P. T. COFFIELD.

WATER MOTOR.

APPLICATION FILED JUNE 12, 1911.

1,001,821.

Patented Aug. 29, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

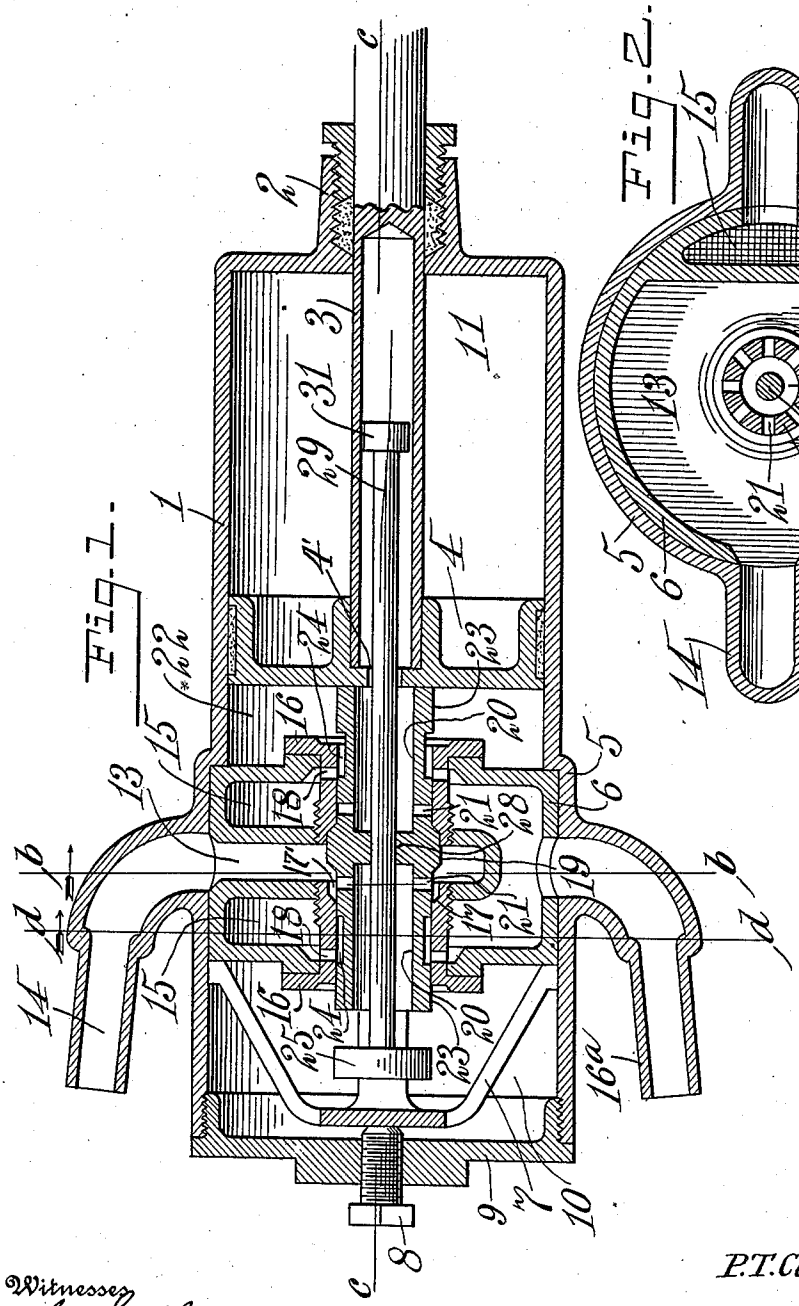

Fig. 2.

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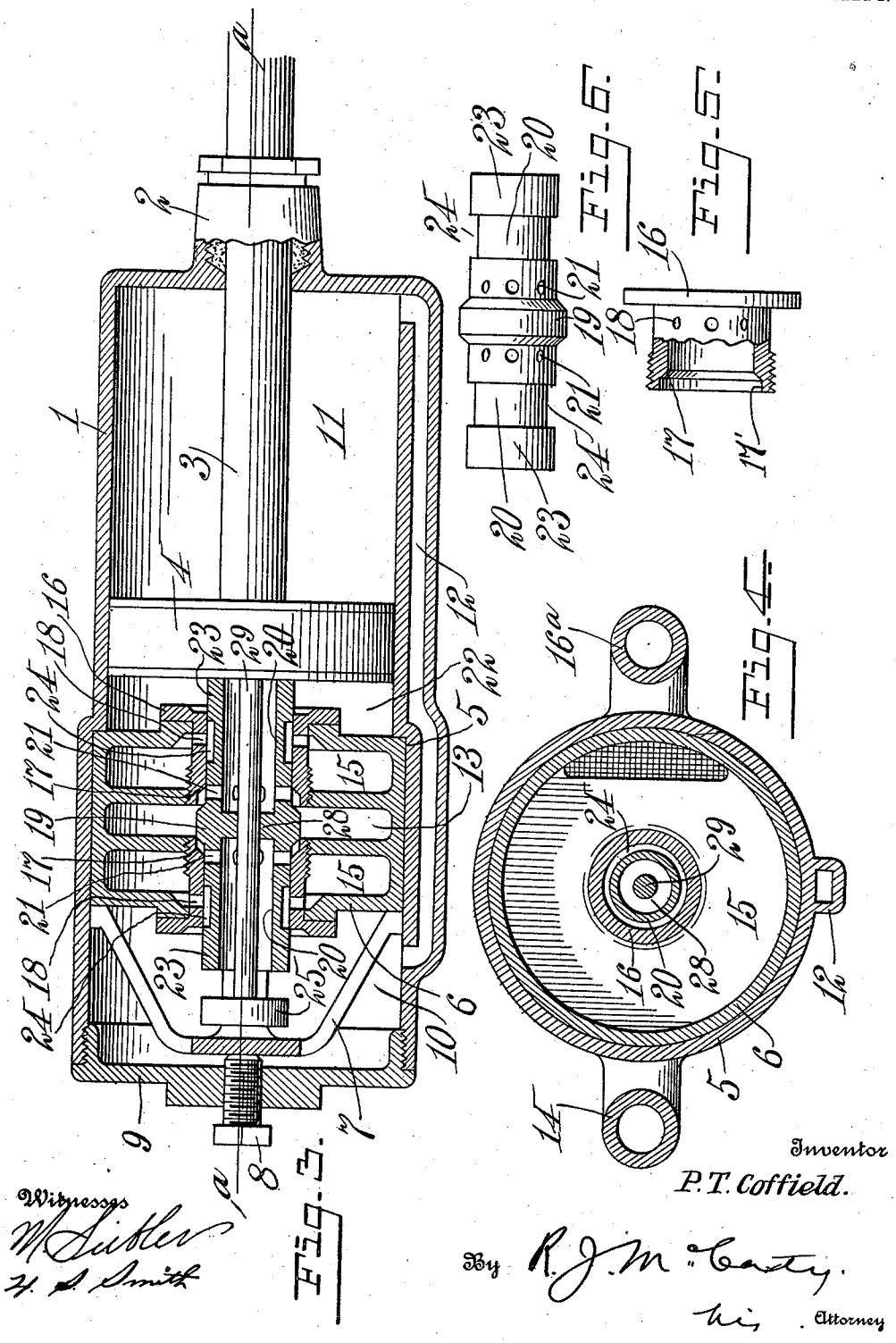

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

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

WATER-MOTOR.

1,001,821. Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed June 12, 1911. Serial No. 632,593.

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 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 letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in water motors.

The object of the invention is to utilize a compound valve which, owing to its position in the organization of parts, may be of a desirably large size without a corresponding increase in the diameter or length of the motor cylinder or other parts. By thus creating an organization in which the valve controlling the inlet and exhaust is conspicuously large, less resistance is offered to the passing fluid and a corresponding increase in efficiency is obtained.

Having outlined the scope of the invention and its essential characteristics, I will give a description of the same more in detail, and in connection with the accompanying drawings, which amply illustrate the motor.

Referring in general terms to the said drawings, Figure 1 is a longitudinal horizontal sectional elevation of the motor on the line *a*—*a* of Fig. 3; Fig. 2 is a section on the line *b*—*b* of Fig. 1; Fig. 3 is a vertical longitudinal sectional elevation on the line *c*—*c* of Fig. 1; Fig. 4 is a section on the line *d*—*d* of Fig. 1; Fig. 5 is a sectional view of one of the valve bushings; and Fig. 6 is a detail view of the valve.

Referring more particularly to the drawings, 1 designates the motor cylinder one end of which has a stuffing box 2 through which a piston rod 3 passes. This piston rod is attached to a piston 4, the end of the rod so attached being hollow a portion of its length. The piston has an axial opening 4′ which communicates with the adjacent end of the piston rod.

The end of the cylinder opposite the stuffing box is increased in diameter to provide an extended pocket 5 in which is located a valve housing 6. The enlarged portion of the cylinder is extended a suitable distance beyond the valve housing and in the space so provided a spider or yoke 7 is placed, the arms of which engage the valve housing, and the said housing is thus held rigidly in the pocket 5 through the instrumentality of said yoke and a binding screw 8 which engages the central portion of said yoke and tightens the same. A cap 9 is detachably secured to the adjacent end of the motor, the same having an axial screw-threaded opening which supports the binding screw 8.

The valve housing 6 occupies only a portion of the pocket 5, thus providing a chamber 10 hereinbefore incidentally referred to. This chamber 10 communicates with the chamber 11 formed in the other portion of the cylinder by the piston 4, said chamber being on the right of the piston as we view Fig. 1. The communication between said chambers 10 and 11 is through a passageway 12 formed in the bottom wall of the cylinder. The valve housing 6 has a centrally arranged inlet chamber 13 which communicates with an inlet pipe 14 which is a part of the enlarged end of the cylinder. The exhaust chamber 15 also communicates with an opposite exhaust or outlet pipe 16ª which is also part of the enlarged end of the cylinder.

The valve housing 6 is provided with a substantially axial orifice in alinement with the axial orifice in the piston and the adjacent hollow end of the piston rod. Arranged within the orifice in the axis of the valve housing, on each side of the inlet chamber 13, are right and left bushings 16. These bushings receive and coöperate with a compound valve which controls the inlet and exhaust. The inner ends of said bushings are recessed or increased in internal diameter as at 17′, and terminated in valve seats 17 which lie some distance from said inner ends of the bushings. The said bushings also have ports 18 which communicate with the exhaust chamber 15. The central body or inlet portion 19 of the compound valve lies within the inlet chamber 13, and alternately moves there-across and into the recesses 17′ in the ends of the bushings in engaging one or the other of the seats 17. The fluid trapped within the recesses 17′ as the valve approaches the seat 17, is given an opportunity to escape and any noise in

the operation of the valve is obviated, such for example as water hammering. The compound valve also comprises tubular extensions 20 on each side of the body portion 19, which have ports 21. These ports provide a communication between the inlet chamber 13 and the interior of said tubular parts.

Viewing either Figs. 1 or 3, the outer end of the left hand tubular member 20 communicates with chamber 10, and with chamber 11 through the passageway 12, while the other tubular member 20, to wit, the right hand one, communicates with the chamber 22 formed between the piston and the valve housing. A portion of the outer circumference of each of said tubular parts is reduced as at 24, to provide passageways for the exhaust fluid to alternately enter the ports 18 in the bushings and thence to the exhaust chamber. The ends 23 of said tubular parts 20 coöperate with the adjacent parts of the bushings in forming exhaust valves. In Fig. 1, chamber 22 is exhausting.

The piston 4 acts as a valve actuator by engaging one end thereof as said piston reaches the limit of its stroke in the direction of the valve. When it thus engages the adjacent end of the valve, it seals said valve from chamber 22 and concurrently shifts said valve from its seat. To correspondingly shift the valve in the other direction, a sealing member 25 is provided which lies between the yoke 7 and the adjacent end of said valve. This sealing member 25 is mounted on one end of a draft rod 29 which extends through the longitudinal axis of the compound valve, an orifice 28 being provided therefor in the body of said valve, and through the axial orifice 4′ in the piston and into the adjacent tubular end of the piston rod 3. The end of said draft rod so extended into said piston rod, is provided with a head 31 which is engaged by the piston 4 as the latter reaches the limit of its stroke away from the valve, and the sealing member 25 is caused to act upon the adjacent end of the valve in a manner similar to the piston on its adjacent valve end.

As the motor appears in Fig. 3, the exhaust valve portion 23 adjacent to the piston is closed, the piston having moved from the position shown in Fig. 1. From the position in Fig. 3 the movement of the valve is completed by the live fluid acting upon the body portion 19 of the valve, and the exhaust portion 23 of the valve nearest the sealing member 25 will open, thus establishing a communication between the chamber 11 and the exhaust, and chamber 22 and the inlet, the travel of the piston being reversed from that shown in Fig. 3.

Having described my invention, I claim:

1. In a motor of the type specified, the combination with a cylinder, a piston therein having an axial opening, and piston rod having a hollow portion inclosing the opening in the axis of said piston, of a valve housing mounted in said cylinder and having inlet and exhaust chambers and an axial opening in alinement with the opening in the axis of the piston providing valve seats and ports, a compound valve mounted in said axial opening and adapted to be engaged on one end by the piston, a sealing member adapted to engage the other end of said valve, and means operated by the piston for operating the said sealing member, substantially as specified.

2. In a motor of the type specified, the combination with a cylinder, a piston having an axial opening therein, and a piston rod having a tubular end connected to said piston, of a valve housing in said cylinder having inlet and exhaust chambers and an axial opening, bushings mounted in the said axial opening of said housing and providing valve seats and ports, a compound valve mounted in said bushings and having parts coöperating with said seats and ports, said valve adapted to be actuated in one direction by direct contact with the piston, a sealing member arranged on the other side of the valve housing and adapted to actuate the valve in the other direction, and to seal the end of said valve, and a draft rod extending from the said sealing member through the longitudinal axis of the valve and the axial opening in the piston, and adapted to be engaged by said piston to so impart such movement to said valve, substantially as specified.

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

PETER T. COFFIELD.

Witnesses:

R. J. McCARTY,

MATTHEW SIEBLER.