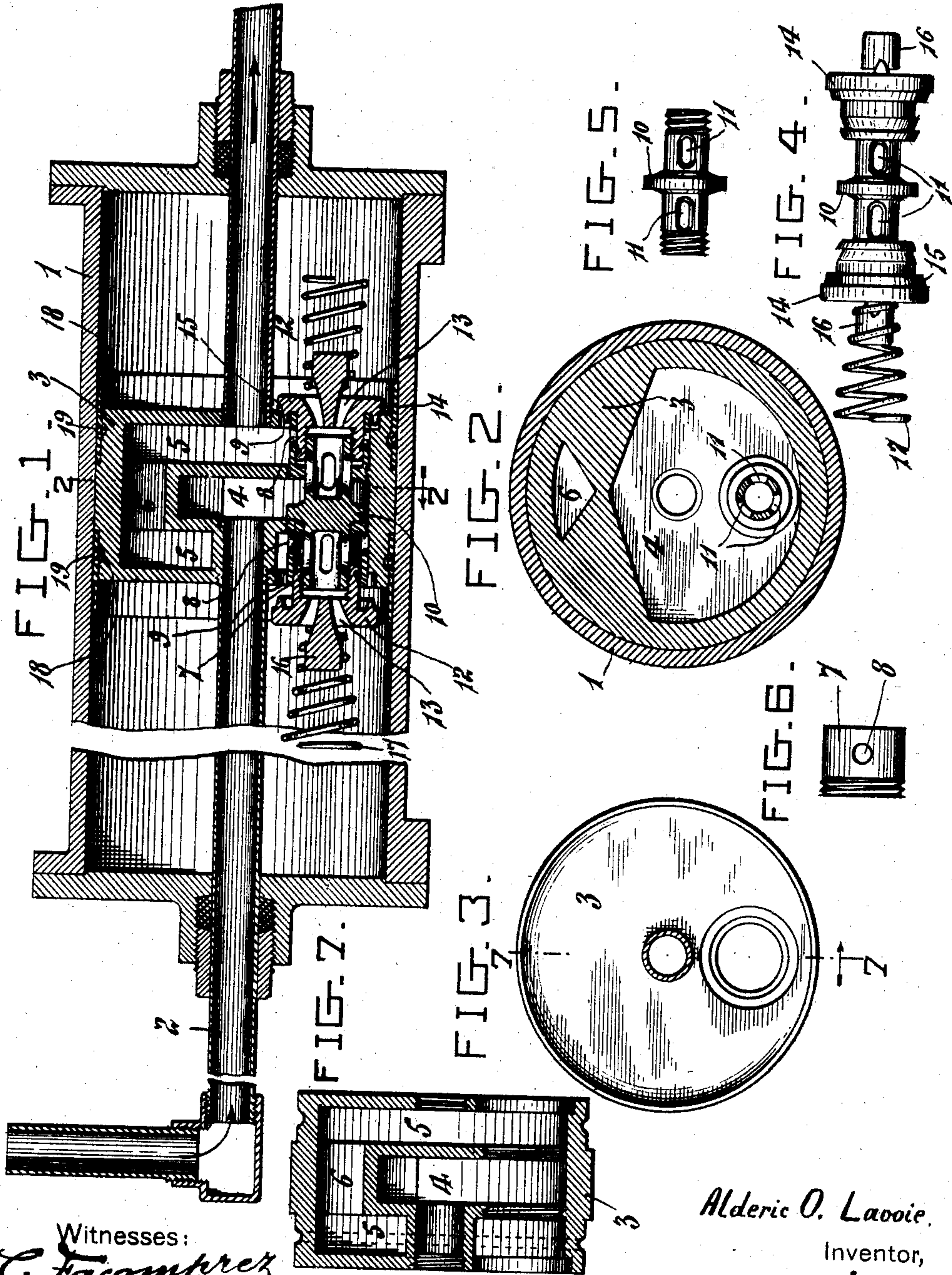


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HYDRAULIC MOTOR.  
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907,250.

Patented Dec. 22, 1908.



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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC MOTOR.

No. 907,250.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed June 4, 1908. Serial No. 436,551.

*To all whom it may concern:*

Be it known that I, ALDERIC OLIVIER LAVOIE, a subject of the King of Great Britain, residing at St. Henri, near the city and district of Montreal, in the Province of Quebec, Canada, have invented certain new and useful Improvements in Hydraulic Motors; and I do hereby declare that the following is 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.

The invention to be hereinafter described relates to hydraulic motors, and more particularly to the reciprocating type of such motors.

Broadly speaking, it comprises a motor cylinder or casing, a reciprocating multi-chambered piston mounted therein, means for delivering water or other fluid to and from the casing to the piston, and flow reversing valves in said piston adapted to be automatically operated by movement of the piston.

In order to more clearly disclose the construction, operation and use of the invention, reference should be had to the accompanying drawings, wherein like reference characters designate the same parts throughout the several views.

In the drawings: Figure 1 is a central longitudinal section through the motor; Fig. 2 is a cross section on line 2—2 of Fig. 1, looking in the direction of the arrow; Fig. 3 is a plan view of one side of the piston head, with the valve removed; Fig. 4 is a side elevation of the piston valve with the valve seats removed; Fig. 5 is a side elevation of the valve body, showing the ports; Fig. 6 is a side view of one of the thimbles in which the valve moves; and, Fig. 7 is a section on line 7—7 of Fig. 3.

A motor cylinder 1 of cylindrical or other desired form is provided. Through this chamber is passed the combined piston rod and divided feed water pipe 2, to which is securely fastened the hollow chambered piston 3, having a central receiving chamber 4 and two end chambers 5, which communicate with one another through a by-pass 6. Opposite the by-pass 6 is a passage which extends completely through the piston communicating with all three chambers. This passage is provided with threaded and perforated tubular thimbles 7, the perforations 8 being adapted to communicate with the

chambers 5 and the outer edges of the thimbles coöperating with the adjacent edges of the passages to form therebetween annular passages 9, which also communicate with the chambers 5. A reciprocable spring-actuated valve is mounted to move freely in the passage, and through the thimbles 7. This valve comprises a body portion provided with a shoulder 10, which engages the inner ends or edges of the thimbles 7, and thus limits the movement of the valve. The valve body is divided into two duplicate working chambers, each provided with a plurality of side ports 11, adapted to register alternately with the chamber 4 and with the perforations 8 of the thimbles 7. The outer ends of the valves are threaded and adapted to receive end caps 12, which are provided with end ports 13 to allow free flow of fluid to the valve chambers and flanges 14 and 15 adapted to tightly close the annular passages 9. Each cap is provided with a conical knob 16, about which is disposed the small end of a conically wound spiral spring 17.

The surface of the piston is recessed or reduced slightly near its opposite ends to receive leather or other similar packing rings 18 to make a tight joint with the cylinder face. This packing may be conveniently bound in position by binding wires 19, or similar devices.

The operation of the machine is as follows: We will assume that the pump or motor has just been started, and that water or other fluid medium is being admitted to the piston chamber 4 through the pipe 2, as indicated by the arrow in Fig. 1. The fluid will pass first into the chamber 4. From the chamber 4 it will pass through the side ports 11 in one chamber of the valve and out through end ports 13 between the piston face and the head of the pump chamber. The back pressure of the fluid on the outer face of the cap 12 and the valve, will, of course, hold it firmly seated, so that the annular passage 9 will be completely closed, and the perforations 8 will not be in register or communication with side ports 11. At the same time that the annular passage 9 and the perforations 8 at one end of the valve are closed, the corresponding passage and perforations at the opposite end are open. Thus, the fluid on the opposite side of the piston will have free flow through the annular passage 9 and end port 13 and perforations 8 into the adjacent chamber 5, through the by-pass 6, into the next cham-



ber 5, and finally out through the outlet pipe, as indicated by the arrow. When the piston reaches the limit of its movement, toward the left of Fig. 1, the spiral spring 17 will be compressed by contact with the head of the motor cylinder. Such compression will, of course, move the valve in the opposite direction, thus seating the cap 12 at the opposite side of the piston and unseating the cap previously seated. At the moment of shifting the valve, the side ports 11 previously in communication with the chamber 4, will be cut off from communication, and the ports previously cut off will be placed in communication. When the valve is shifted and the side ports 11 changed, as mentioned, the first set of side ports 11 will be brought into communication with the perforations 8, from which they were previously cut off. Thus, the piston will be forced in the opposite direction and the fluid, on its opposite side, will be forced back through the annular passage 9 and end ports, side ports and perforations 13, 11 and 8, successively, into the chamber 5 and out through the outlet pipe.

It is clear that many changes may be made in the construction of the several parts of the invention, that many rearrangements of these parts may be had, and many other combinations of them may be resorted to, and that many substitutions for them may be had, without in any way departing from the field and scope of the present invention, and it is meant to include all such within this application, wherein only a preferred form has been shown and described.

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

1. A motor of the character described, comprising a motor cylinder, a multi-chambered piston mounted therein, a passage extending completely through said piston and communicating with all of said chambers, a by-pass communicating with chambers in opposite ends of the piston, a reciprocating valve mounted in the aforesaid passage and adapted to control the flow of fluid there-through, and means for automatically reciprocating said valve to reverse the direction of flow of the fluid.

2. A motor of the character described, comprising a motor cylinder, a multi-chambered piston therein, a passage extending

completely through said piston and communicating with all of said chambers, thimbles mounted in the ends of said passage and provided with perforations adapted to establish communication with the end chambers of the piston, a by-pass communicating with chambers in opposite ends of the piston, a reciprocating valve mounted in said thimbles and adapted to simultaneously open the perforations in one of the thimbles and close the perforations in the other so as to establish communication between the valve and the chambers in opposite ends of the piston alternately, and means for automatically shifting said valve.

3. A motor of the character described comprising a motor cylinder, a multi-chambered piston reciprocally mounted therein and provided with passages in its opposite sides, thimbles mounted in said piston, extending into said passages spaced therefrom at their outer ends and provided with perforations adapted to communicate with the end chambers of said piston, a reciprocating valve slidably mounted in said thimbles and provided with side ports adapted to register with said perforations, caps secured to the opposite ends of said valve and provided with flanges adapted to alternately close the spaces between the opposite ends of the thimbles and the piston, and means for automatically reciprocating said valve.

4. A motor of the character described, comprising a motor cylinder, a multi-chambered piston reciprocally mounted therein and provided with a passage extending completely through said piston and communicating with all of the chambers of the piston, a by-pass in said piston communicating with the end chambers therein, thimbles mounted in the opposite ends of said passage and provided with perforations adapted to communicate with the end chambers of the piston, a reciprocating valve mounted in said thimbles and provided with a shoulder adapted to engage the inner ends of the thimbles and limit the movement of the valve, and means for automatically reciprocating said valve.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ALDERIC OLIVIER LAVOIE.

Witnesses:

C. FACOMPRESZ,  
W. S. BABCOCK.