No. 885,070. PATENTED APR. 21, 1908.

J. G. McDOWELL.

HYDRAULIC MOTOR.

APPLICATION FILED AUG. 18, 1906. RENEWED SEPT. 6, 1907.

2 SHEETS—SHEET 1.

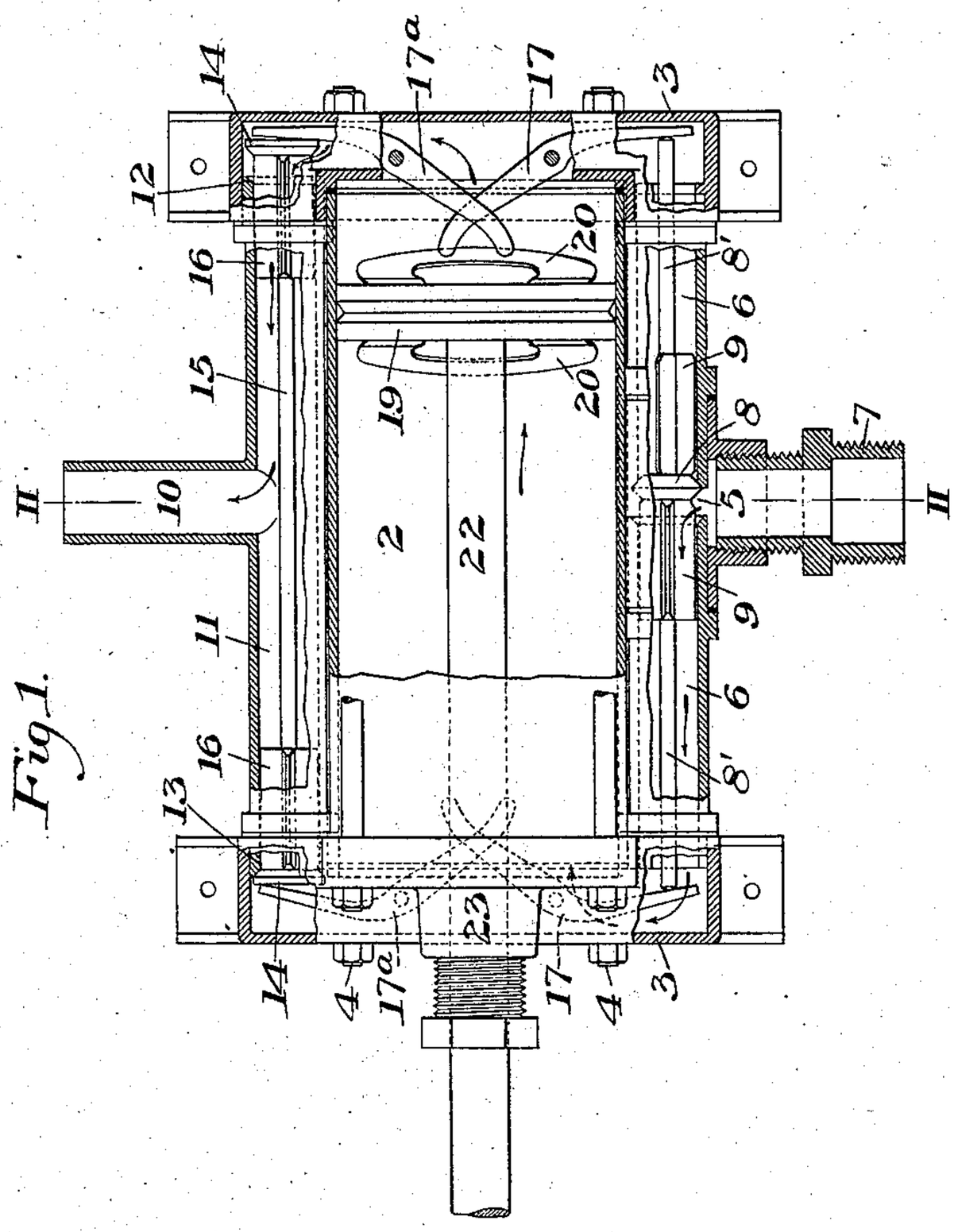

Fig. 1.

WITNESSES

Warren W. Swartz

Richard D. Little

INVENTOR

John G. McDowell

by Barlow & Byron

his attys

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2 SHEETS—SHEET 2.

Fig. 4.

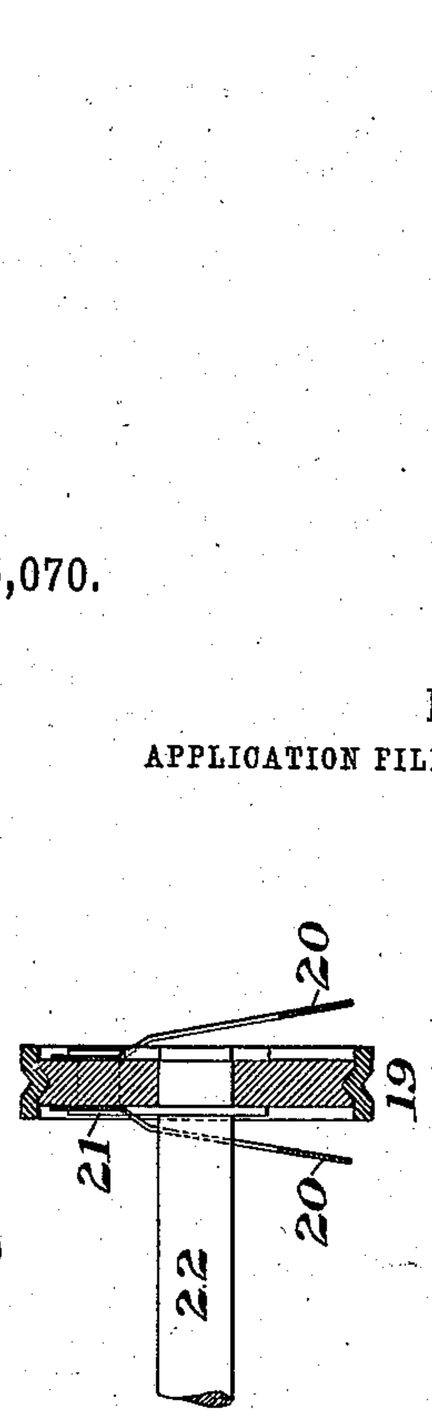


Fig. 2.

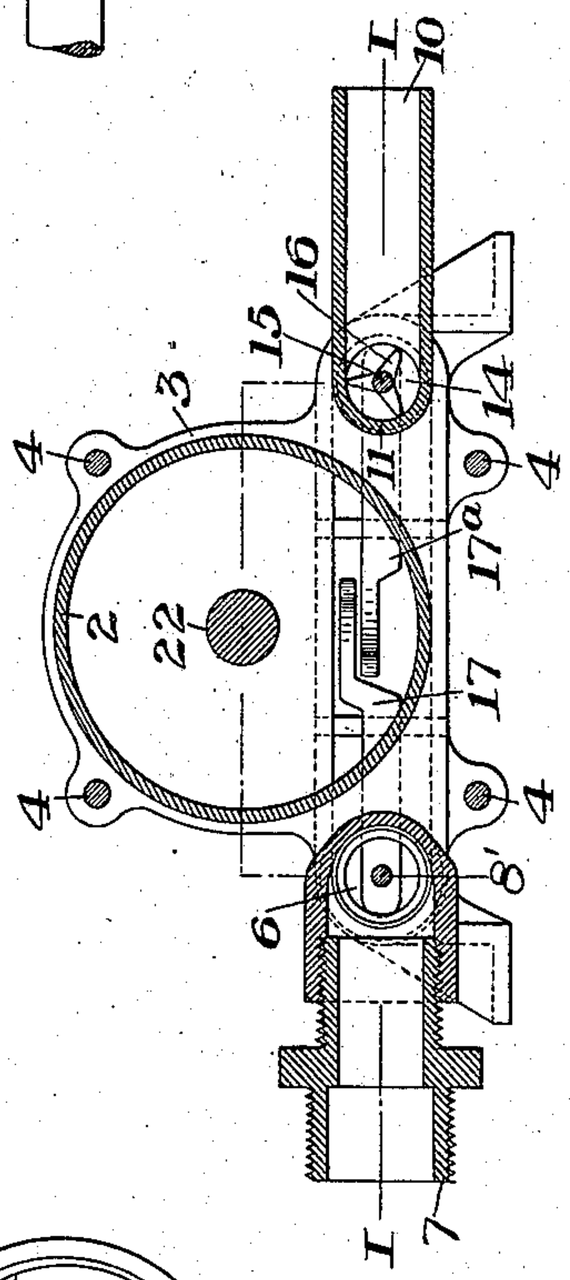
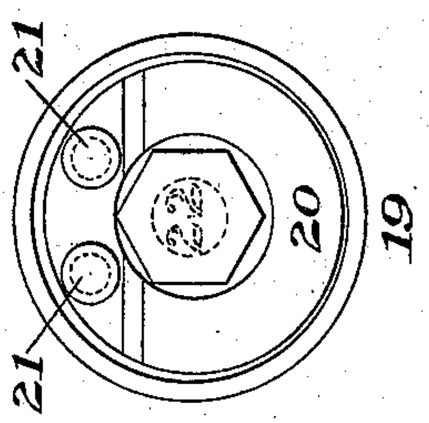


Fig. 3.



WITNESSES

Warren W. Swartz

Richard D. Little

INVENTOR

John G. McDowell

by Dakeyne & Symes

his attys

UNITED STATES PATENT OFFICE.

JOHN G. McDOWELL, OF PITTSBURG, PENNSYLVANIA.

HYDRAULIC MOTOR.

No. 885,070. Specification of Letters Patent. Patented April 21, 1908.

Application filed August 18, 1906, Serial No. 331,197. Renewed September 6, 1907. Serial No. 391,701.

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 an irregular horizontal section on the line I—I of Fig. 2; Fig. 2 is a transverse section on the line II—II of Fig. 1; Fig. 3 is a face view of the piston, and Fig. 4 is a central cross-section of the same.

My invention relates to that class of water motors wherein springs are employed in connection with the shifting valves; and the object of the invention is to cheapen and improve the springs and lengthen their life. Heretofore in such matters an individual spring has been provided for each valve, and these springs have been made of wire. In the use of these springs it has been found that their life is short, the spring either breaking or losing its resilience. I have discovered that by using a leaf spring I can greatly lengthen the life of the springs; and I have further found that by using one spring which acts upon two valves, I can reduce the number of springs and improve the action and life of the motor.

In the drawings I show my invention as applied to a motor of the type set forth in the application of Oscar F. Grant and myself, Serial No. 281,898, filed October 9th, 1905. In these figures, the numeral 2 designates the cylinder of the motor, which is secured between the two flanged heads 3, secured by the through-bolts 4, at the top and bottom of the cylinder.

5 is the water inlet port communicating with the water inlet passage 6, and provided with a suitable coupling 7 for connection with the hose or other water supply pipe. The ends of the inlet passage 6 communicate with the respective ends of the cylinder through the heads 3. The inlet port 5 is controlled by a valve 8 secured to a longitudinally extending valve rod 8′, whose end portions extend into the chambers of the heads 3. Said rod is provided with guides 9, which maintain it centrally within the passage 6.

10 is the outlet or escape, which opens outwardly from the longitudinally extending outlet passage 11, which also communicates with the cylinder at each end, through the outlet ports 12 and 13 respectively. These ports 12 and 13 are respectively controlled by the valves 14, on opposite end portions of the valve rod 15 which extends through the passage 11 and has the centralizing guides 16.

Pivotally mounted within each of the heads 3 are two levers 17, 17ª. Each lever 17 has one arm extending into position to be engaged by the ends of the valve rod 8; while its other arm projects slightly within the end portion of the cylinder 2 in a position to be engaged by the piston 19. Each of the levers 17ª has one of its arms extended into position to be engaged by a valve 14 and its other arm extended within the end portion of the cylinder in the same manner as the corresponding arms of the lever 17.

Instead of the springs, which, in the said application are shown as applied to the levers 17ª, I provide two springs 20, which are preferably of annular shape and are secured to the opposite faces of the piston 19. I have shown these springs as secured by through-rivets 21 which are common to both springs. Each spring preferably consists of a brass annulus, which is bent or inclined outwardly as shown in Fig. 4. The springs may be cut from sheet brass and then bent up in any desirable manner. The projecting portion of each spring is so arranged that it will contact at or near the end of the stroke with the levers 17 or 17ª, thus compressing the spring.

22 represents the piston rod working through the stuffing box 23, and to which the machine to be driven by the motor may be connected in any suitable manner.

The operation of the motor is as follows:—Supposing the piston 19 to be moving in the direction of the arrow, water enters the cylinder from the port 5 through the right-hand end portion of the passage 6, the escape from the opposite side of the piston being by way of the port 12 and the left-hand end portion of the outlet passage 11, as indicated by the arrow. As the piston approaches the end of its stroke, the spring contacts with the arms of the levers 17 and 17ª compressing the springs and actuating the levers. When the last mentioned contact takes place, said levers are moved to actuate the valve rods 8′ and 15, so that the valve 8 is shifted to the opposite side of the port 5, the port 12 is closed by one of the valves 14, and the other valve 14 is moved to open the port 13, thus providing for the admission of water to the left-hand end of the cylinder and escape from

the right-hand end. Owing to the degree of compression given the springs 20 before the levers 17, 17ª are operated by the piston, there is imparted to the valve rods a quick operating movement of such character as to make certain that the valves 5 and 14 will be positively and fully shifted. Without these springs, owing to the pressure of water against the valves to resist their shifting movement, the valves would remain in central relation to their respective ports, which would, of course, prevent the operation of the motor. This is entirely prevented by the springs 20, as their impulse is sufficient to throw the valves past their centers.

The advantages of my invention result from the use of a leaf spring, which I have found to retain its resilience for a long time, thus giving long life to the motor without repair. It also results from the use of a single spring which operates a plurality of valves, thereby reducing the number of springs and enabling a stronger spring to be used.

Many variations may be made in the form and arrangement of the cylinder, piston, the valves, &c., without departing from my invention.

I claim:—

1. In a hydraulic motor, a cylinder, a reciprocating piston, valves mounted in a stationary part of the motor, levers arranged to actuate the valves, and leaf springs secured to opposite sides of the piston and arranged to contact with the levers near the end of the stroke; substantially as described.

2. In a hydraulic motor, a cylinder, a reciprocating piston, a pair of curved leaf springs secured to the opposite faces of the piston, inlet and outlet valves, and levers arranged to actuate said valves, said levers contacting with the piston springs near the end of its stroke; substantially as described.

In testimony whereof I have hereunto set my hand.

JOHN G. McDOWELL.

Witnesses:
JOHN MILLER,
H. M. CORWIN.