W. SHRIVER.
Water-Engine.

No. 214,461. Patented April 15, 1879.

FIG. 1.

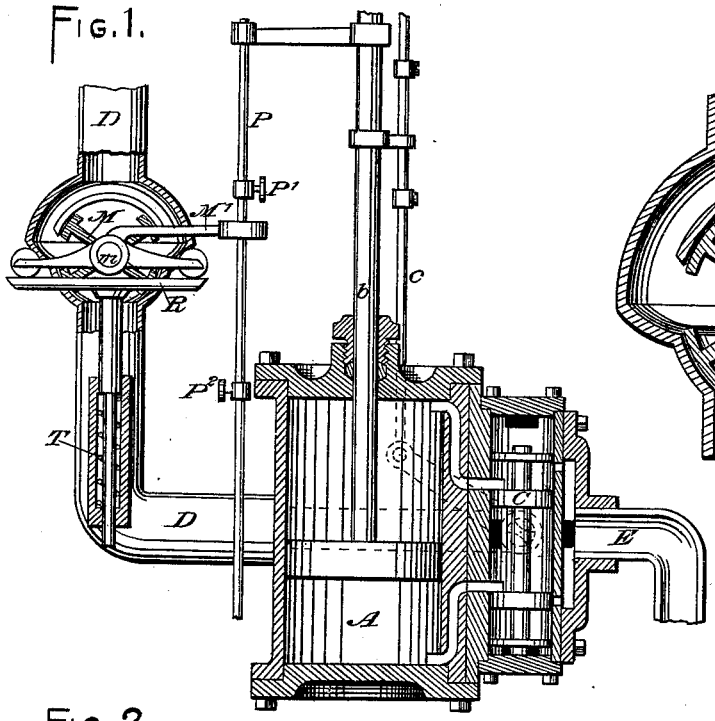


FIG. 3.

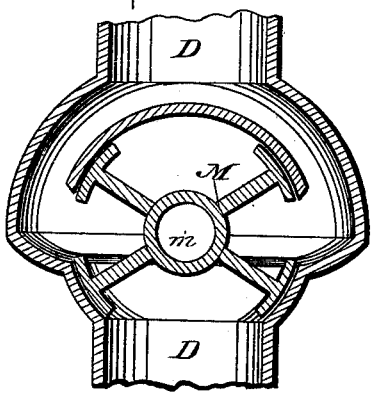


FIG. 2.

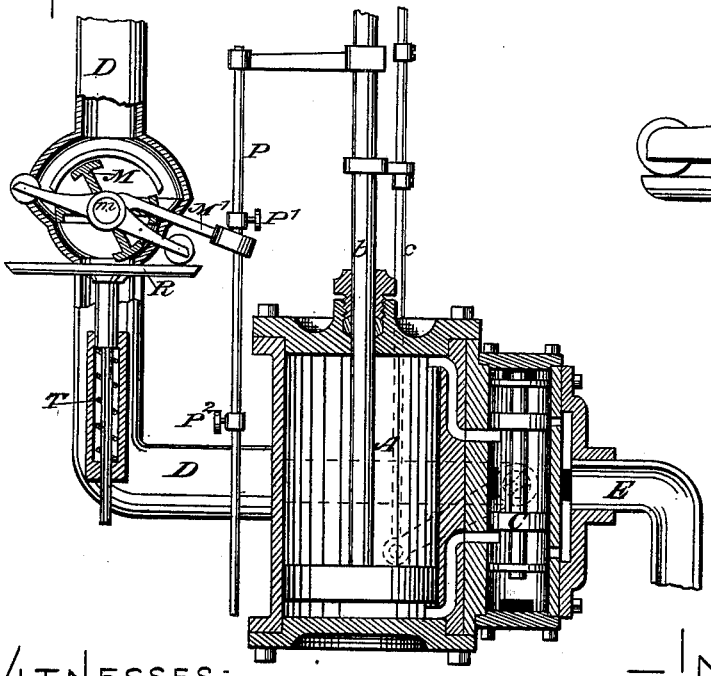
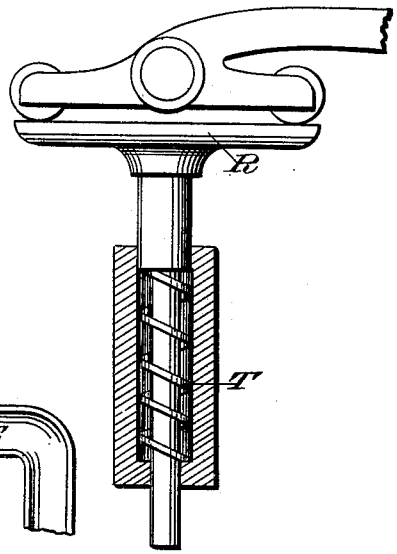


FIG. 4.



WITNESSES:
E. B. Bolton
C. C. Stetson

INVENTOR:
Walter Shriver
by his attorney C. C. Stetson

UNITED STATES PATENT OFFICE.

WALTER SHRIVER, OF NEW YORK, N. Y.

IMPROVEMENT IN WATER-ENGINES.

Specification forming part of Letters Patent No. **214,461**, dated April 15, 1879; application filed November 9, 1878.

To all whom it may concern:

Be it known that I, WALTER SHRIVER, of New York city, in the State of New York, have invented certain new and useful Improvements relating to Water-Engines, or motors operated by the pressure of water; and I do hereby declare the following to be a full and exact description thereof.

My experiments have been made with engines for blowing organs. The pressure of water from a street-main or other source was made to act on a piston, causing it to reciprocate, being changed in its action at the end of each stroke by the movement of a valve. Engines of this general description have been long known, and it has been found that however rapidly each valve is moved, it is not easy to avoid a brief interruption in the current of the water. A large air-chamber partially obviates the difficulty; but the air is liable to be absorbed, and in situations where, as usual, only a moderate degree of engineering skill is available, serious difficulties are liable to occur from the concussion due to a sudden stopping of the current of water at the moments when the piston reverses its motion.

I remedy the difficulty by a radically different means. I arrest the motion of the water by a partially-shutting valve, which is additional to the ordinary reversing-valve. It slows the current of the water immediately before the main valve is shifted to reverse the motion of the piston, and opens widely after the piston has commenced its return stroke, to allow the water to work with full pressure again.

The action of my additional valve may itself be quick. It may be determined by trial in different situations how quickly it may work. It is only required that it shall shut with sufficient slowness to avoid shock, and that it shall not shut tightly.

I will designate my valve as a partially-shutting valve. Its effect is to only partially stop the flow of water.

I have made my experiments in connection with the water-engine represented in the patent to me dated November 28, 1876, No. 184,808, and I will represent it with such engine; but it will be understood that it may be used with any other approved form of water-engine having a reciprocating piston.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a central vertical section, showing the piston at mid-stroke. In this condition my additional valve is wide open.

Fig. 2 is a corresponding view, showing the condition of the parts when the piston has, by approaching the end of its stroke, closed my additional valve and partially arrested the flow of the water. The form of valve and passages which I have adopted causes the valve to balance between the force of the water entering on opposite sides, thus relieving the shaft of the valve from strain. By making the valve of a little less diameter than the interior of the casing in which it works, I secure an easily-worked valve, and one with which the only partially-closed condition will be attained by its leakage, even when by any chance it is thrown farther than is desirable.

The remaining figures represent details on a larger scale.

Fig. 3 is a section through my additional valve when it is in an open condition. Fig. 4 shows the T-piece and spring by which my additional valve is instantly thrown into its open condition after the piston has commenced its stroke.

Similar letters of reference indicate corresponding parts in all the figures.

A is the water-cylinder. *b* is the piston-rod, and *c* is the valve-rod, which works a piston slide-valve, C, and directs the water to one or the other end of the cylinder, as required, allowing its free escape always from the opposite end. The water is inducted to the cylinder through the pipe D, and is allowed to flow away through the pipe E.

M is a valve mounted in a sufficiently-enlarged portion of the water-way forming the pipe D. It is controlled by an arm, M′, on its shaft *m*. When this valve is turned in the proper position, it is of no effect. This is the position which it maintains during the main portion of each stroke; but immediately be-

fore the end of each stroke it is turned so as to gradually moderate and nearly stop the flow of the water. When the motion has been thus moderated, the valve C changes its position, and the water is directed to the opposite end of the cylinder. So soon as this change is effected, the valve M is again turned in a wide-open position, and remains so until near the end of the next stroke, when the operation of gradually closing and arresting the flow of the water is repeated.

There may, if desired, be a simple air-chamber in addition to my valve M; but I have not found it necessary, and prefer to employ none.

When the water-engine is employed to act against a reliable resistance, as in pumping air to blow an iron-furnace, an organ, or the like, the valve M may be turned by acting on its arm M′ by stops adjusted on a reciprocating rod carried by the piston. P represents such a rod, which, it will be understood, is rigidly connected to the piston-rod. It carries two stops, P^1 P^2, which may be adjusted by means of pinching-screws, as represented.

When the engine has nearly completed its stroke in the downward direction, the stop P^1 strikes the arm M′ and turns the valve M, to check the flow. When it has nearly completed its motion in the upward direction, the stop P^2 strikes the arm M′ and turns it in the other direction, to stop the flow.

After being turned in either direction, the valve M is reliably turned back to its open position by the action of a T-shaped piece of metal, R, which is pressed up by a spring, T, and, by acting under the lever M′, exerts a constant force, which returns the valve to its wide-open position the moment it is released from the influence of the respective stops P^1 P^2.

Various modifications may be made without departing from the principle of my invention.

In case the engine is employed to turn a crank, the valve M may be turned by cams. The valve M may be varied in form and in its motion within wide limits. It is only necessary that it should be a strong and reliable valve, properly worked to partially arrest the motion of the water immediately before the end of each stroke, and to allow it to exert its full force again after the valve C has shifted.

I claim as my improvement in a reciprocating water-engine—

1. The combination of the partially-shutting valve M with any ordinary or suitable shifting device, C, for directing the force of the water to the two sides of the piston alternately, so as to avoid shock and concussion, as herein specified.

2. The rod P, stops P^1 and P^2, and arm M′, in combination with the shaft *m* and valve M, mounted in the induction-passage D, and adapted to automatically retard the flow of the water immediately before the shifting of the valve, as herein described.

3. In combination with a water-engine having a reciprocating piston and valves, as specified, the T-shaped piece R and spring T, valve M, with its lever M′, and the rods P and stops P^1 P^2, as herein specified.

4. The housed spring T and T-shaped rod R, constructed, arranged, and adapted to serve, in combination with the partially-shutting valve M, by exerting a constant force, to keep said valve in an open condition, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 8th day of November, 1878, in the presence of two subscribing witnesses.

WALTER SHRIVER.

Witnesses:

CHARLES CREIGHTON,

JOHN DECKELMAN.