(No Model.)

J. S. ASH.

STEAM ENGINE.

No. 347,219. Patented Aug. 10, 1886.

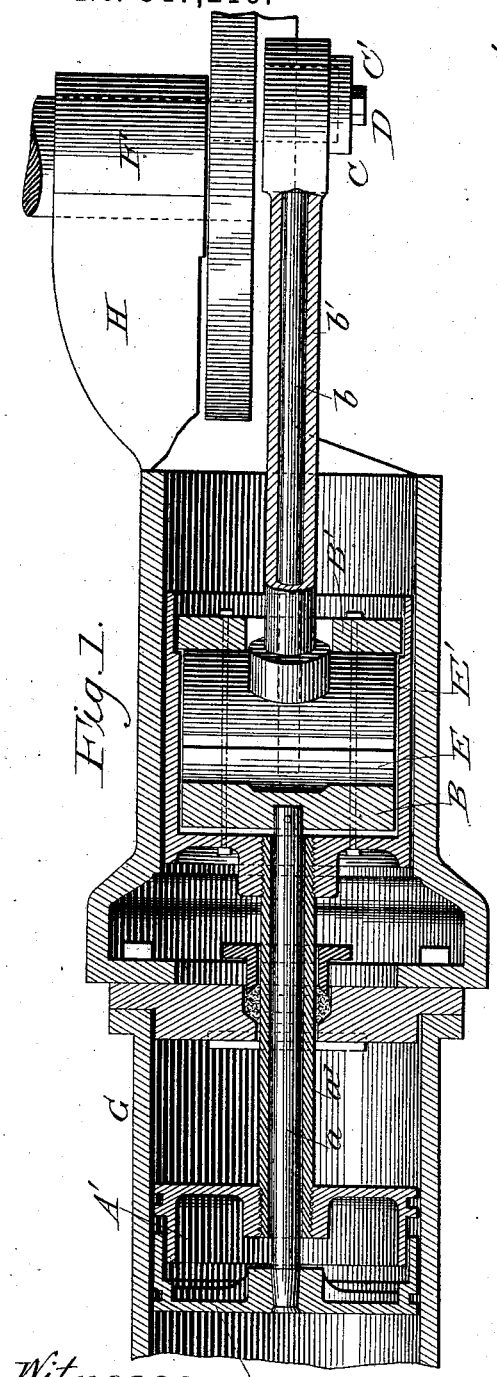

Fig. 1.

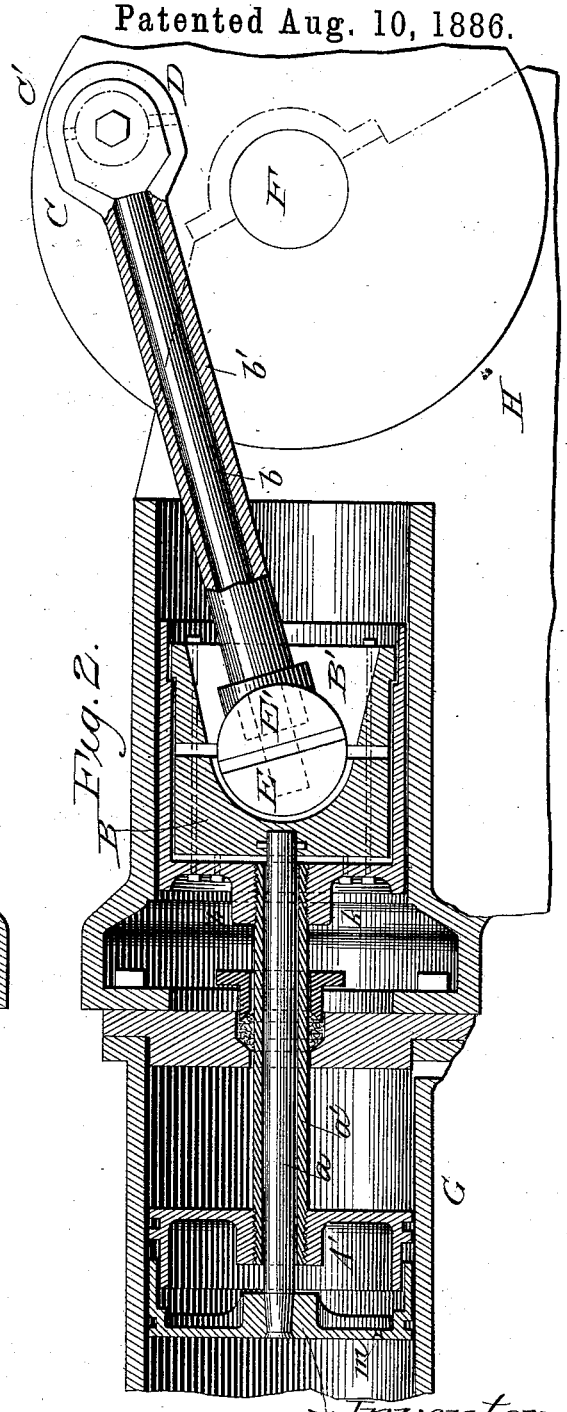

Fig. 2.

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JOHN S. ASH, OF BUCKINGHAM, PENNSYLVANIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 347,219, dated August 10, 1886.

Application filed January 23, 1886. Serial No. 189,500. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. ASH, a citizen of the United States, residing in Buckingham, in the county of Bucks and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines, of which the following is a specification.

My invention relates to improvements in double-acting reciprocating engines; and its objects are to prevent shock and lost motion at the crank-pin and cross-head pin, and to prevent knocking of the piston against the heads when these bearings become worn. I accomplish these objects by making the piston and other reciprocating parts double, the momentum of each portion being checked independently of the other by the steam confined in the cylinder at the time of exhaust-closure, and the motion of each portion of which is conveyed independently to the crank.

My invention further consists in certain details of construction, as hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 is a plan, partly in section, showing the reciprocating parts and their attachment to the crank-pin. Fig. 2 is a side elevation, also partly in section, showing the same.

Similar letters refer to like parts in both views.

As my invention does not relate to other parts, they are given only sufficiently to show the connection.

Referring to the drawings, H is the bed-plate, and G the cylinder, with a portion broken away, of an engine, in which F is the main shaft. The piston is in two parts, A and A′, one sliding on the other. The piston-rod also is in two parts, *a* and *a′*, one of which passes through the other. The cross-head consists of a hollow shell, to which is rigidly attached the box B′. The box B is free to move a short distance in the cross-head, except as it is confined by the set-screws *k*. The connecting-rod also is in two parts, which are attached to the parts of a split pin, E E′. The crank-pin brasses C C′ are held between the two parts of the connecting-rod. In the piston-head is a small valve, *m*, opening outward and kept in place by a spring.

The operation is as follows: The part A of the piston, receiving its impulse from the farther end of the cylinder, imparts it, through the rod *a*, to the box B in the cross-head. This bearing on the half-pin E, without affecting E′, forces forward the rod *b*. In the same manner the part A′ of the piston, receiving its impulse from the crank end of the cylinder, imparts it, through the hollow rod *a′*, to the box B′, bearing on the forward part of the cross-head pin. From this it is conveyed through the half-pin E′ and hollow connecting-rod *b′* to the box C′ and crank-pin D. It will be observed that each part acts independently of the other, and that the momentum of either portion is checked independently by the action of the cushion of steam retained when the exhaust is closed. It will be further observed that the momentum of but one-half of the piston and other reciprocating parts requires thus checking, and that of the other portion serves to impart rotary motion to the crank, except in so much as it is counterbalanced by pressure on the other side of the pin. By properly arranging the compression the brasses may be kept up to the pins at all times. The set-screws *k* are provided to take up lost motion should they be required. As all wear tends to remove the piston from the cylinder ends, knocking from this cause cannot occur. The valve *m* allows any steam which may pass the packing-rings to escape from between the two portions of the piston into the cylinder when the exhaust is open.

The adjustment of the length of the connecting-rod may be made by liner-plates in connection with the set-screws *k*. The latter may be placed at the end of the connecting-rod instead of in the cross-head.

It is evident that the pin E E′ may be made part of the cross-head and the boxes B B′ part of the connecting-rod with the same result, and that other changes in the position and arrangement of parts may be made without departing from the general character and design of my invention.

It is evident that the ordinary crank-pin connection may be used with a simple connecting-rod and cross-head pin, and the device remain effective so far as concerns the connection at the cross-head.

I claim as new and desire to secure by Letters Patent—

1. The combination of compound piston A

A′, piston-rod *a a′*, cross-head B B′, and connecting-rod *b b′* with the valve *m* and set-screws *k*, substantially as specified.

2. The combination of the compound piston, piston-rod, and two boxes in cross-head, split cross-head pin, and compound connecting-rod, substantially as specified.

3. The valve *m*, in connection with the compound piston A A′, opening from the interior of the piston into the cylinder, as and for the purpose specified.

4. The set-screws *k*, in combination with the compound connecting-rod *b b′*, split cross-head pin E E′, and boxes B B′ in cross-head.

5. The compound piston A A′, in combination with the compound piston-rod *a a′* and cross-head B B′, as specified.

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