit of my invention which consists in a compound valve having the instrumentalities and functions hereinbefore described.

I claim as my invention:

1. In a hydraulic motor, the combination with a cylinder, of a member having inlet and exhaust chambers, an inlet valve having tubular extensions, the ends of which are adapted to seal the inlet to the exhaust chamber, said tubular extensions having their outer diameters reduced between the inlet portion of the valve and the ends of said tubular extensions to provide exhaust passages around said cylindrical portions, and abutments engaging said tubular extensions to initially move said valve.

2. In a hydraulic motor, the combination with a cylinder, of a member having inlet and exhaust chambers, a single movable valve member a portion of which controls the inlet chamber, said valve having tubular extensions which form passages which conduct the motive fluid to the cylinder, the ends of said tubular extensions being constructed and arranged to form piston valves to control the exhaust from the cylinder, the outer surfaces of said tubular extensions being recessed circumferentially to provide passages forming outlets to the exhaust chamber, and abutments adapted to engage the ends of said tubular extensions to seal the ends thereof and to initially move said valve.

3. In a hydraulic motor, the combination with a cylinder, of a member having inlet and exhaust chambers, a valve member the central portion of which consists of a double-seating puppet valve controlling the flow from the inlet chamber to the cylinder, and the ends of which consist of piston valves which control the outlet from the cylinder to the exhaust chamber, and abutments adapted to alternately seal the said ends and to initially move said valve to a point where the motive fluid acts to complete the movement of said valve.

4. In a hydraulic motor, the combination with a motor cylinder, a piston movable therein, and a member having inlet and ex-

haust chambers, of a valve having seating portions and ports which form the inlet portion, and other portions which form exhaust portions of said valve, the portions of said valve between the inlet and exhaust portions forming the exhaust passages, and a valve casing providing seats for the inlet portion of the valve and having ports communicating with said exhaust passages and the exhaust chamber, the ends of said casing coöperating with the exhaust portions of said valve to seal the inlet from the exhaust, and abutments to initially move the valve.

5. In a water motor, a motor chamber with a movable piston therein, means for supplying water to both sides of the piston, inlet valves to control the supply, with hollow stems for the inlet valves projecting into the motor chamber on each side of the piston, with openings beyond the valve seats into said hollow stems for the passage of the water to said chamber, with means for initially shifting said valves to permit the accumulation of pressure therein to fully actuate the same, and exhaust valves movable with the inlet valves to govern the exhaust.

6. In a water motor, a motor chamber with a movable piston therein, means for supplying water to both sides of said piston, inlet valves to control the supply, with hollow stems for said inlet valves projecting into the motor chamber on each side of the piston, with openings beyond the valve seats for the passage of water through the hollow stems to each side of the piston, and exhaust valves carried by said hollow stems to govern the exhaust, and means for initially moving said valves to a position from whence they are finally moved by the water pressure.

7. In a water motor, a motor chamber with a movable piston therein, means for supplying water to both sides of said piston, inlet valves to control the supply, said inlet valves provided with hollow stems projecting into the motor chamber on each side of the piston, and openings beyond the seats into said stems for the passage of water, with abutments to initially shift the inlet valves and to close the hollow stems to permit accumulation of pressure therein to fully actuate said inlet valves, and exhaust valves on the ends of said stems to govern the exhaust.

8. In a water motor, a motor chamber with a movable piston therein, means for supplying water to both sides of the piston, inlet valves to control the supply, with hollow stems for the inlet valves projecting into the motor chamber on each side of the piston, with openings beyond the valve seats into said chambers for the passage of the water, with means for initially shifting said valves to permit accumulation of pressure therein to fully actuate the same, and exhaust valves to govern the exhaust, with connection therefor with the inlet valves, and means on the inlet valve to shift the exhaust valves under the movement of the inlet valve to permit the complete reversal of the inlet valve.

9. In a water motor, a motor chamber with a movable piston therein, means for supplying water to both sides of the piston, inlet valves to control the supply with hollow stems for the inlet valves projecting into the motor chamber on each side of the piston, with openings beyond the valve seats into said stems for the passage of the water, with abutments to initially shift the inlet valve and to close the hollow stems to permit accumulation of pressure therein to fully actuate said valves, and exhaust valves to govern the exhaust mounted on the inlet valve stems, and means on the inlet valve stems to shift the exhaust valves with the movement of the inlet valve, to permit the complete reversal of the inlet valve.

10. In a hydraulic motor, the combination with a cylinder, a piston therein, a valve housing having inlet and exhaust chambers, said housing mounted in and removable from said cylinder, a single tubular valve member constructed and arranged to be finally moved by water pressure, and means for initially moving said valve to a position from whence it is finally moved by the water pressure.

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

PETER T. COFFIELD.

Witnesses:
R. J. McCarty,
Howard S. Smith.