E. WEST.

HYDRAULIC ENGINE.

No. 176,822. Patented May 2, 1876.

Fig. 1.

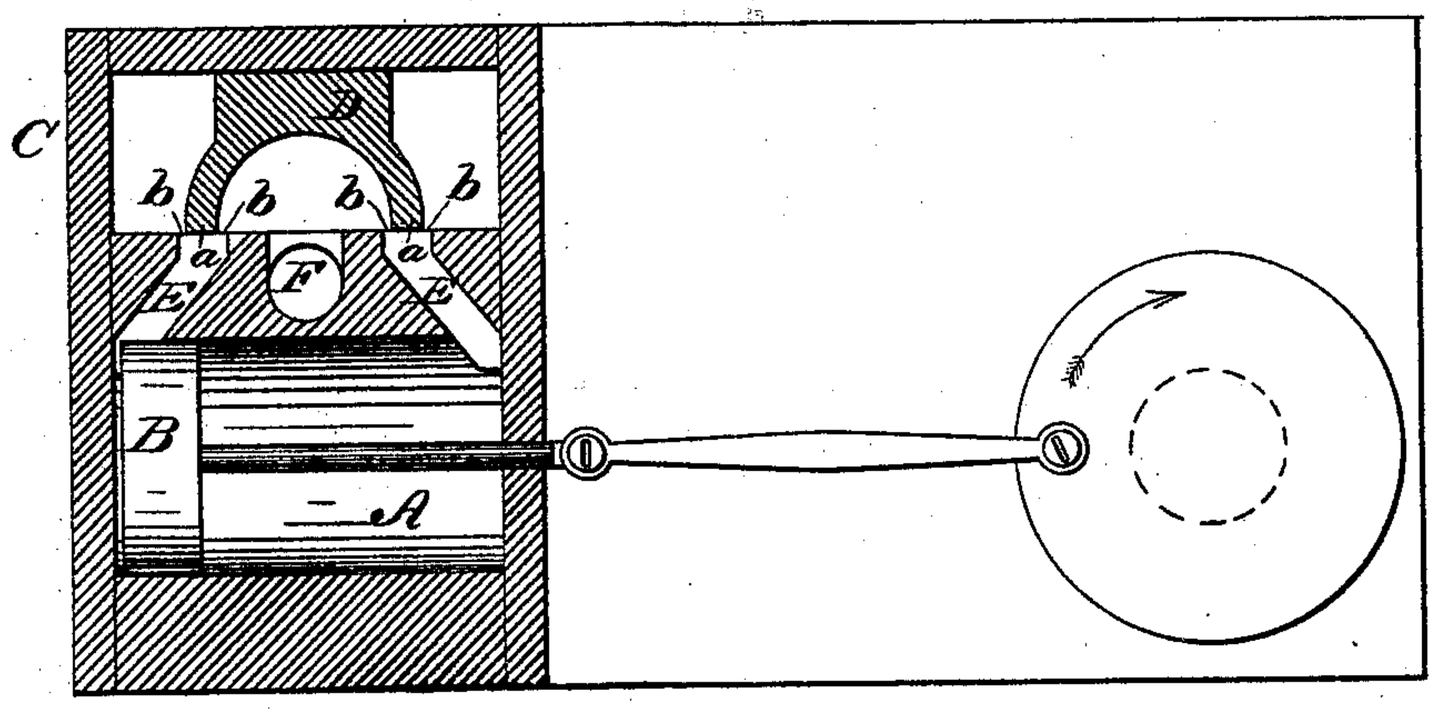
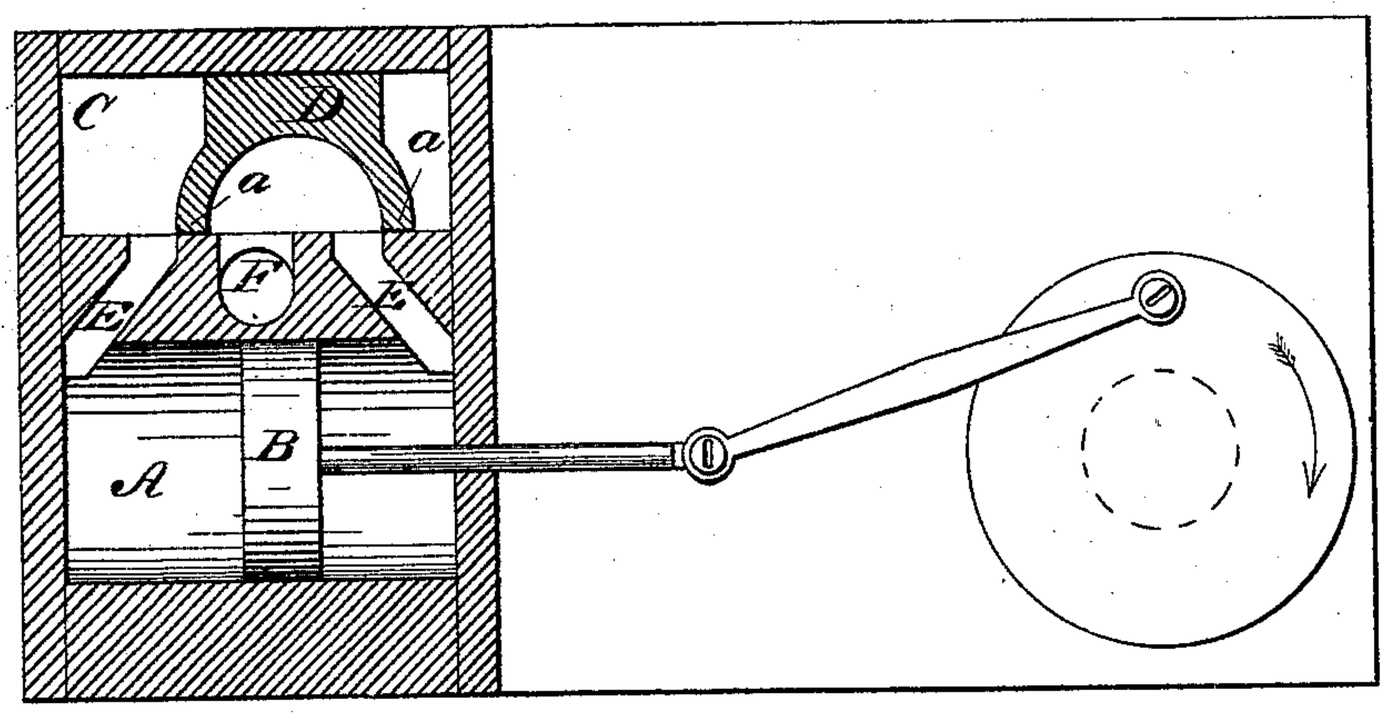


Fig. 2.



Witnesses:

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ELISHA WEST, OF LOCKPORT, NEW YORK.

IMPROVEMENT IN HYDRAULIC ENGINES.

Specification forming part of Letters Patent No. **176,822,** dated May 2, 1876; application filed March 30, 1876.

To all whom it may concern:

Be it known that I, ELISHA WEST, of Lockport, in the county of Niagara and State of New York, have invented certain Improvements in Hydraulic Engines, of which the following is a specification:

My invention relates to reciprocating slide-valve engines, to be driven by water or other non-elastic fluid, and has for its object the prevention of the ordinary concussion or hammering at the end of each stroke, and also the relief of the valve from excessive friction; and to this end the invention consists in the use of a valve having its bearing-faces narrower than the ports of the cylinder, so as to admit the water-pressure to both sides of the piston at the end of the stroke, as hereinafter fully described and explained.

In the use of hydraulic engines as ordinarily constructed, great annoyance is experienced from the hammering or ramming of the water at the end of each stroke, and from the great friction upon the valve during the time of its most rapid movement—the first-mentioned difficulty resulting from the sudden and entire closing of the ports, and the consequent sudden stoppage of the advancing water while in rapid motion, and the second resulting from the momentum of the water, the full force of which is received directly upon the valve when the ports are suddenly closed, as usual.

By my improvement, which consists simply in the combination of wide ports and narrower valve-faces, I momentarily admit or apply the water-pressure to both sides of the piston at the same time, thus equalizing the pressure on the opposite sides of the piston, and also opening one exhaust before closing the other, so that there is always a communication between the inlet and the exhaust port, and, consequently, a continuous flow of water through the engine, the result of which is, that there is no sudden or entire stoppage of the water, no concussion, and, consequently, no excessive pressure upon the valve. The improvement is applicable to engines having valves sliding on a flat face, as in the drawings, and also to those moving in the arc of a circle.

Figure 1 represents a longitudinal central section of my improved engine, with the piston at one end of its stroke; Fig. 2, a similar view with the piston at the middle of its stroke.

A represents the cylinder; B, the reciprocating piston therein; C, the valve-chest; D, the slide-valve; E E, the induction-ports, and F the eduction-port, all of which parts are constructed and arranged as usual, except that the ports are made of increased width, and the bearing or cut-off faces *a* of the valve made of a width less than that of the induction-ports, so that when the faces of the valve stand over the middle of the ports there will be spaces or openings *b* on both sides of each face, as shown in Fig. 1, so that the water can pass from the chest under both ends of the valve directly to the outlet and to both sides of the piston, thus momentarily equalizing the pressure on the opposite sides of the piston, and on the upper and under sides of the valve.

It is obvious that the form and arrangement of the parts, and the manner of driving the valve, may be varied as desired without departing from the limits of my invention, provided the wide ports and narrower valve-faces are retained.

What I claim as my invention is—

1. The combination, in a reciprocating engine, of the ports E E and the slide-valve D, having its faces *a a* of a width less than that of said ports.

2. The combination of the cylinder A, containing the piston B, and provided with the ports E E and F, and the slide-valve D, having its faces *a* narrower than the ports E, substantially as shown.

3. In a reciprocating engine, a slide-valve constructed and arranged substantially as shown and described, to admit the actuating fluid at the end of each stroke to both sides of the piston, as and for the purposes described.

4. In a reciprocating hydraulic engine, the combination, substantially as shown and described, of induction and eduction ports, and a slide-valve which permits a continuous flow of water through the engine, from the inlet to the exhaust, for the purpose of preventing concussion.

ELISHA WEST.

Witnesses:

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