W. H. CLARK.

HYDRAULIC ENGINE.

No. 190,005. Patented April 24, 1877.

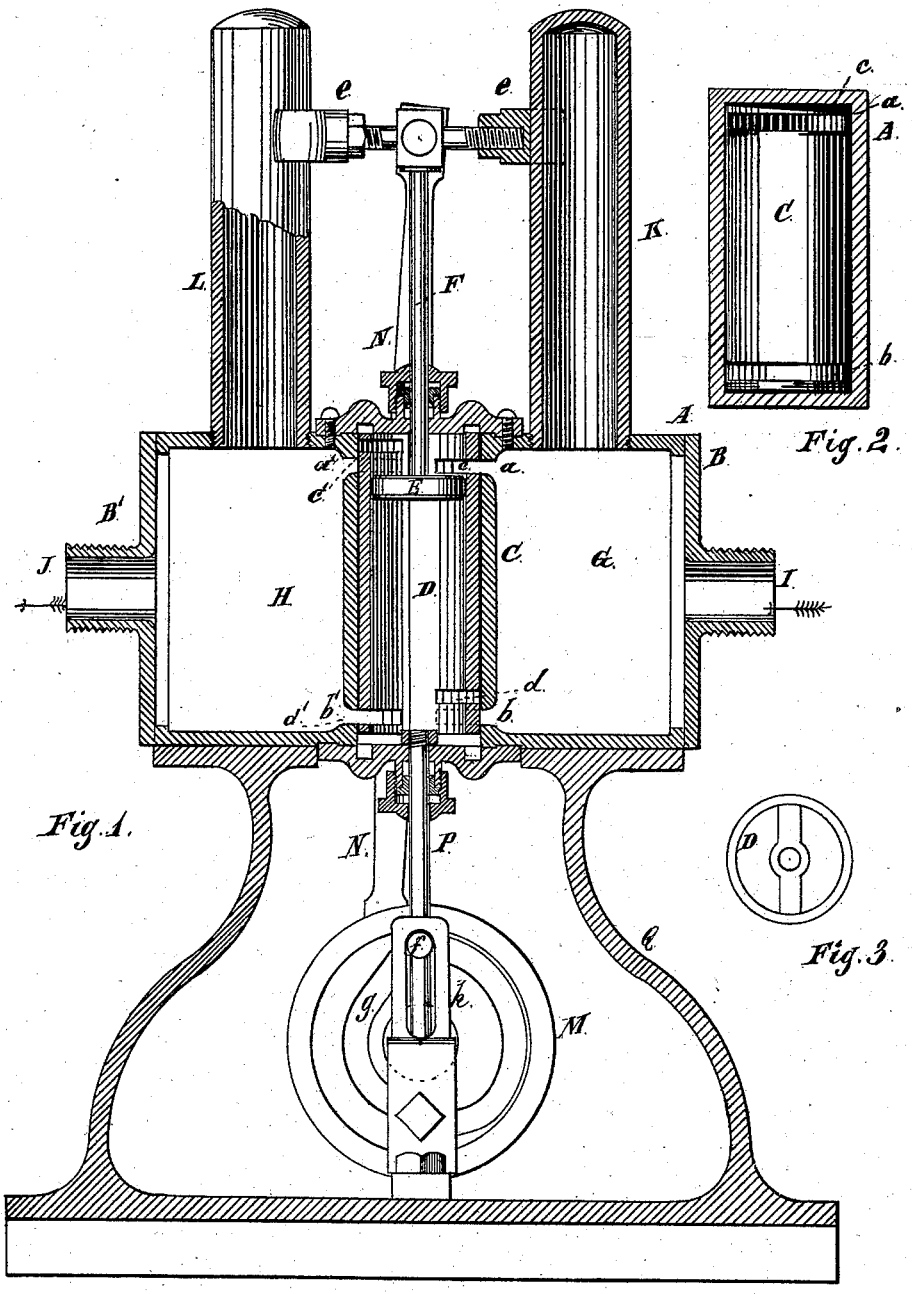

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM H. CLARK, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN HYDRAULIC ENGINES.

Specification forming part of Letters Patent No. 190,005, dated April 24, 1877; application filed March 19, 1877.

To all whom it may concern:

Be it known that I, WILLIAM H. CLARK, of the city of Chicago, Cook county, State of Illinois, have invented new and useful Improvements in Hydraulic Engines, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section; Fig. 2, a detail of the cylinder; Fig. 3, a bottom view of the sliding sleeve.

The object of my invention is to so construct a hydraulic engine that the movement of the water from the chest or pipes to the piston shall be as little as possible, and to provide an improved valve.

In the drawings, A represents a chest or case, of the ordinary construction, B B′ being the two heads thereof, secured in place in the usual manner. C is a cylinder, cast with the chest. D is a sliding sleeve, fitting within the cylinder C. E is the piston which moves in the sleeve D.

The cylinder C is provided with an opening, *a*, at the top, and a similar opening, *b*, at the bottom, for the passage of the water. It is also provided with a similar opening, *a′*, at the top, and *b′* at the bottom, for the discharge of the water. The sleeve D is provided with corresponding openings *c d* and *c′ d′*.

F is the piston-rod. G is a chamber in the chest, upon one side of the cylinder C; and H is a similar chamber upon the opposite side. I is the inlet for the water, and J the outlet. K is the air-chamber in ordinary use, and L is a similar chamber above the chamber H. M is a cam-wheel. N is the pitman-rod, which drives the pitman-wheel, which is secured to the shaft, upon which is located a driving-pulley, through which the power of the engine is communicated, in the usual manner. The cam-wheel M is also driven by the pitman-rod N, and moves in unison with the pitman-wheel upon the shaft.

This construction being old, no further description need be given thereof.

The upper end of the pitman-rod is pivoted upon an arm extending out at right angles from a head upon the piston-rod F, as usual.

e e are guides for the upper end of the piston-rod, moving upon the inner surface of the chambers K L. P is a rod, attached to a cross-bar upon the lower end of the sliding sleeve D. The lower end of the rod moves in a suitable bearing. Upon this rod is an adjustable pin, *f*, arranged to move in the cam-groove *g* in the cam-wheel M, and the outer end of this pin may move in a slotted guide, *h*. Q is a frame or support for the chest A.

In operation, the parts being in the position represented in Fig. 1, water will flow from the chamber G through the opening at the top of C, and through the opening *c* in the sliding sleeve D, just above the piston E, which now is at its highest point, and the pressure of the water will force this piston down. At the same time the water in the sleeve D will be forced out through the opening *d′ b′* into the chamber H. When the piston E has nearly reached its lowest point, the sleeve will be carried down by means of the cam, pin *f*, and rod P, closing the opening *a* at the top of the cylinder, and bringing the opening *d* at the bottom of the sleeve in juxtaposition with the opening *b* at the bottom of the cylinder, at the same time bringing the opening *c′* at the top of the sleeve in juxtaposition with the opening *a′* at the top of the cylinder, and closing the opening *b′* at the bottom of the cylinder, in which position water will be admitted through the openings *b d* beneath the piston, which will then be near the lower end of the sleeve D. The pressure of the water will force the piston up, and the water above the piston will be discharged through the top into the chamber H. All the water which flows into the chamber H will be discharged at J. The pressure of the air-chamber operates in the usual manner.

The air-chamber L is designed to remove the pressure in the chamber H, in case, at any time, for a moment the outflow from H should not be as rapid as the flow therein. A pipe extending down some distance, more or less, is to be attached to J; and by this construction the effect of a siphon is produced, aiding the discharge of the water.

Instead of the chambers G and H, two induction-pipes may be connected directly with top and bottom of the cylinder C, with two eduction-pipes.

It will be observed that by this construction the water from the chamber G only trav-

els the diameter of the cylinder C to get its full effect upon the piston, and this travel is in a direct line.

The end of the pin *f* which travels in the groove *g* should be provided with a roller.

The peculiar construction and arrangement of the valve is such that it cuts off the water without jar; and the pressure upon the sleeve and valve being equal in all directions, there is practically no wear or friction.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a hydraulic engine, the cylinder C, provided with inlet-openings *a b* and outlet-openings *a' b'*, the sliding sleeve D, provided with corresponding openings *c d c' d'*, in combination with passages for the inlet and outlet of water, and devices for operating the sleeve D, substantially as and for the purposes specified.

2. The cylinder C and sleeve D, in combination with the rod P and cam-wheel M, and passages for the inlet and outlet of water, all constructed and operating substantially as and for the purposes specified.

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