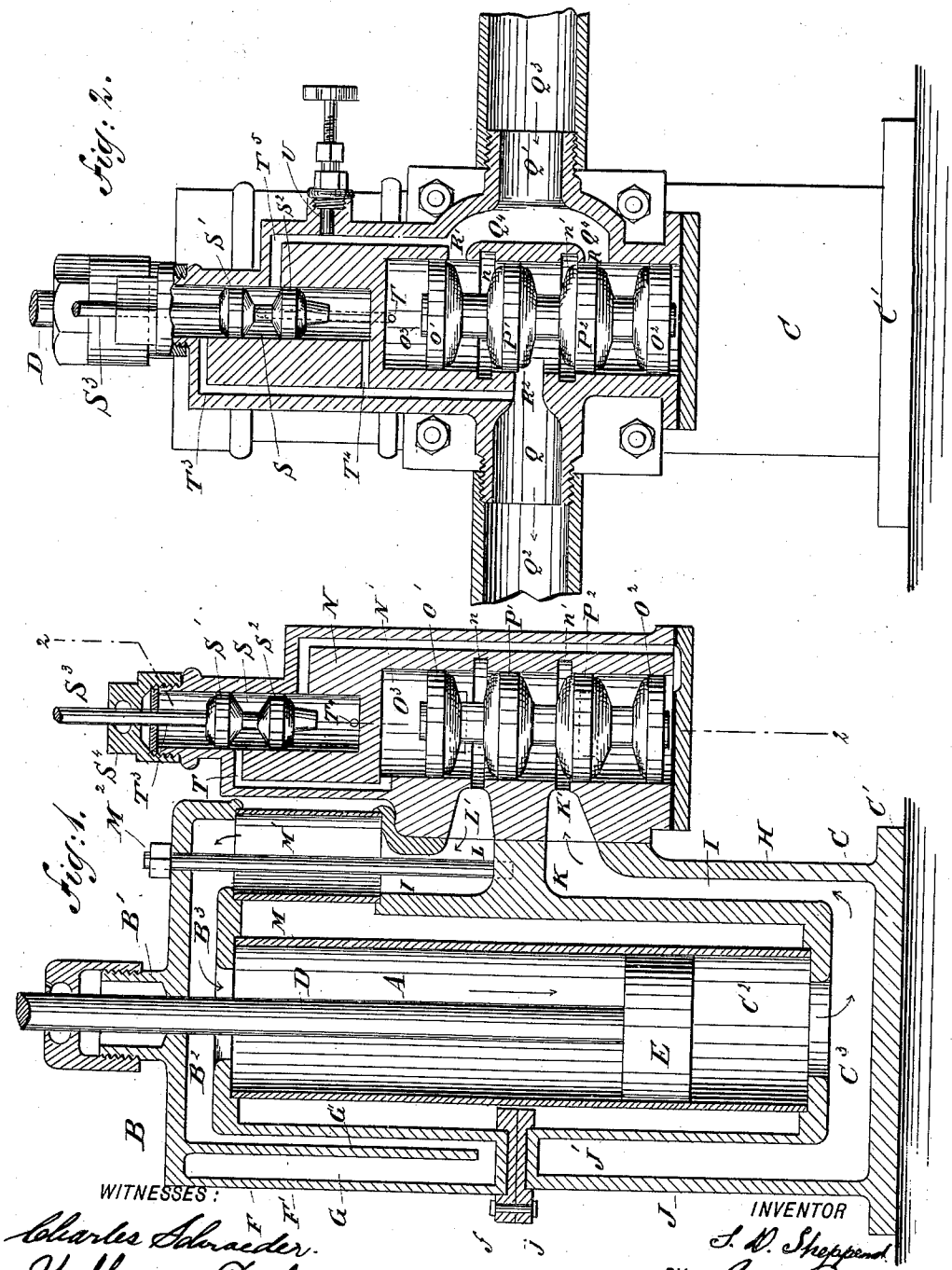
(No Model.)

2 Sheets—Sheet 1.

S. D. SHEPPERD.

WATER MOTOR.

No. 474,347. Patented May 3, 1892.



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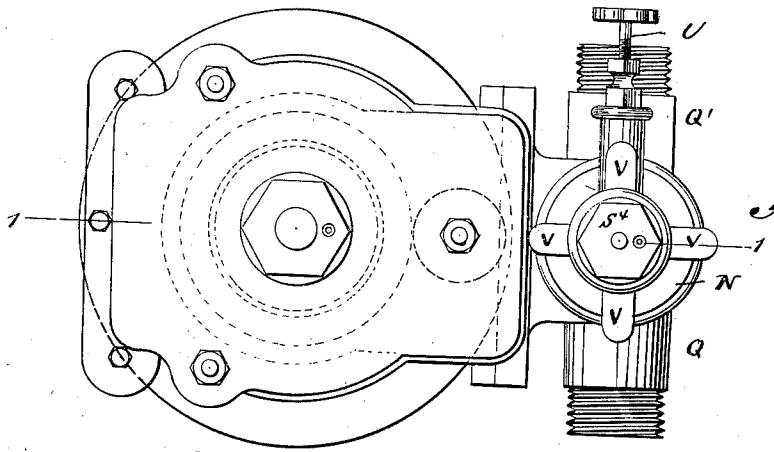

Fig: 3.

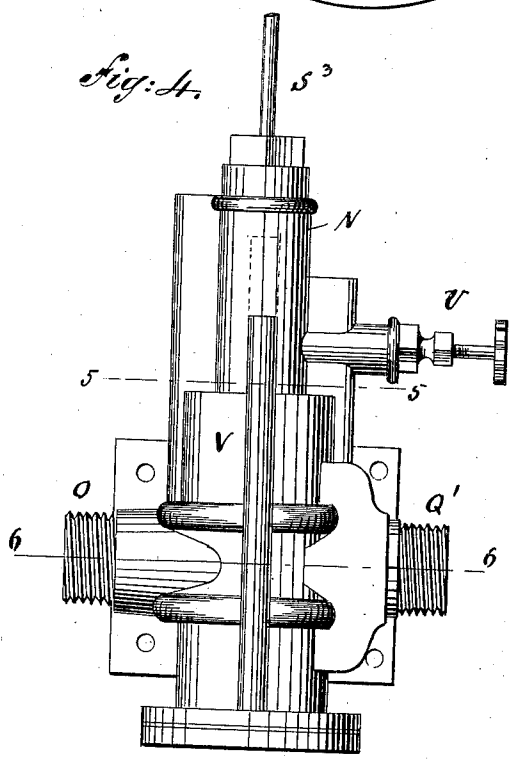

Fig: 4.

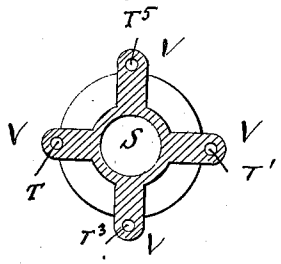

Fig: 5.

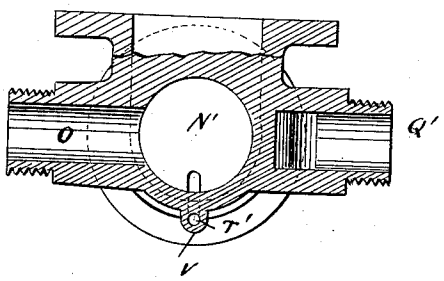

Fig: 6.

WITNESSES:

Charles Schroeder.

Charles Bles

INVENTOR:

S. D. Shepperd

BY Lapsley & Raymer

ATTORNEYS.

UNITED STATES PATENT OFFICE.

SYLVANUS D. SHEPPERD, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE BACKUS WATER MOTOR COMPANY, OF SAME PLACE.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 474,347, dated May 3, 1892.

Application filed November 18, 1891. Serial No. 412,340. (No model.)

To all whom it may concern:

Be it known that I, SYLVANUS D. SHEPPERD, a citizen of the United States, and a resident of Newark, in the county of Essex, in the State of New Jersey, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

This invention relates to water-motors, and especially to that class of water-motors that are provided with reciprocating pistons and valves for controlling the ingress and egress of the water for driving said piston.

The object of my invention is to provide a motor of this kind which is simple in construction, can be easily erected for use, and is not apt to get out of order.

This invention consists in a combination, with a tube, of two head-sections placed on the ends of the same and provided with legs, of which one of each section forms an air-chamber, and the other leg of the one section being provided with a seat for a valve-casing, and the two sections being bolted together for the purpose of holding them firmly on the ends of the tube.

The invention further consists in the construction and combination of parts and details, which will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical central longitudinal sectional view of my improved water-motor on the line 1 1 of Fig. 3. Fig. 2 is a vertical transverse sectional view through the valve-casing on the line 2 2 of Fig. 1. Fig. 3 is a plan view of my improved water-motor. Fig. 4 is a side view of the valve-casing. Fig. 5 is a horizontal sectional view of the same on the line 5 5 of Fig. 4. Fig. 6 is a similar section on the line 6 6, Fig. 4.

Similar letters of reference indicate corresponding parts.

The cylinder A consists of a piece of tubing having its ends cut off square and planed smooth, the ends of said piece of tubing A resting in the annular recesses *a*, formed in the inner surfaces of the two head-pieces B and C. The upper head-piece B is provided with a neck B′, forming a stuffing-box for the piston-rod D, secured to the piston E, which works up and down in the cylinder A. The said upper head-section B is also provided with an aperture B^2, that establishes communication between the upper end of the cylinder A and the channel B^3, formed in the said upper head. The upper head is provided on one side with a leg F, provided with a partition F′, extending from the top upper wall of said upper head-section down to within a short distance from the bottom of the leg, thereby forming an air-chamber G and the channel G′, leading from the channel B^3 in the upper head-section to said air-chamber G. The lower head-section C is provided with a thickened bottom and base C′ and with two opposite legs H and J, the leg J being closed at the upper end and forming the air-chamber J′ for the lower head-section. The bottom head-section C is also provided with a channel C^3, which communicates by an aperture C^2 in the upper wall of said section with the lower end of the cylinder A. In the leg H of the bottom section C the channel I is formed, which leads to the port K in the valve-case seating, also provided with a port L, which is in communication with the channel I′, formed in the upper part of the leg H. The lower end of a piece of tubing M is placed in a recess formed in the upper end of the leg H, the upper end of said piece of tubing resting in a suitable recess formed in the under side of the upper head B. A rod M′, having its lower end secured in the leg H, passes through said piece of tubing M, and on its upper end a nut M^2 is screwed, by means of which the under side of the upper head-section B is pressed firmly against the upper end of the tubing M and the lower end of said tubing M is pressed firmly against the upper end of the leg H. Flanges *f* and *j* are formed on the ends of the legs F and J and are securely bolted together, whereby the head-sections are pressed firmly against the ends of the cylinder A, so as to form tight joints, said bolts in the flanges, with the rod M′, serving to unite the entire parts of the motor proper, with the exception of the valve-casing. The flanged casing N is provided on one side with a seat, fitting against the seat formed on the side of the leg H, and said seat is provided with ports K′ and L′, which lead to the cylindrical bore N′ in said casing, which bore contains four pistons O′

O^2 P' P^2, which are all secured on a common piston-rod O^3, and said ports K′ and L′ are also in communication with the two annular grooves *n* and *n′*, formed in the bore N′. The valve-casing N is provided with two lateral projecting necks Q and Q′, the latter of which is connected with the inlet-pipe Q^3 and the former with the outlet Q^2. The neck Q′ is connected by the channels Q^4 with two inlet-ports R and R′, and the neck Q is connected with the outlet-port R^2. The valve-casing is provided above the bore N′ with a bore S of less diameter and containing the two pistons S′ and S^2, secured upon the rod S^3, which passes through a suitable stuffing-box secured on the upper end of the valve-casing N, which piston-rod is to be operated in any suitable well-known manner by the ascending and descending main piston-rod D. The channel T leads from about the center of the bore S to the upper end of the bore N′, and the channel T′ leads from the lower half of the bore S to the bottom of the bore N′. The channel T^3 leads from the top of the bore S to the outlet-neck Q and is connected by a channel T^4 with the bottom of the bore S, and the channel T^5 leads from about the center of the bore S to the channel Q^4 of the inlet-neck Q′, which channel T^5 can be controlled by a valve U. The channels T′ T^3 T^4 T^5 are formed in the vertical ribs V on the sides of the valve-casing, and the valve-casing N is firmly bolted to the leg H by bolts passed through the flanges on said flanged casing, as shown in Fig. 4.

The motor operates as follows: As shown in Fig. 1, the piston E is making its downward stroke and the water under pressure passes from the pipe Q^3 into the neck Q′, the channel Q^4, the port R′, and ports L L′, and channel I′, the tubing M, and channel B^3 of the upper head-section B into the upper end of the cylinder. When the piston has completed its downward stroke, the rod S^3 is moved downward by means of tappet or other device acting on the same, whereby the upper end of the channel T, leading to the upper end of the bore N′, is closed by the upper piston S′, and the lower piston S^2 is moved below the upper end of the bore T′, whereby the bores T′ and T^5 are brought into communication, permitting the water to pass from the channel Q^4 through the channel T^5 into that part of the bore S between the piston S′ and S^2, and from there through the channel T′ to the lower end of the bore N′. The water acting on the lower piston O^2 forces the pistons O' O^2 P' P^2 upward, whereby the piston P′ closes the channel R′ and the piston P^2 is moved from the channel R, thus permitting the water to pass from the neck Q′ through the neck Q^4 and channel R, and through ports K K′ and the channels I and C^3 and into the lower end of the cylinder to force the piston upward. When the piston has completed its upward stroke, it moves the rod S^3 upward by suitable means and brings the pistons S′ and S^2 into the position shown in Figs. 1 and 2, whereby the communication between the channel T^5 and the channel T′, leading to the bottom of the bore, is interrupted, and the communication between the channel T^5 and the channel T, leading to the top of the bore N′, is established. The water now passing through the channel T acts on the upper piston O′ in the bore N′ and forces the pistons downward, whereby the water is again admitted into the upper end of the main cylinder A, and so on. The exhaust-water at all times passes through the bore R^2 into the neck Q and outlet-pipe Q^2. The waste water from the valves S′ S^2 is conducted from the bore S through the channels T^3 and T^4 into the neck Q. The air-chambers formed in the leg F and J cushion the water and prevent undue hammering or beating of the same.

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

1. The combination, with a tube and a piston in the same, of two head-sections placed against the ends of the same, one section being provided with a leg provided with channels, a valve-casing secured to said leg, and a piece of tubing connecting said leg with the other head-section and communicating with one of the channels in said leg, substantially as set forth.

2. The combination, with a tube, of two head-sections placed against the ends of the same, one head-section being provided with two legs, of which legs one has two channels, the other leg forming an air-chamber, the other head-section being provided with a single leg, forming an air-chamber, a piece of tubing inserted between the head, having one leg and the leg provided with channels, bolts for holding the two head-sections together, and a valve-casing secured on the leg provided with the channels, substantially as set forth.

3. The combination, with a tube, of two head-sections placed against the same, of which head-sections one is provided with two legs and the other with one leg, the two opposite legs having flanges which are bolted together, a piece of tubing inserted between the remaining leg of one section and the under side of the other head-section, a rod passing through said piece of tubing and secured in the leg on which the tubing rests and also passing through the other head-section, a nut on said rod, channels in the leg in which the rod is secured, and a valve-casing secured on said leg provided with the channels, substantially as set forth.

4. The combination, with a tube, of two head-sections held against the ends of the same, which head-sections are provided with legs, one leg of one section being provided with two channels and with a seat, which seat has two bores communicating with the channels, a valve-casing bolted on said seat, valves in said casing, and mechanism for operating said valves, substantially as set forth.

5. The combination, with a tube, of two head-sections held against the ends of the same, which sections are provided with legs, one leg of one section being provided with two channels and with a valve-seat having two ports communicating with the channels, and a valve-casing bolted on said seat, which casing has two independent bores—a water-actuated valve in one bore and a governing-valve for said water-actuated valve in the other bore—substantially as set forth.

6. The combination, with a tube and a piston on the same, of two head-sections on the same, which head-sections are provided with legs, one leg of each section forming an air-chamber, one of said air-chamber legs being provided with a partition forming in said leg a channel and an air-chamber, the remaining leg of one section being provided with two channels and a valve-casing seat, a valve-casing on said seat, valves in said casing, and a piece of tubing connecting the leg on which the valve-seat is attached with the opposite head-section, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

SYLVANUS D. SHEPPERD.

Witnesses:
ROBERT B. CISSEL,
HARRY PITTENGER.