C. FISHER.

Hydro-Pneumatic Engine.

No. 215,902. Patented May 27, 1879.

Fig. 1.

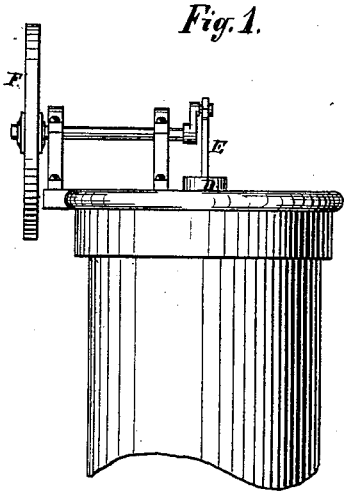


Fig. 2.

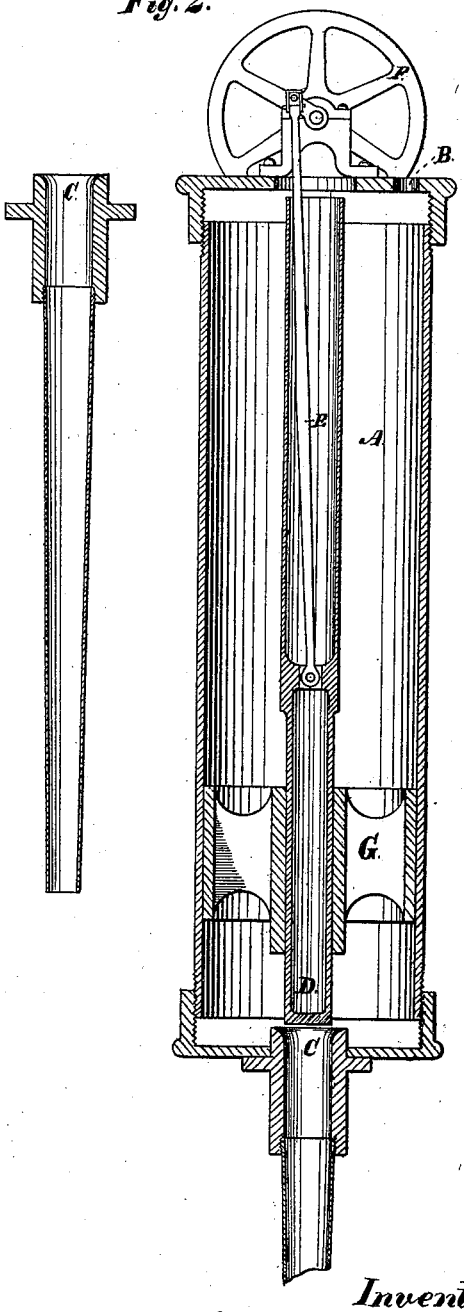
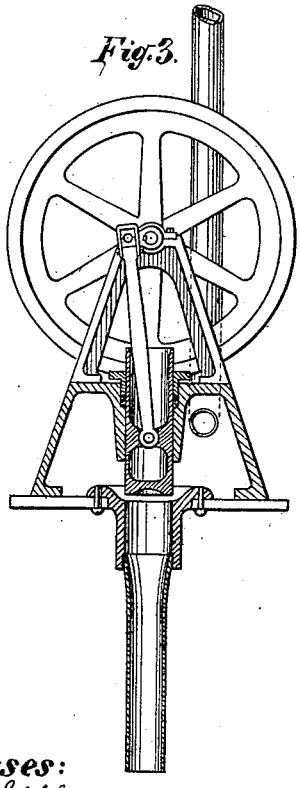


Fig. 3.



Witnesses:

Henry Eichling

Robert H. Duncan

Inventor

Clark Fisher

by Paul A. Duncan

his Atty

UNITED STATES PATENT OFFICE.

CLARK FISHER, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN HYDRO-PNEUMATIC ENGINES.

Specification forming part of Letters Patent No. **215,902**, dated May 27, 1879; application filed November 29, 1878.

To all whom it may concern:

Be it known that I, CLARK FISHER, of Trenton, in the county of Mercer and State of New Jersey, have invented a new and useful Hydro-Pneumatic Engine, of which the following is a specification.

The invention to which this specification relates depends upon the following principle: If the induction-orifice of a vertical tube through which a full stream of water or other fluid is passing and being discharged into the open air be suddenly closed, the body of fluid below the valve will continue, by virtue of its momentum and the force of gravity, to descend, and thus a vacuum will be formed in the upper end of the tube, and a corresponding atmospheric pressure will be exerted upon the upper side of the valve. As the fall of the fluid progresses, air will rush into the tube from below in quantity sufficient to establish an equilibrium of pressure on the valve.

If, now, the valve used be of the form of a piston fitting the interior of the tube, it will be forced down into the tube by the atmospheric pressure above it as the vacuum begins to form; and if the extent of its downward motion be properly regulated, (by means, *e. g.*, of a spring used to suspend it, or by means of a pitman connecting it with a crank-shaft, as hereinafter explained,) the piston will be restored, upon the breaking of the vacuum, to its normal position—*i. e.*, slightly withdrawn from the upper end of the tube—this effect being produced by the elasticity of the spring, or, when the crank-shaft is used, by the momentum of the revolving parts, the action in either case being aided somewhat possibly by the impact of the inrushing air upon the under side of the valve. This lifting of the valve permits the re-establishment of the flow of the water, and this in turn permits the operation to be repeated, the result being a continued reciprocating motion, which can, if desired, be converted into revolving motion by the usual modes.

The accompanying drawings illustrate an engine constructed on this principle, and represent an operative machine, Figure 1 being an elevation of the upper part of the machine, and Fig. 2 a vertical view of the same.

A is a vessel or tank, which is supplied with water through the aperture B, and from which there extends downward an open tube, C. E is a pitman connecting the piston with the crank of the wheel F, and G is a tubular spider which serves as a guide for the piston.

The operation is as follows: The flow of water through the tube C being once established, the piston is moved down so that its lower end enters the upper end of the tube. This immediately acts as a valve to arrest the further flow of water into the tube; but the water already in the tube and below the piston continues to descend by its acquired momentum and the constantly-acting force of gravity. This tends to create a vacuum within the tube, and the corresponding atmospheric pressure on the upper end of the piston forces it downward until its descent is arrested by the crank reaching the lowest part of its circle of movement. The momentum acquired by the revolving parts during the descent of the piston is due to the combined effect of the atmospheric pressure acting on the upper end of the piston, and of the weight of those parts which have been falling from a higher to a lower level. By virtue of this momentum of the revolving parts, the crank is carried past the dead-center and up to its first position. This withdraws the piston from the tube C, so that the flow of water into the tube recommences. This momentum of the parts carrying the crank past its upper center, the piston again descends and enters the discharge-tube, and the operation is repeated so long as the supply of water continues.

By carrying the piston up through a stuffing-box, as shown in Fig. 3, both the length of the piston and the height of the chamber A can be materially reduced, and at the same time the head of water can be indefinitely increased, the supply-pipe B being extended upward, if desired, as far as the strength of the parts will permit.

If desired, two or more pistons may be used, connecting with cranks upon a common shaft, care being taken to have the cranks so arranged that the several pistons will commence their respective ascents at different points of time. In such case, of course, each piston works in an independent discharge-pipe.

In the construction illustrated in the draw-

ings, the upper end of the piston projects above the water in the feeding-vessel. This is deemed specially advantageous in a single-piston engine, since the piston will not be loaded with water to impede its rise.

It will be observed that this engine is peculiar in its construction, in that the piston acts also as the valve which gives intermittent action to the motive power.

What is claimed as new is—

The combination of the piston and the discharge-tube, when the two are arranged for operation substantially as described.

CLARK FISHER.

Witnesses :
SAML. A. DUNCAN,
ROBERT H. DUNCAN.