(No Model.) 2 Sheets—Sheet 1.

A. J. PIERCE.

STEAM ENGINE.

No. 398,444. Patented Feb. 26, 1889.

Fig. 1.

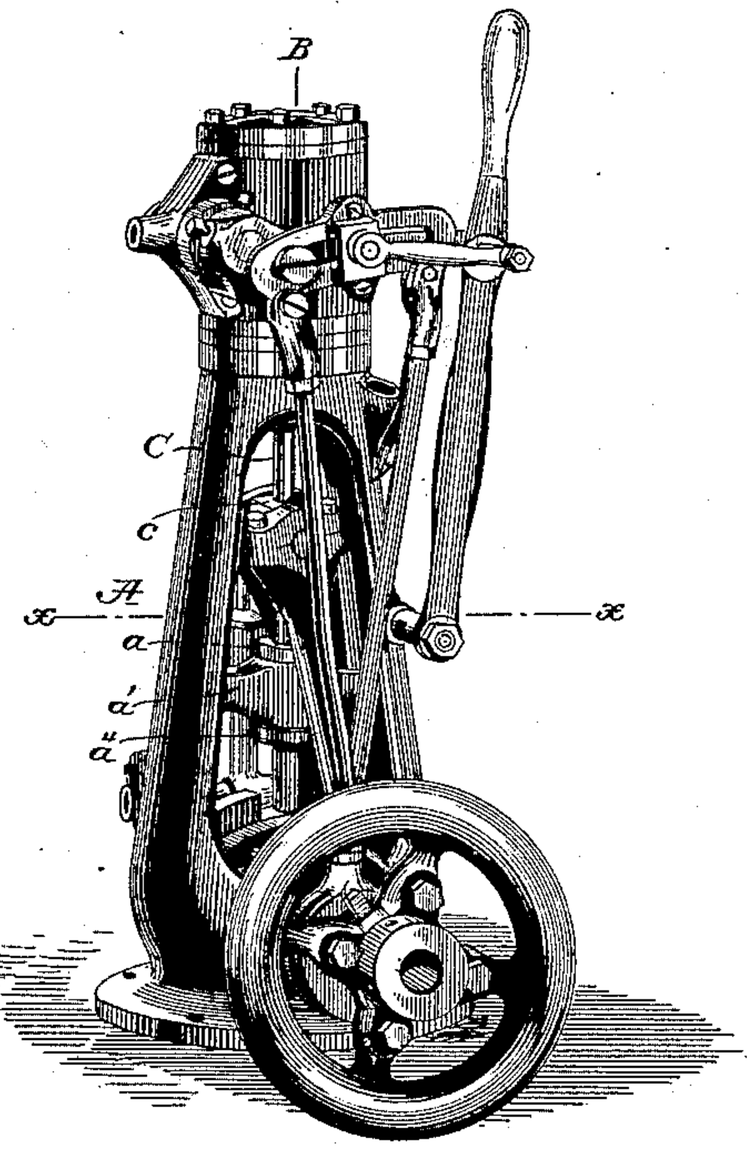
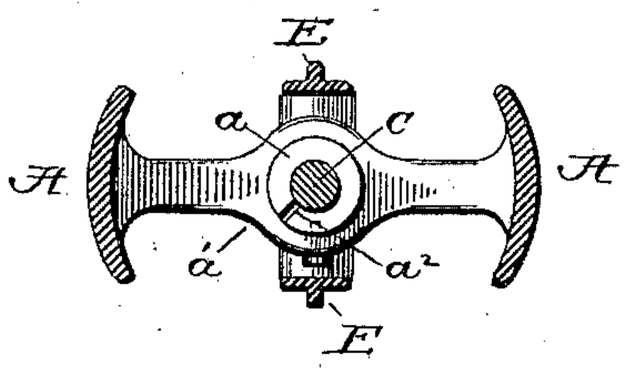


Fig. 2.



ON LINE X—·—·—X

Witnesses,
W. H. Mortimer.
W. A. Kennedy.

Inventor,
A. J. Pierce
By Phil. T. Dodge
Attorney.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

ON LINE Y—Y

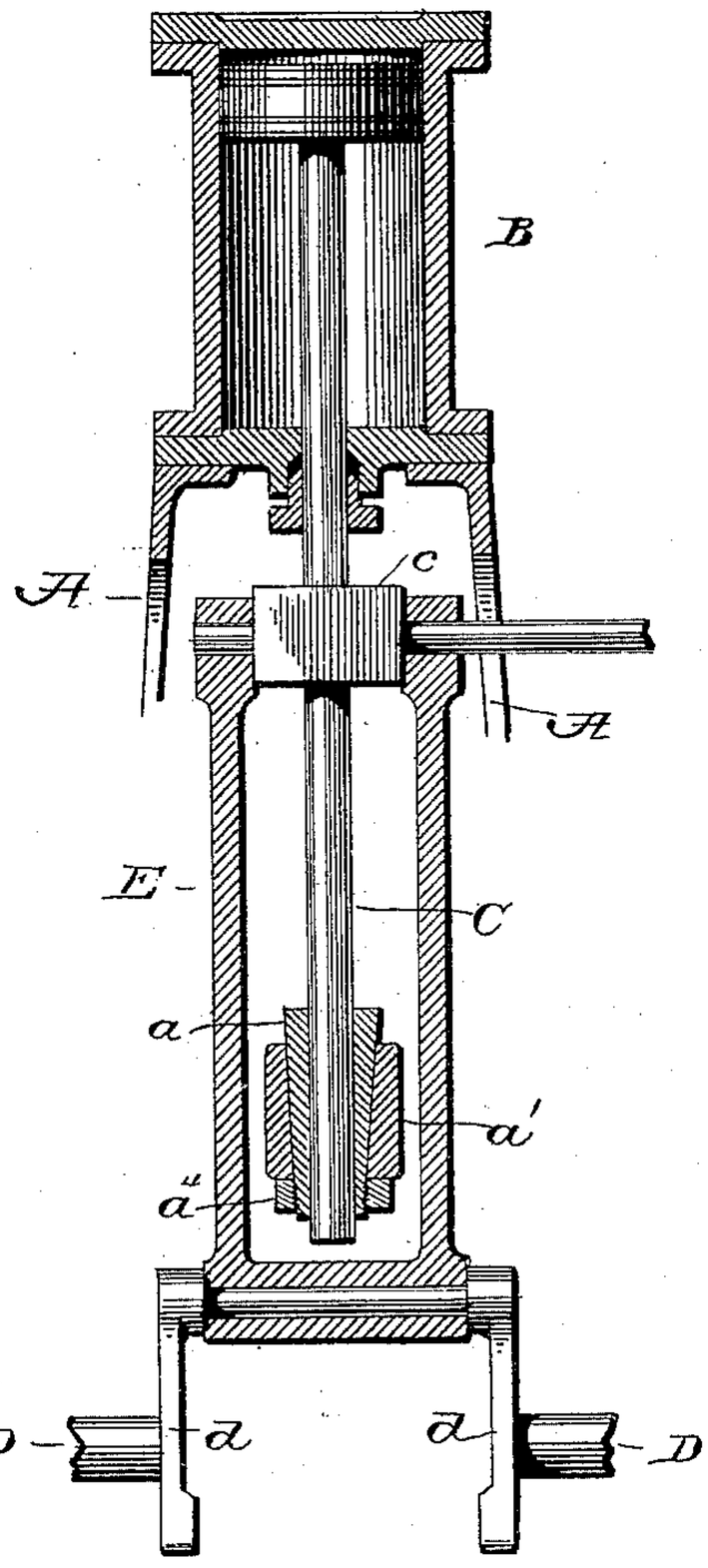
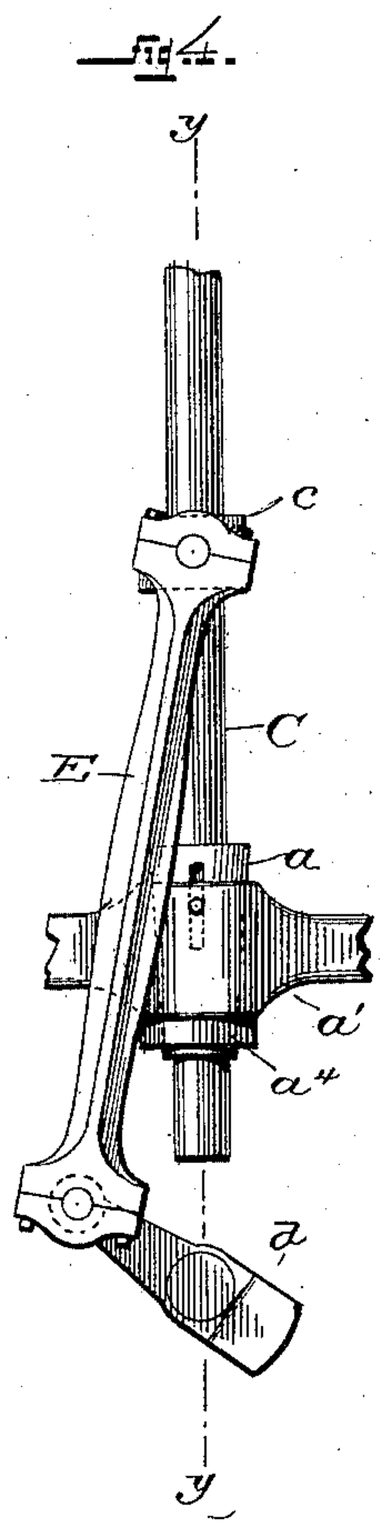


Fig. 4.



Witnesses.
W. W. Mortimer.
A. R. Kennedy.

Inventor,
A. J. Pierce
By Phil T. Dodge
Attorney.

UNITED STATES PATENT OFFICE.

ANDREW J. PIERCE, OF RACINE, WISCONSIN.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 398,444, dated February 26, 1889.

Application filed July 20, 1888. Serial No. 280,503. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. PIERCE, of Racine, in the county of Racine and State of Wisconsin, have invented certain Improvements in Steam-Engines, of which the following is a specification.

My invention relates to improvements in direct-acting piston-engines, more particularly those inverted vertical-cylinder engines which are commonly used for marine purposes.

The improvement consists in means of peculiar construction for guiding the piston-rod and transmitting motion thence to the crank-shaft.

In the accompanying drawings, Figure 1 is a perspective view of an engine having my improvements embodied therein. Fig. 2 is a cross-section on the line *x x*. Fig. 3 is a vertical section through the lower part of the engine on the line *y y* of Fig. 2. Fig. 4 is a side view of the piston-rod, its lower guiding-pitman, and crank.

Referring to the drawings, A represents the base or main frame of the engine in the form of an upright hollow post or standard with side openings.

B is the main steam-cylinder bolted in an inverted position to the upper tubular end of the frame and containing the customary reciprocating piston, from which the piston-rod C is projected downward through the lower end of the cylinder, as usual. The engine is provided with a valve mechanism such as shown for controlling the ingress and egress of the steam; but as this mechanism is not of the essence of my invention, detailed description thereof is not necessary.

The piston-rod is made of much greater length than usual, and instead of being guided by the customary cross-head is extended downward through a tubular guiding-sleeve, *a*, seated in a horizontal bar or arm, *a'*, which extends rigidly across the interior of the frame or standard, being commonly cast integral therewith. The sleeve *a* is made of brass or other suitable material in tubular form, tapered on the outside and split or divided vertically on one side, as shown at a^2. It is inserted in a downward direction through a correspondingly-tapered hole in the cross-bar *a'* and threaded at its lower end to receive the nut or collar a^4, by means of which it may be turned downward within its conical seat, and thus contracted closely around the piston-rod and adjusted to compensate for wear. By means of the cross-bar and collar the piston is firmly supported against lateral movement and guided in exact coincidence with the axis of the cylinder.

In the base of the frame I mount in suitable bearings the horizontal driving-shaft D, having at its middle a crank, *d*. In order to communicate motion from the piston-rod to this crank, I employ a pitman, E, commonly made of U form. The lower end is bored to receive the cranked end, while its two arms extend upward on opposite sides of the piston-rod and guide to the journals or trunnions formed on a cross-head, *c*, which encircles the piston-rod, and which is bolted, keyed, or otherwise attached rigidly thereto.

It will be observed that under the construction described by means of the forked pitman I am enabled to transmit power from both sides of the pitman-rod to the crank, and thus to avoid side strains. Good results may be obtained when one arm of the pitman is omitted, provided the other features of construction shown in the drawings are retained; but I find that great advantage attends the use of the double or divided pitman.

Having thus described my invention, what I claim is—

The upright tubular main frame having midway of its length the internal rigid cross-bar, *a'*, in combination with the cylinder fixed rigidly on the top of the frame, the piston, and the piston-rod extended through the guide a^2, the crank-shaft mounted in the base of the frame, and the longitudinally-divided pitman straddling the bar *a'* and connected at one end to the crank and at the opposite end to a cross-head, *c*, on the piston-rod.

In testimony whereof I hereunto set my hand, this 23d day of June, 1888, in the presence of two attesting witnesses.

ANDREW J. PIERCE.

Witnesses:
E. G. DURANT,
J. F. BICKEL.