No. 776,978. PATENTED DEC. 6, 1904.

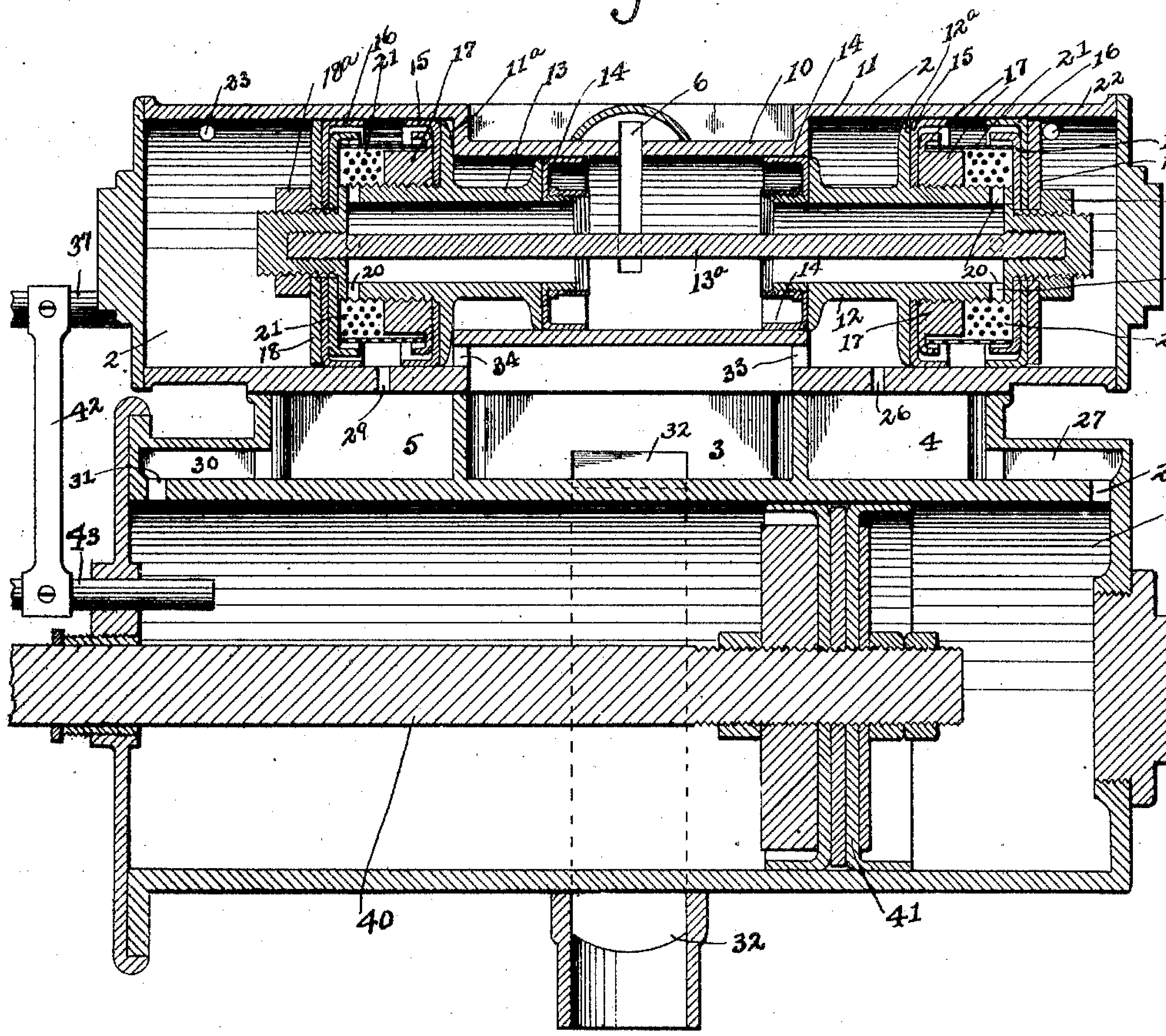
C. L. WILKINS & M. J. WEBER.

WATER MOTOR.

APPLICATION FILED NOV. 3, 1900. RENEWED OCT. 31, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

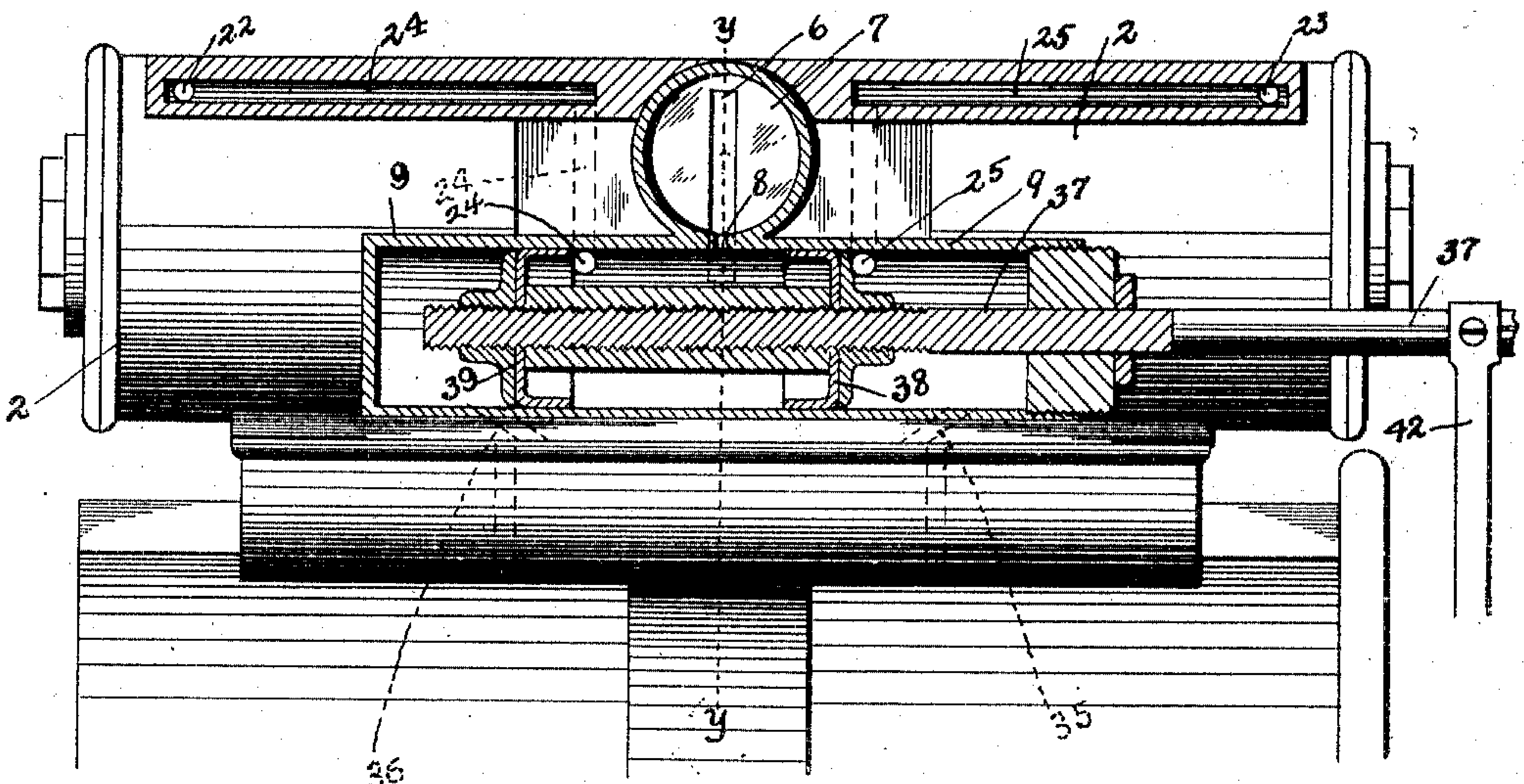
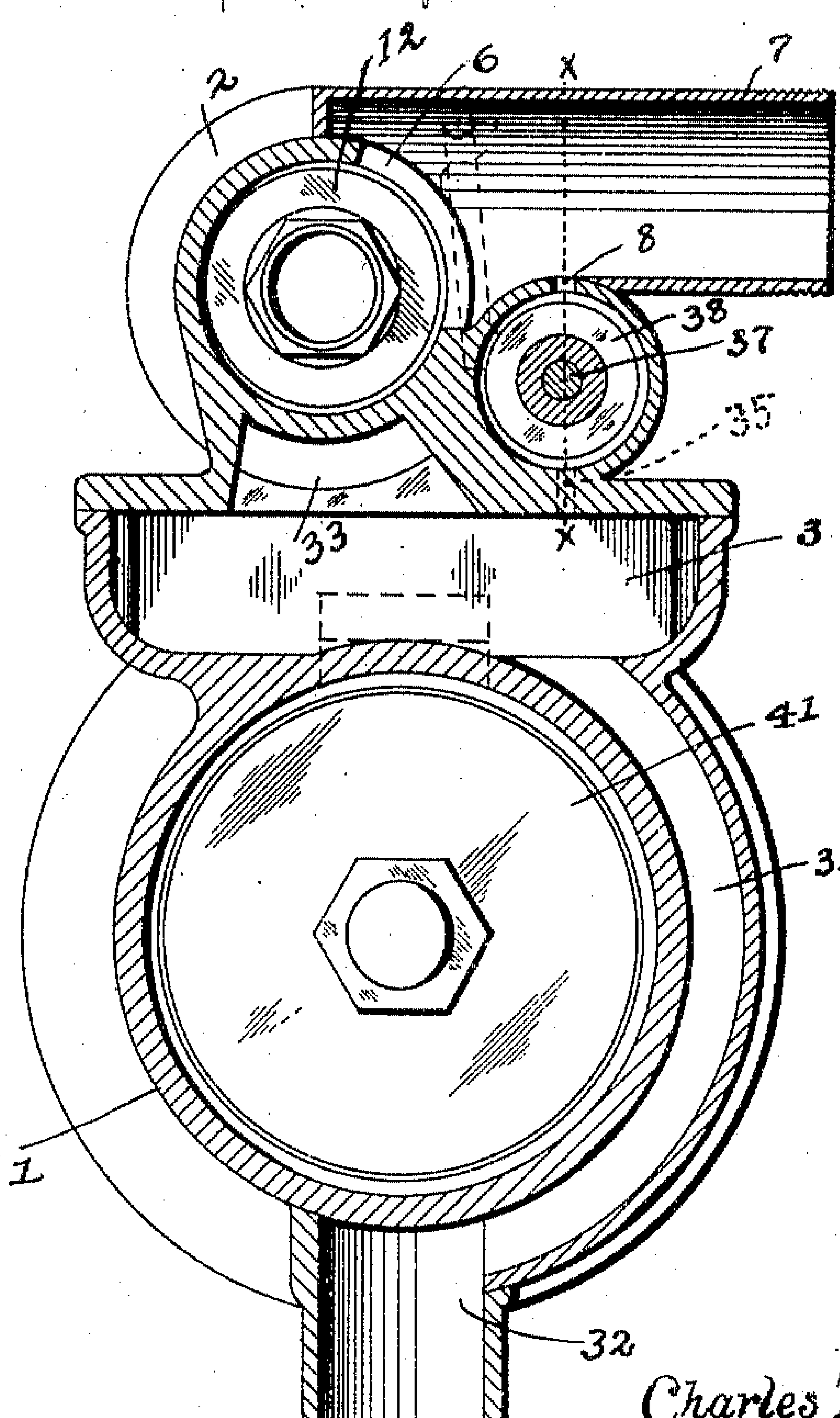


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES L. WILKINS AND MATHEW J. WEBER, OF COLUMBUS, OHIO, ASSIGNORS TO OHIO PUMP & BRASS CO., OF COLUMBUS, OHIO.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 776,978, dated December 6, 1904.

Application filed November 3, 1900. Renewed October 31, 1904. Serial No. 230,828. (No model.)

To all whom it may concern:

Be it known that we, CHARLES L. WILKINS and MATHEW J. WEBER, citizens of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Water-Motors, of which the following is a specification.

Our invention relates to the improvement of water motors or lifts; and the objects of our invention are to provide an improved construction of this character wherein simple, reliable, and effective mechanism is provided for pumping rain-water from a cistern or other reservoir to desirable points and to produce certain improvements in details of construction and arrangement of parts, which will be more fully pointed out hereinafter. These objects we accomplish in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal section of our improved motor. Fig. 2 is a view partly in section and partly in elevation, the portion thereof in section being taken on line *x x* of Fig. 3; and Fig. 3 is a central transverse section through the motor on line *y-y* of Fig. 2.

Similar numerals refer to similar parts throughout the several views.

In carrying out our invention we employ a main or operating cylinder 1, which is surmounted by a smaller valve-cylinder 2, extending parallel therewith. Formed between the upper side of the cylinder 1 and lower side of the cylinder 2 is a central chamber or passage 3, and on opposite sides of the latter are formed chambers or compartments 4 and 5.

6 represents an elongated water-inlet opening with which the upper and central portion of the cylinder 2 is provided and to which leads an inlet-pipe arm 7. As indicated more clearly in Fig. 2 of the drawings, the inlet-pipe arm 7 also communicates through an inlet-port 8 with the central portion and upper side of a smaller or supplemental valve-cylinder 9, which is arranged, as shown, at one side of the cylinder 2 and beneath the inlet-pipe arm 7.

As indicated in the drawings, the central portion of the cylinder 2 is reduced in size, the production of this reduced portion, which is indicated at 10, resulting in the formation on the inner side of the cylinder of internal shoulders 11 and 11^a on opposite sides of the center of the length of the cylinder.

On each side of the center of the length of the cylinder 2 we provide an internal valve the bodies of which, as indicated at 12 and 13, consist of a horizontal tube-section, the outer end of which is closed, as indicated in Fig. 1 of the drawings. About the open or inner end of each of the valves 12 and 13 is mounted a cup-leather 14, which is adapted to fit and slide within the reduced portion 10 of said cylinder. Within the larger end portions of the cylinder we provide the valve-bodies 12 and 13 with valve-heads, consisting of separated inturned cup-leathers 15 and 16, the cup-leather 15 being held in place between a parallel flange 12^a of the body 12 or 13 and the outturned flange of a nut 17, which is mounted on the threaded portion of the periphery of said body 12 or 13. The outer cup-leather 16 is embraced between a ring 18 on the outer end of the valve-body and an inner cup-shaped ring 19, the ring 18 being detachably secured in this position by a nut 18^a on the threaded end extension of the valve-body. The space between the cup-leather 15 and 16 communicates with the interior of the valve-body through the medium of ports 20, arranged at suitable intervals. Surrounding the body of the nut 17 and interposed between the ring 19 and flange of said nut 17 is a short perforated cylinder 21. As indicated in the drawings, we preferably employ a horizontal central connecting-rod 13^a. This rod, however, may be omitted without rendering the valves 12 and 13 inoperative, as will be apparent from the description of the operation hereinafter given.

Leading into each end of the valve-cylinder 2 on the outer sides of the valves 12 and 13 are ports 22 and 23, the port 22 communicating with a passage 24, which leads, as shown partly in full lines and partly in dotted lines in Fig. 2, into the supplemental valve-cylinder 9 on one side of the port 8 thereof. The port 23 in a like manner communicates with a passage 25, which leads into the cylinder 9 on the opposite side of the port 8. The chamber 4 communicates with the cylinder 2 through a lower side port 26, said chamber 4 also communicating through the passage 27 and port 28 with one end of the cylinder 1. The cylinder 2 also communicates with the chamber 5 through the medium of a port 29, said chamber communicating through a passage 30 and port 31 with the opposite end of the cylinder 1 from that in which is employed the port 28.

The chamber 3 is provided with an exhaust-passage 32, which, as indicated in the drawings, leads downward on the outer side of the cylinder 1. The chamber 3 in its upper portion communicates through ports 33 and 34 with the interior of the cylinder 2, these latter ports being formed in the shoulder portions 11 and 11^a of said cylinder, as shown.

As indicated in dotted lines at 35 and 36, the end portions of the cylinder 9 are provided with exhaust-ports which lead into the exhaust-chamber 3.

Through one end of the valve-cylinder 9 works a valve-rod 37, on which within said cylinder is mounted a valve having separated heads 38 and 39, the cup-leathers of which are adapted to fit and slide within said cylinder.

40 represents the main piston-rod, which works through one end of the cylinder 1 and is provided on its inner end with a head 41, which is adapted to fit and slide within said cylinder.

Through the medium of a connecting-arm 42 the outwardly-extending portion of the valve-rod 37 is connected with a horizontal rod 43, which also works through one end of the cylinder 1 and is adapted to project a short distance within the latter, as shown in Fig. 1.

It will be understood that the power mechanism herein described is designed to be used in the usual manner in conjunction with a pumping-cylinder arranged adjacent to the cylinder 1, said pumping-cylinder and mechanism not forming a part of this invention and not being shown herein. It will also be understood that the main piston-rod 40 works in said adjacent pumping-cylinder, carrying a piston-head thereon in the usual manner, and that the rod 43 has one of its ends projecting within said pumping-cylinder.

In order to illustrate the operation of our invention, we will assume that the outer and larger head of the valve 12 is in the outer portion of the cylinder and that the space between the cup-leathers of said valve is beyond and out of communication with the port 26. These parts being in this position, it will be seen that the space between the cup-leathers of the remaining valve-head will be in communication with the port 29. We will also assume that the port 24 of the supplemental valve 9 is in communication with the space between the valve-heads 38 and 39, that the port 25 is on the outer side of the valve-head 38, and that the piston-head 41 is in what we will term the "outer end portion" of the cylinder 1. The water-inlet 7 being connected with a city water-supply pipe or other similar water-supply, the water which enters the space between the cup-leathers of the valve 38 39 through the inlet 8 passes out through the passage 24 and port 22 and thence into that end of the cylinder 2 in which the valve 12 is shown in its outermost position. It will also be seen that the water which enters the central portion of the cylinder 2 through the inlet 6 will not only be contained in said cylinder, but within the tubular or barrel-like bodies of the valves 12 and 13. The pressure exerted by the water which enters the port 22, as above described, against the valve-head 12 operates to force said valve 12 inwardly until its flange 12^a is in contact with the shoulder 11 of the cylinder 2 and the space between its cup-leathers 15 and 16 is in communication with the port 26. This movement of the valve 12 also results in a corresponding outward movement of the valve 13, which results in closing communication between the port 29 and the space between the cup-leathers of said valve 13. The water which passes through the openings of the perforated casing 21 is now free to pass downward through the port 26, chamber 4, passage 27, and port 28 into the outer end of the cylinder 1, where it will exert an inward movement on the piston-head 41. In the above-described movement of the valve-bodies 12 and 13 it will be seen that the water which may be contained between the head of the valve 13 and the end of the cylinder 2 will exhaust through the port 23 and passage 25 into the cylinder 9 and from the latter through the exhaust-passage 35 to the exhaust-chamber 3, from which it will pass out through the exhaust-passage 32. During the described inward movement of said piston-head 41 it is obvious that the water back of said head will be exhausted or forced outward through the port 31, passage 30, chamber 5, ports 29 and 34, chamber 3, and exhaust-passage 32. When the piston-head 41 comes into contact with the trip-rod 43, it is obvious that the latter, together with the valve-rod 37, with which it is connected, will be moved outward, resulting in the valve which is carried on said rod 37 being moved outward to close communication between the ports 8 and 24 and to open communication between said port 8 and the passage 25. The water, which is now directed through the port 8, passage 25, and port 23 into the end of the cylinder 2, exerts such pressure on the valve 13 as to move the latter inward and the valve 12 outward to the position shown in the drawings. In this position it is obvious that communication is established between the interior of the valve-body 13 and the inner end of the cylinder 1 through the port 20, perforated casing 21, port 29, chamber 5, passage 30, and port 31, the water thus discharged into said cylinder resulting in again forcing the piston-head outward. This last operation of the valves 12 and 13 also results in producing a communication between the exhaust-passage 32 and the outer end portion of the cylinder through the port 28, passage 27, chamber 4, ports 26 and 33, and chamber 3, and further results in forcing the water in front of the valve 12 out through the port 22, passage 24, cylinder 9, port 36, and passage 32. In the above manner the desired reciprocating motion is imparted to the piston-rod 40.

It is obvious that the movement of the rod 37 in the opposite direction from that herein described will be accomplished in the usual manner by the contact of the rod 43 and the piston-head which is contained in the adjoining or adjacent pumping-cylinder when said piston-head moves toward the power-cylinder 1.

From the operation above described it is evident that while the connecting-rod 13[a] serves to form a positive connection of the valves 12 and 13 these valves would operate in the manner heretofore described without the employment of such connecting-rod.

From the construction shown and described it will be seen that a simple, reliable, and effective water-motor is provided which may be operated by the pressure of water contained in city water-supply pipes and that owing to the employment of the perforated cylinders or castings 21 sediment, sand, or other foreign substance contained in the water would be prevented from being carried into the main cylinder.

Having now fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a water-motor, the combination with the cylinder 1 having a piston therein, of a valve-cylinder 2 having hollow reciprocating valve-bodies therein each of said valves having a head carrying separated cup-leathers, ports in each of said valves communicating with the spaces between said head cup-leathers, a perforated casing embraced between each pair of said cup-leathers and means whereby a reciprocating motion of said valves results in alternately opening and closing communication between the spaces between the cup-leathers and the ends of the cylinder 1, substantially as specified.

2. The combination of a piston-cylinder, a main valve-cylinder, a supplemental valve-cylinder, all of said cylinders being in substantial parallelism, opposite ports communicating from the main valve-cylinder to the corresponding ends of the piston-cylinder, reciprocating hollow valves within the main valve-cylinder and having open inner ends, external annular peripherally-perforated chambers carried by the valves and in communication with the interior thereof, said chambers arranged to register alternately with the ports of the main valve-cylinder, ports communicating between the supplemental valve-cylinder and the opposite ends of the main valve-cylinder, opposite reciprocating valves within the supplemental cylinder and controlling the ports thereof, inlets for the main and supplemental cylinders and located between the valves thereof, and means for automatically shifting the supplemental valve by the movement of the cylinder-piston.

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MATHEW J. WEBER.

In presence of—
CHARLES B. HENDERSON,
J. W. SCHAL.