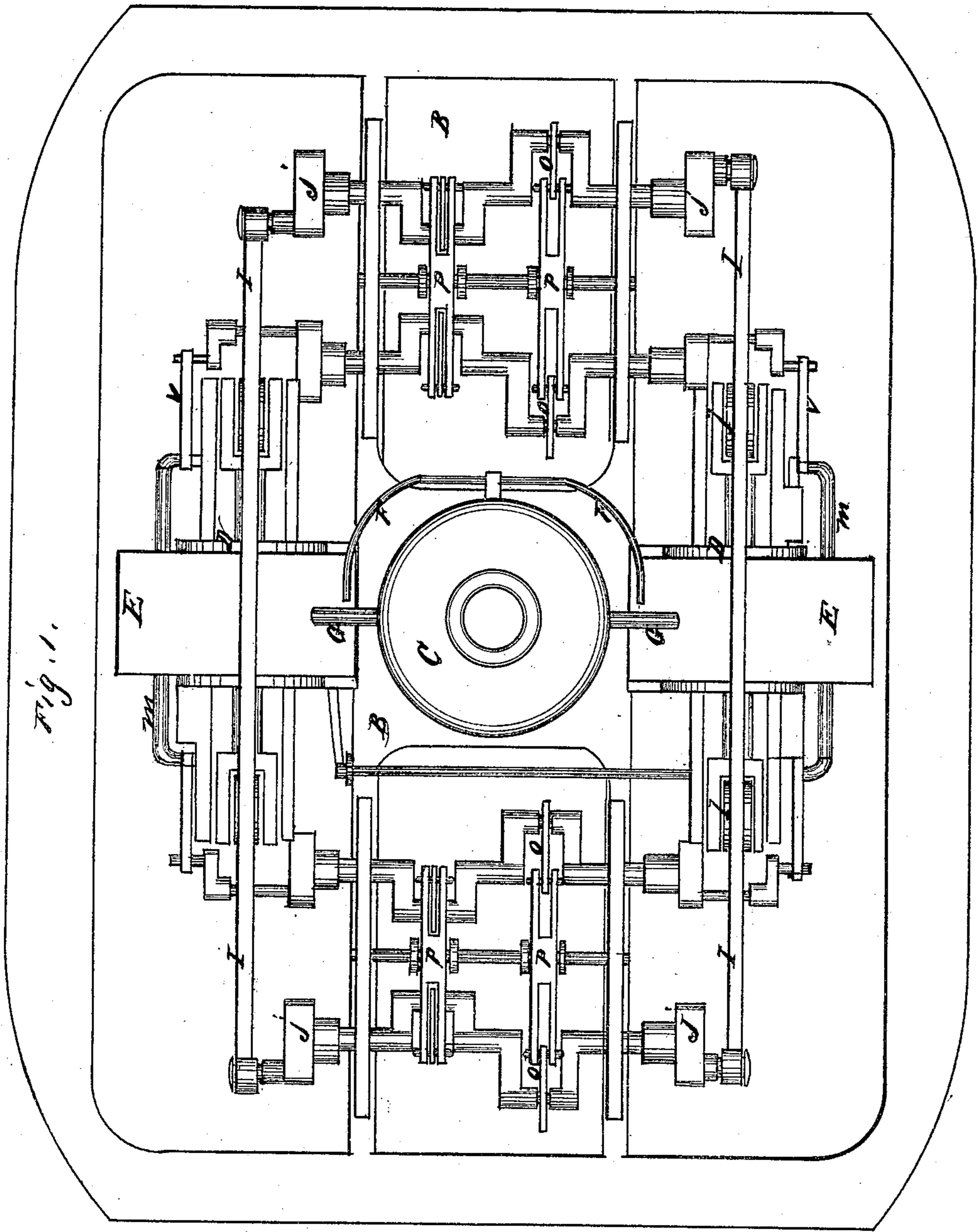


**A. STALEY.**  
**Reciprocating Engines.**

No. 142,747.

Patented September 9, 1873.



Witnesses

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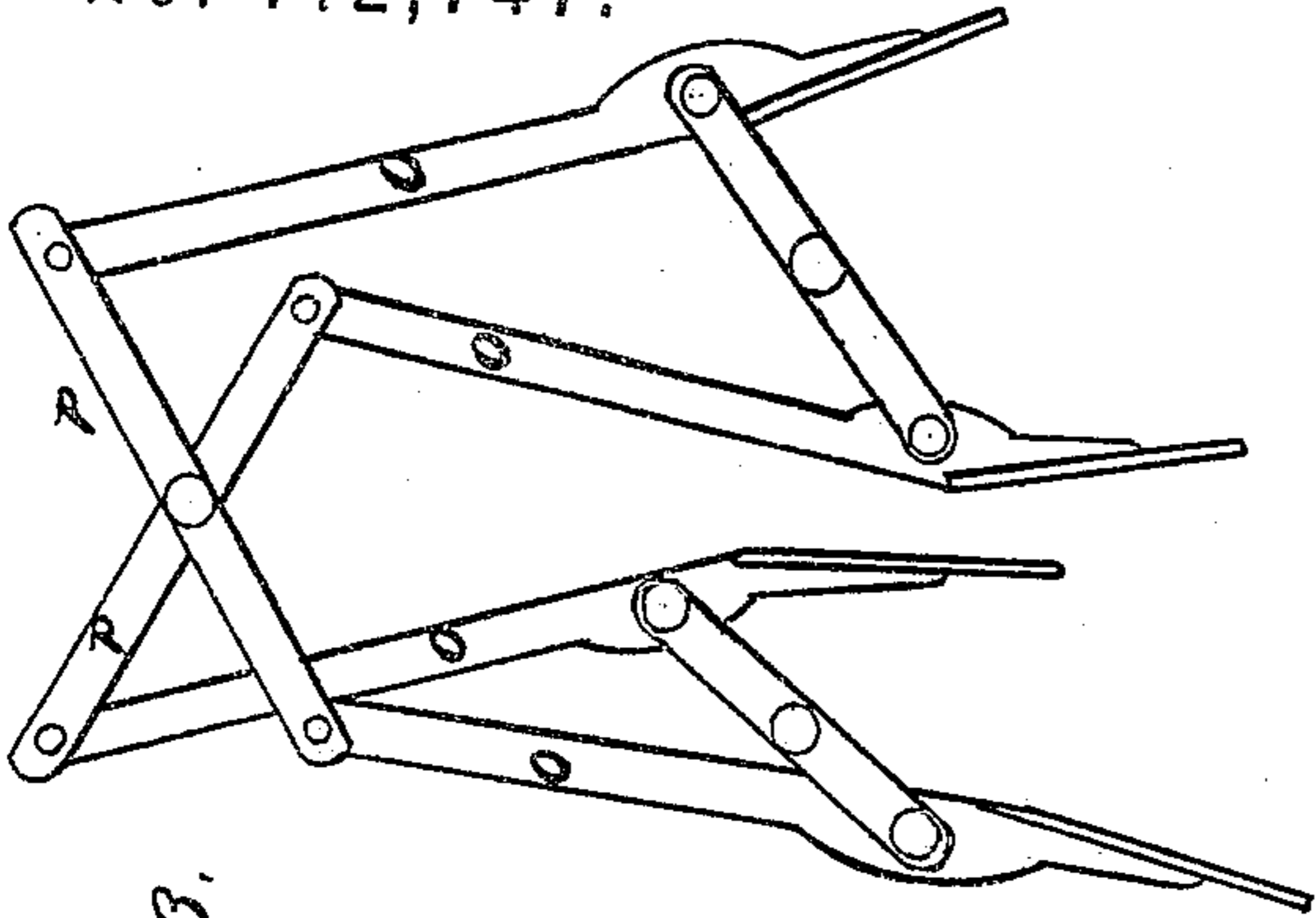


Fig. 3.

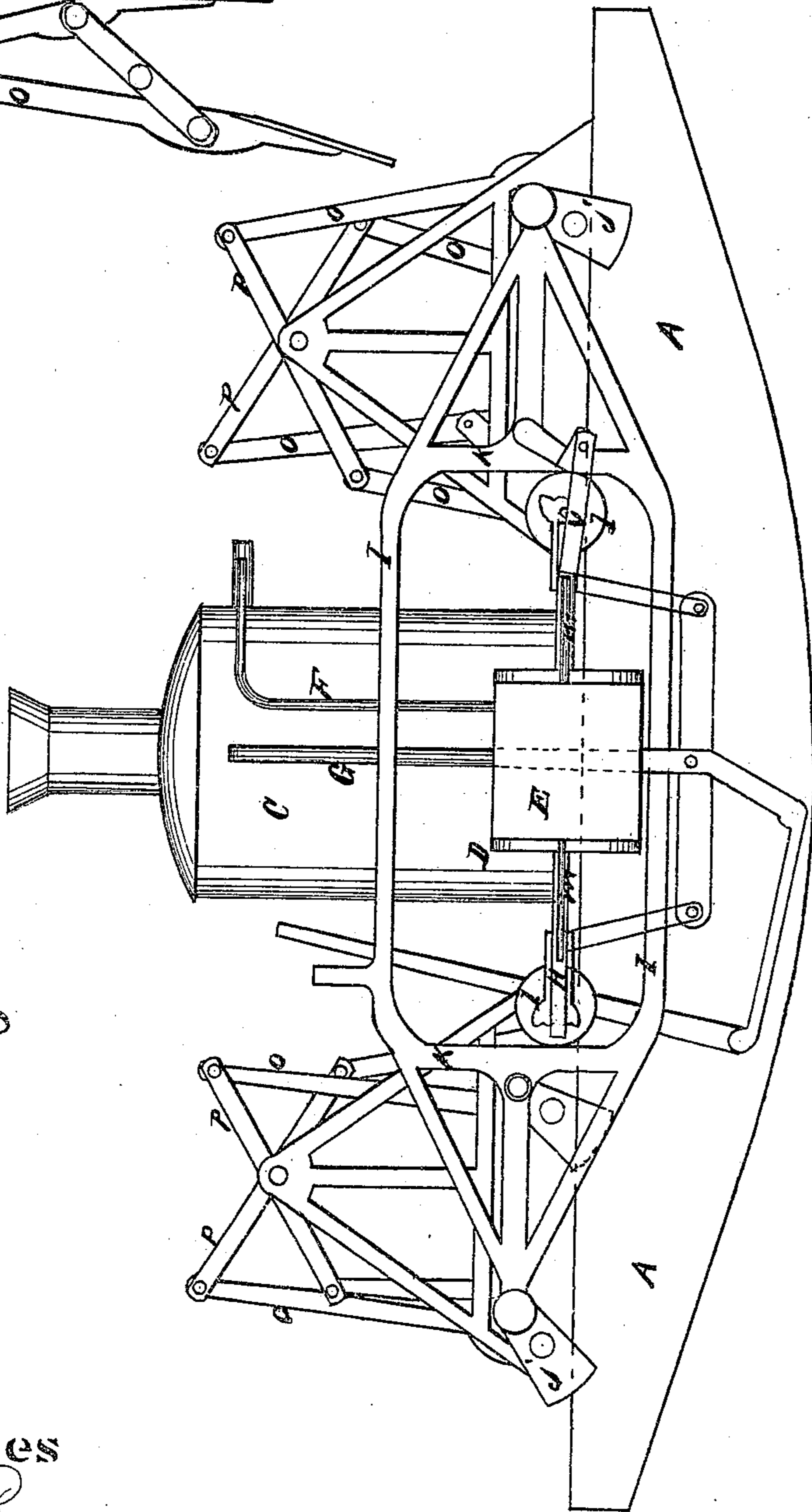


Fig. 2.

Witnesses

J. L. Boone  
C. M. Richardson

Albert Staley

# UNITED STATES PATENT OFFICE.

ALBERT STALEY, OF SAN FRANCISCO, CALIFORNIA.

## IMPROVEMENT IN RECIPROCATING ENGINES.

Specification forming part of Letters Patent No. 142,747, dated September 9, 1873; application filed April 30, 1873.

*To all whom it may concern:*

Be it known that I, ALBERT STALEY, of San Francisco city and county, State of California, have invented an Improvement in Reciprocating Engines; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

My invention relates to an improved engine for applying the power of steam to two or more crank-shafts located upon opposite sides of the steam-cylinder. My engine arrangement is especially adapted for driving the paddle-shaft of my improved propeller for vessels, but it can also be employed in other places where circumstances permit of its use.

In order to more fully illustrate and explain my invention, reference is had to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a plan or top view. Fig. 2 is a side elevation. Fig. 3 is a view of the paddles.

In the present instance, I have represented my improvements in connection with a vessel composed of two cigar-shaped hulls, A A, which are connected together by a common deck, B. The boiler C is mounted upon a platform between the two hulls in the middle of the deck, and the cylinders D D are located one upon each side of the boiler or engine frame. A steam-chest, E, is placed outside of each cylinder, and the steam-pipe F leads from the steam-space in the boiler down under the cylinder, and thence into the steam-chest. G is the exhaust-pipe. The piston-rod H passes through each cylinder-head, and has the piston secured to its middle, so that when steam is admitted alternately upon each side of it, the piston-rods will travel back and forth, being guided by their bearing in the cylinder-head. I is a skeleton-link or pitman-frame, the opposite ends of which are connected with cranks j of the paddle-shafts upon each side of the cylinder D. One rail of this frame passes above the cylinder, and another below it. Cross-bars K unite these two rails at a point between the extremities of the frame and its middle upon each side of the

cylinder, and these cross-bars serve as slides or abutments for rollers l in the ends of the piston-rods to move upon and operate against. The valve-rod m is connected by a link, V, with the crank of the paddle-shaft, so as to operate the steam-valves by the revolution of the crank.

Now, when steam is admitted to the cylinder in the usual way, the piston and piston-rods are moved back and forth, so as to give the frame I a reciprocating motion, which drives the cranks j of the paddle-shafts. The circular motion of the cranks will also give the frame I a vertical movement up and down, which motion is accommodated by the rollers l, which permit the frame to rise and fall by traveling on the cross-bars or abutments K, to which the pressure of the steam is applied.

My propeller-paddles are each secured to the extremity of an arm, O. These arms are suspended in pairs from the opposite ends of a walking-beam, p, and are given a circular motion by cranks on the crank-shafts, as shown. Two or more pairs of paddles can be applied at each end of the vessel, if desired. The opposite paddles of each pair are driven by different shafts, the cranks of which are so placed relatively that the paddles are operated alternately up and down, the walking-beam moving to correspond with the motion of the cranks.

By the above-described arrangement I provide a simple, cheap, and effective engine for applying power to this class of mechanism, while the propeller arrangement will secure a larger percentage of the power applied than the ordinary wheel, on account of the ease with which they enter and leave the water.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

The skeleton-link or pitman-frame I, with its cross-bars or abutments K, in combination with the piston S and piston-rods H with their friction-rollers l, substantially as and for the purpose above described.

In witness whereof I hereunto set my hand and seal.

ALBERT STALEY. [L. S.]

Witnesses:

JOHN L. BOONE,

C. M. RICHARDSON.