2. Sheets. Sheet. 1.

I. N. Forrester,

Oscillating Engine.

No. 110,352. Patented Dec. 20. 1870.

Fig. 1.

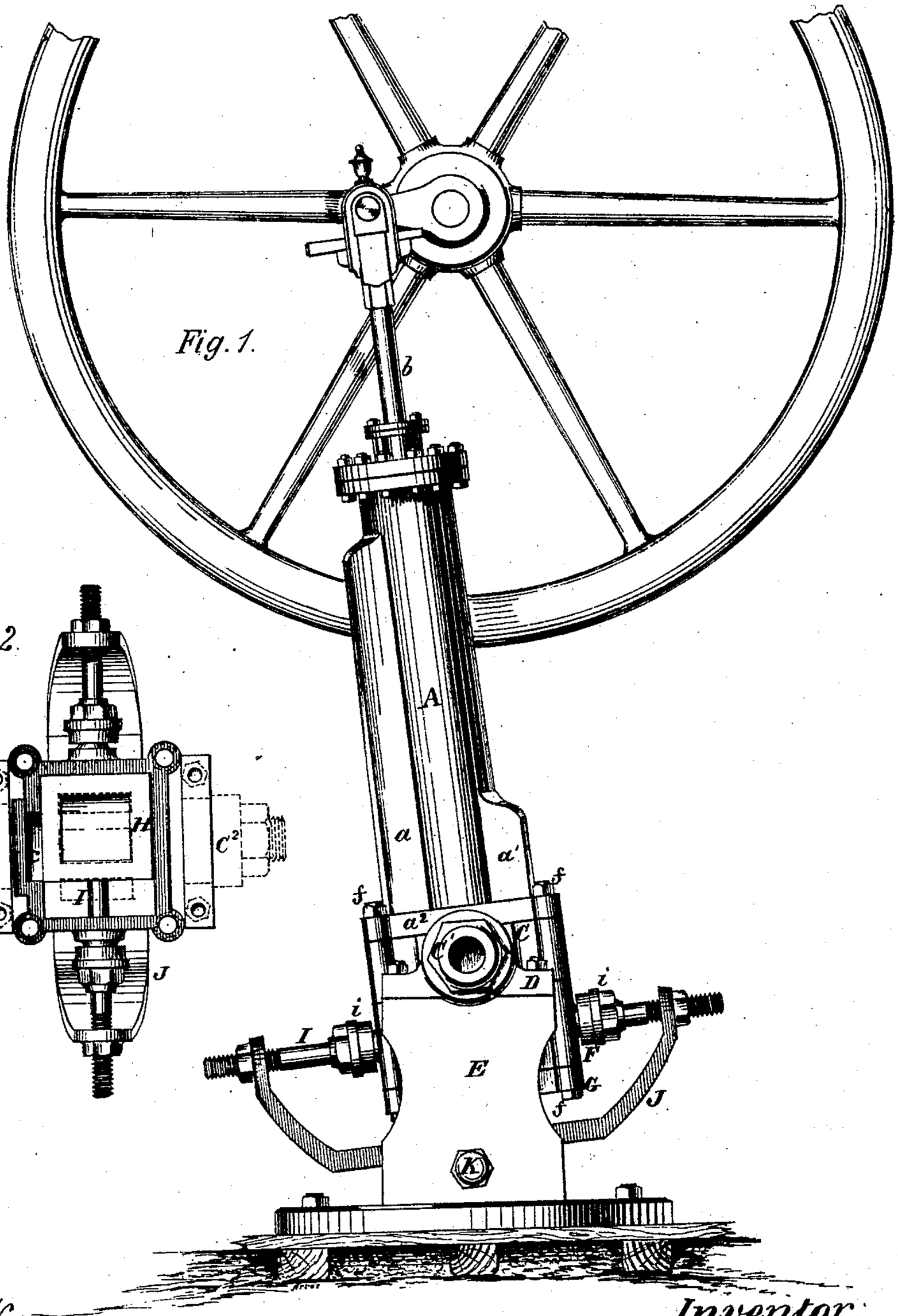

Fig. 2.

Witnesses:
Fred. Arts
Joel Peyton.

Inventor:
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by his Atty
Wm D. Baldwin

J. N. Forrester,

2 Sheets. Sheet 2

Oscillating Engine.

No. 110,352. Patented Dec. 20. 1870.

Fig. 3.

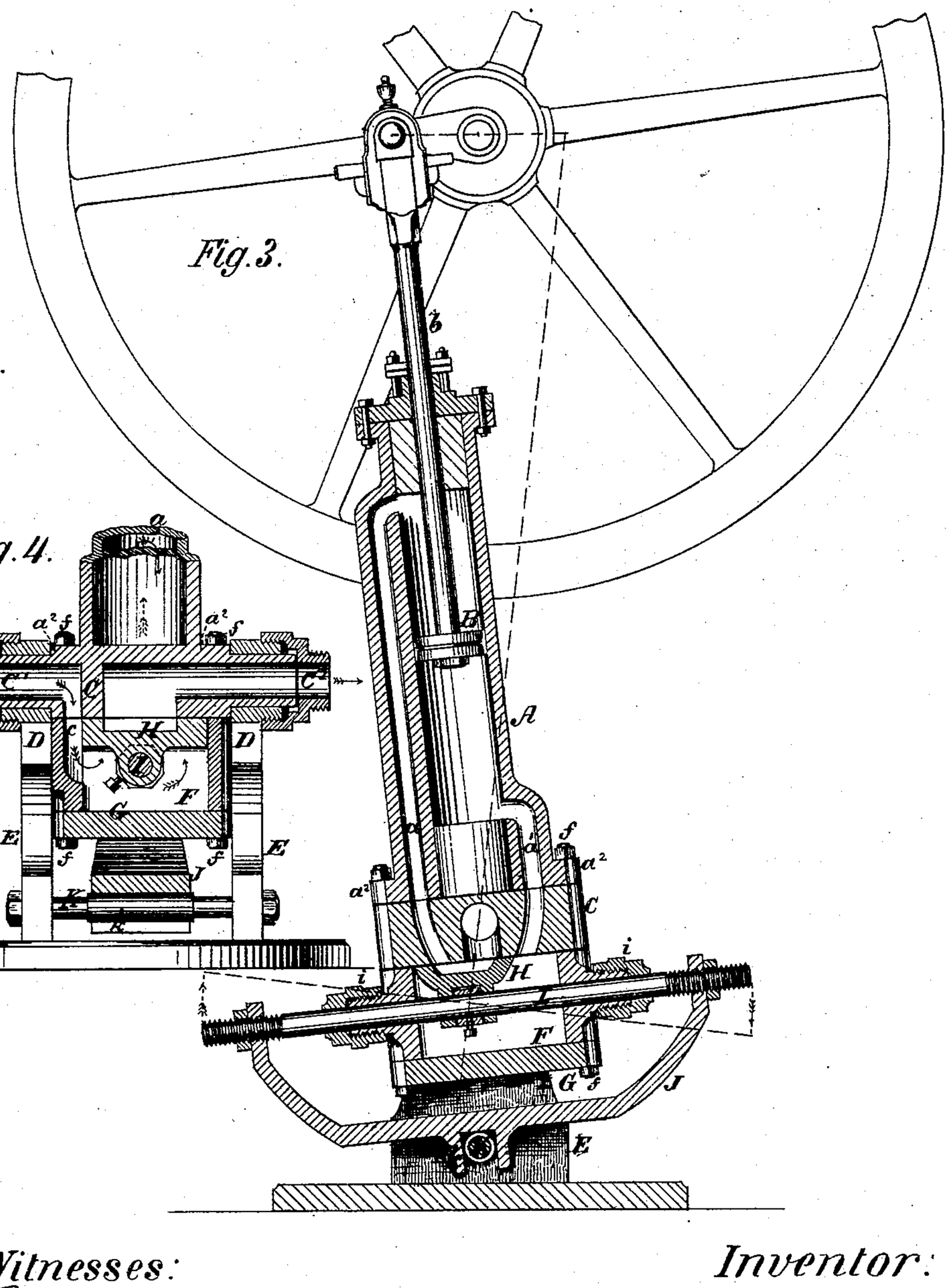

Fig. 4.

Witnesses:

Edw. Artois

Joel Skyton.

Inventor:

J. N. Forrester

by his Atty

Wm D. Baldwin

United States Patent Office.

ISAAC NEWTON FORRESTER, OF BRIDGEPORT, CONNECTICUT.

Letters Patent No. 110,352, dated December 20, 1870.

IMPROVEMENT IN OSCILLATING STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ISAAC NEWTON FORRESTER, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Oscillating Steam-Engines, Water-Engines, and Pumps, of which the following is a specification.

My invention relates more especially to that class of machines known as oscillating steam-engines; it is also adapted to use as a pump for forcing water.

The object of the first part of the invention is to facilitate the working of the valves by the oscillation of the engine; and

My improvement consists in combining with the working cylinder a slide-valve, working transversely to the axis of the cylinder, and operated by the oscillation of the cylinder on its trunnions.

The object of the next part of my invention is to prevent wear of the face of the slide-valve, to keep it truly in line, and to prevent strain on the valve-rod; and

The improvement consists in combining the slide-valve with the valve-rod, passing entirely through the valve-chest.

The object of the next part of my invention is to operate the slide-valve, in a simple and direct manner, by the oscillation of the valve-chest on its trunnions; and

The improvement consists in combining an oscillating valve-chest, a reciprocating slide-valve, and an oscillating yoke, connected with the valve-stem to move the slide-valve.

The object of the next part of my invention is to cause the valve quickly to open and close in order to open the valve widely at the commencement of the stroke of the piston; and

The improvement consists in combining an oscillating working cylinder, a slide-valve, moving transversely to the bore of the cylinder in one direction, and a valve-seat, moving in a direction opposite to that of the valve.

The object of the next part of my invention is to facilitate the manufacture of the cylinder, and also to afford access to the valves without removing or disturbing the trunnions on which the cylinder oscillates; and

The invention consists in combining with the cylinder, a valve-seat, on which the trunnions are formed, or to which they are secured, and a valve-chest, so constructed that it may be removed from the valve-seat without disturbing the cylinder, valve-seat, or trunnions.

To further secure the object last described, the improvement consists in combining the bed-plate or frame, the valve-seat, oscillating on trunnions in the bed-plate, the cylinder, mounted on the valve-seat, the valve-chest, the valve, and the oscillating yoke which moves the valve.

The next part of my invention relates to the engine when used as a pump; its object is to prevent the concussion of the water in the working cylinder as the stroke is reversed; and

The improvement consists in inserting a cushion of India rubber or other equivalent elastic material in each end of the working cylinder, the elasticity of which cushion lessens the concussion of the water against the cylinder-heads as the stroke is reversed.

In the accompanying drawing, which shows so much of my improved engine as is necessary to illustrate the invention herein claimed—

Figure 1 is a side elevation.

Figure 2, a plan or top view of the valve, the valve-chest, and the parts below it, the valve-seat and trunnions being shown in dotted lines.

Figure 3, a vertical central section through the engine, at right angles with the trunnions.

Figure 4, a similar section through the trunnions.

The working cylinder A, instead of being cast with trunnions, as usual, is cast as a simple cylinder, with the flange a^2 and ports a a^1 formed thereon.

A piston-rod, b, connects the piston-head B with a crank, in the usual way.

The valve-seat C has hollow trunnions, C^1 C^2, formed on its sides and mounted in proper journals, D, on the frame or bed-plate E. The valve-seat is provided with proper ports for the passage of the steam, and serves as a head for the cylinder.

The valve-chest F is arranged beneath the valve-seat.

The plate or cover G for the valve-chest, the valve-chest, the valve-seat, and the cylinder are all firmly clamped together, by through bolts and nuts, f, in the usual way.

The valve H slides on its seat in the usual way.

This valve is mounted on a rod, I, which passes entirely through the valve-chest, and moves freely, endwise, through pipe-box bearings, i, on the chest.

The ends of the valve-rod pass through the ends of a yoke, J, which passes around the valve-chest.

A fork or notch, k, on this yoke, embraces a stop or cross-bar, K, on the frame.

In operation, the steam enters the valve-seat through the trunnions C^1, and passes through the port c to the side of the valve opposite the cylinder; when the valve opens, it passes alternately into the opposite ends of the cylinder, and moves the piston in the usual way. The exhaust steam escapes through the trunnions C^2. The valve is reciprocated by the oscillation of the valve-seat, and the yoke causes it to move in a direction opposite to that of the valve-seat,

which movements cause the valve to open and close very quickly. The throw of the valve is regulated by means of jam-nuts on the screwed spindle of the valve-rod.

The valve may be readily removed, for repairs, &c., by taking off the valve-chest cover and slacking the set-screw which secures the valve to the rod, and withdrawing the rod from the valve-chest. This then allows the valve-chest to be removed from the valve-seat, whereby access may be had to the valve and valve-seat for repairs, and for other purposes.

I have described my improvement as a steam-engine; obviously, it would work well as a water-engine, or as a pump.

I do not broadly claim the combination of an oscillating cylinder with a reciprocating valve.

I claim as my invention—

1. The combination of the oscillating cylinder with the slide-valve working transversely across the bore of the cylinder, these parts being constructed to operate in combination, substantially as hereinbefore set forth.

2. The combination of the oscillating valve-chest, the reciprocating slide-valve, and the valve-rod extending entirely through the chest, these parts being constructed to operate in combination, substantially as hereinbefore set forth.

3. The combination of the oscillating valve-chest, the reciprocating slide-valve, and the oscillating yoke, these parts being constructed to operate in combination, substantially as hereinbefore set forth.

4. The combination of the oscillating cylinder, the slide-valve, reciprocating transversely to the bore of the cylinder, and the valve-seat, reciprocating in a direction opposite to that of the movement of the valve, these parts being constructed to operate in combination, substantially as hereinbefore set forth.

5. The combination of the cylinder, the valve-seat, having trunnions on which the cylinder oscillates, and the valve-chest, oscillating with the cylinder, these parts being constructed to operate in combination, substantially as hereinbefore set forth.

6. The combination of the bed-plate, the oscillating cylinder, the valve-seat, the trunnions, the valve-chest, the valve, and the oscillating yoke, all these parts being constructed to operate in combination, substantially as hereinbefore set forth.

7. The combination, with the cylinder of a pump or water-engine, of elastic cushions at each end of the cylinder, to deaden the concussion of the water on the cylinder-heads, as hereinbefore set forth.

In testimony whereof I have hereunto subscribed my name.

I. N. FORRESTER.

Witnesses:

JOE. I. PEYTON,

BALTIS DE LONG.