

(No Model.)

3 Sheets—Sheet 1.

S. T. BRUCE.
STEAM ENGINE.

No. 439,634.

Patented Nov. 4, 1890.

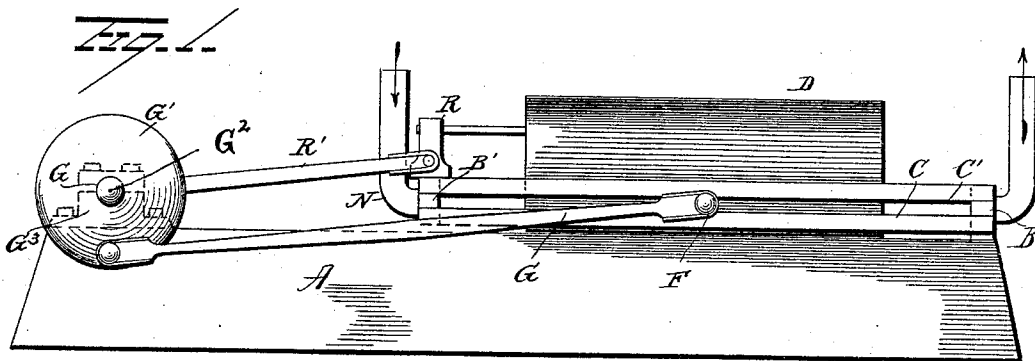
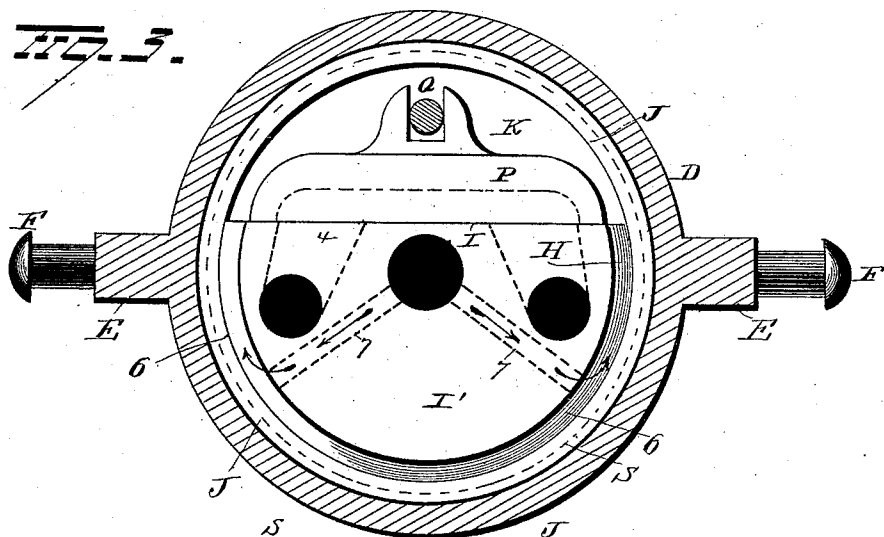
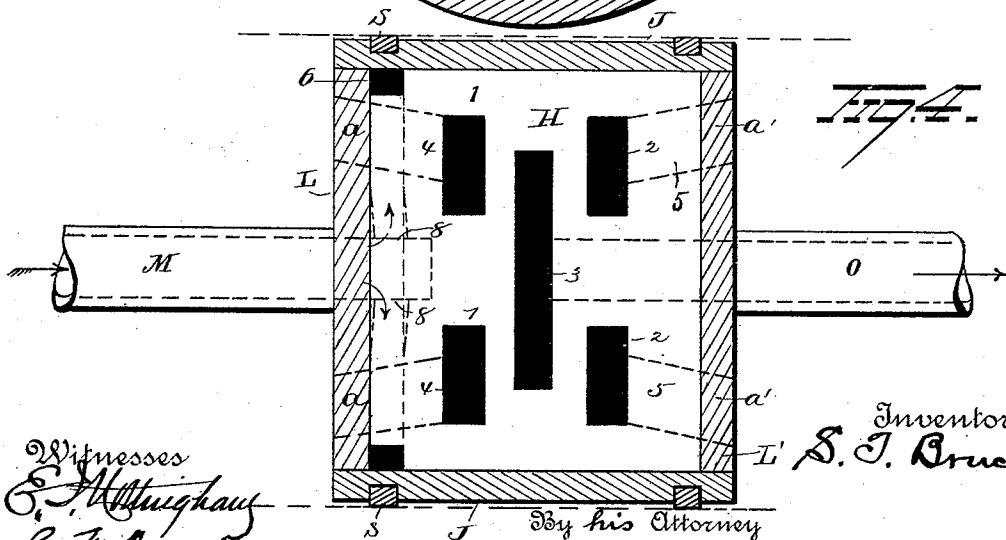


FIG. 3.



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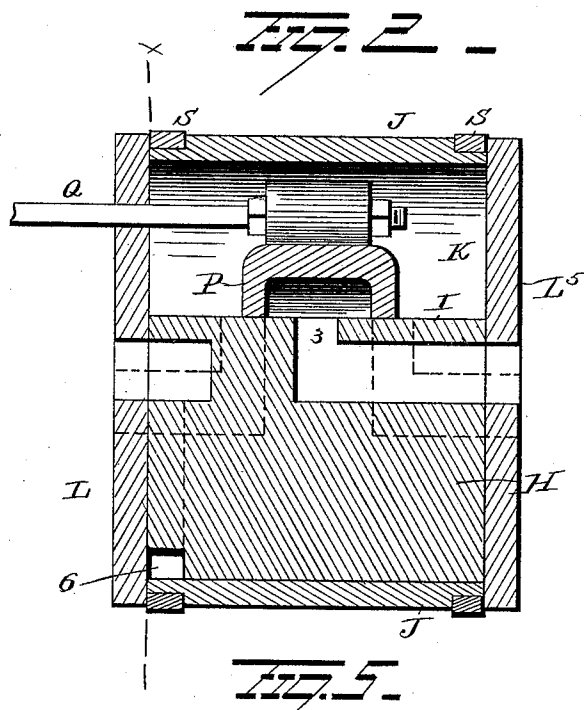
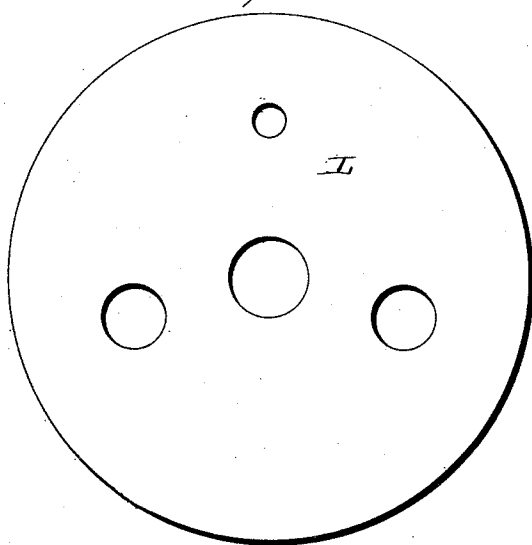
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3 Sheets—Sheet 2.

S. T. BRUCE.
STEAM ENGINE.

No. 439,634.

Patented Nov. 4, 1890.



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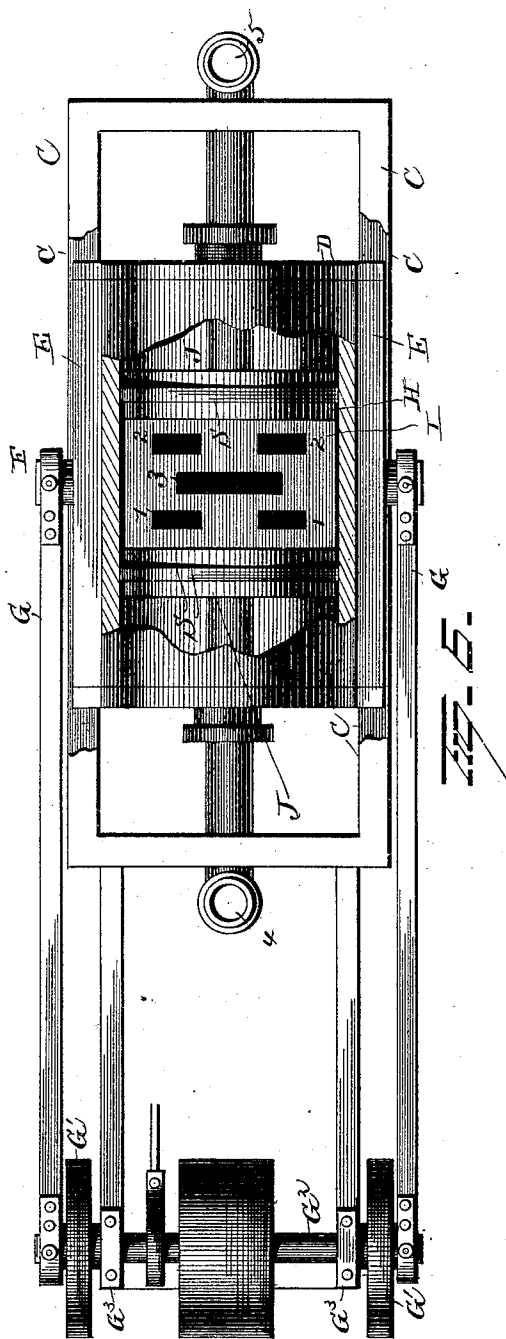
(No Model.)

3 Sheets—Sheet 3.

S. T. BRUCE.
STEAM ENGINE.

No. 439,634.

Patented Nov. 4, 1890.



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UNITED STATES PATENT OFFICE.

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STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 439,634, dated November 4, 1890.

Application filed March 29, 1890. Serial No. 345,844. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY THOMAS BRUCE, a citizen of Marshall, in the county of Saline and State of Missouri, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in steam-engines, and more particularly to that class known in the art as "direct-acting steam-engines," its object being to produce an engine by means of which the full power of the steam may be utilized.

A further object is to construct a steam-engine comprising a small number of parts, and which shall be cheap to manufacture, not easy to get out of order, and effective and sure in operation.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of my improved engine. Fig. 2 is a longitudinal sectional view of the piston and cylinder. Fig. 3 is a sectional view on the line *x x* of Fig. 2. Fig. 4 is a plan view of the valve. Fig. 5 is a face view of one end of the cylinder, and Fig. 6 is a plan view partly in section.

A indicates a bed-plate of any desired construction, and secured upon said bed-plate are brackets B B'. Secured at their ends to the brackets B B' are two pairs of guide-rods C, a space C' being left between the rods of each pair. Located between the pairs of guide-rods C is a cylinder D, having longitudinal flanges or slides E projecting from opposite sides thereof and adapted to enter the space C' between the guide-rods C and slide therein. Projecting from the slides E, preferably at points centrally between their ends, are arms F, to which are pivotally connected one end of two pitmen G. The opposite ends of said pitmen are connected with crank-wheels G', mounted on a shaft G², which shaft is suitably mounted in pillow-blocks G³ on the bed-plate A.

Located within the cylinder D is a piston H. The body of this piston is cast or otherwise produced in a single piece of iron or steel, and is provided with a flat upper face to produce a valve-seat I, as hereinafter explained. Four ports 1 1 2 2 and an exhaust-port 3 are made in the body I' of the piston, and are arranged to terminate at their upper ends at the flat face of said body, these ports, preferably, being made larger at the upper ends than at their lower ends. Outlet-ports 4 4 5 5 are made in the ends of the body of the piston and communicate at their inner ends with the inlet-ports 1 1 2 2, respectively.

Surrounding the body I' of the piston H is a ring J of metal, and between the flattened portion I of the piston-body I' and this ring a steam-chest K is formed. In one end of the body I' of the piston is a semicircular groove 6, which communicates at its ends with the steam-chest, and communicating with the groove 6 are two or more grooves 7. A follower-plate L is secured to the end of the body I' having the grooves 6 7, and passing centrally through this follower is a hollow piston-rod M, which latter is provided with openings 8, which communicate with the grooves 7. By means of the follower-plate L the grooves 6 7 are made to produce steam ducts or passages, and they will hereinafter be referred to as "ducts."

The follower-plate L is provided with perforations *a* to produce continuations of the outlet-ports 4 4. A follower-plate L' is secured to the outer end of the body I' and provided with perforations *a'* to produce continuations of the outlet-ports 5 5. An exhaust-pipe O extends through a perforation in the follower L' and communicates at its inner end with the exhaust-port 3. Where the piston-rod and exhaust-pipe pass through the follower-plates suitable packing-boxes will be provided.

Located in the steam-chest K is a valve P, made concave on its under face, as shown in Figs. 3 and 4, and is made of sufficient size to connect the ports 1 1 2 2 with the exhaust-port 3. Connected at one end to the valve P is a valve-rod Q, which passes through a perforation in the follower L and connected at its opposite end to a slide R, mounted on the guide-rods C. The slide R is connected by

means of a rod or pitman R' with an eccentric on the shaft G².

Packing-rings S are inserted in suitable grooves in the periphery of the ring J.

- 5 Steam being admitted into the piston through the hollow piston-rod M it will pass by means of the ducts 6 7 to the steam-chest K, thence through the inlet-ports 1 1, and out through the outlet-ports 4 4. The steam thus introduced into the cylinder will act on one end thereof and by its impact drive the cylinder forward. Through the medium of the eccentric R², rod or pitman R', and valve-rod Q the slide-valve P will be shifted and made to cover the inlet-ports 1 1 and outlet-ports 3, when the spent steam in the cylinder will be permitted to escape through the exhaust-port 3 into the exhaust-pipe O. At the same time the inlet-ports 2 2 will be exposed, and steam from the steam-chest will flow through them and out through the outlet-ports 5 5, against the end of the cylinder adjacent to the follower-plate L', and drive the cylinder in that direction.
- 25 Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—
1. In a steam-engine, the combination, with a reciprocating cylinder, of a stationary piston therein, the body of said piston being provided with a flat face, ports extending inwardly from said flat face, outlet-ports communicating with the inlet-ports, a ring encircling the body of the piston, a slide-valve located on the flat face, and a rod connecting the valve with the shaft which connects with the cylinder, whereby the valve and cylinder are operated from the same source, substantially as set forth.
 - 40 2. In a steam-engine, the combination, with a reciprocating cylinder, of a stationary piston therein, said piston comprising a body portion, an inclosing-ring, and followers, said body having a flat face between which and the inclosing-ring a steam-chest is formed, a steam-duct communicating with the steam-chest, a hollow piston-rod, steam-ducts connecting said piston-rod with the first-mentioned ducts, an exhaust-duct communicating with the steam-chest, an exhaust-pipe communicating with said exhaust-pipe, a slide-valve in the steam-chest, and a rod connecting the valve with the shaft which connects with the cylinder, whereby the valve and cylinder are operated from the same source, substantially as set forth.
 - 55 3. In a steam-engine, the combination, with a reciprocating cylinder, of a stationary piston therein, the body of said piston being provided with a flat face, ports extending inwardly from said flat face, outlet-ports communicating with the inlet-ports, a ring encircling the body of the piston, a slide-valve located on the flat face, and a rod connecting the valve with the shaft which connects with the cylinder, whereby the valve and cylinder are operated from the same source, substantially as set forth.

ton therein, the body of said piston having a flat face to produce a steam-chest, inlet-ports 60 in the piston communicating with the steam-chest, outlet-ports communicating with the inlet-ports and adapted to discharge through the end of the piston, exhaust-ports communicating with the steam-chest, a hollow piston-rod, ducts connecting the hollow piston-rod and steam-chest, a pipe extending into the piston and communicating with the exhaust port, a slide-valve in the steam-chest, and a rod connecting the valve with the shaft 70 which connects with the cylinder, whereby the valve and cylinder are operated from the same source, substantially as set forth.

4. In a steam-engine, the combination, with a bed-plate and guide-rods located thereon, 75 of a cylinder mounted to slide on said rods, a stationary piston in said cylinder having inlet and outlet ports, a valve adapted to slide on said piston, a shaft mounted on the bed-plate and carrying crank-wheels and an 80 eccentric, pitmen connecting the cylinder with the crank-wheels, and devices connecting the valve in the piston with the eccentric of the shaft, substantially as set forth.

5. In a steam-engine, the combination, with 85 a bed-plate and guide-rods thereof, of a cylinder, flanges or slides adapted to slide between said guide-rods, a stationary piston in the cylinder having steam inlet and outlet ports, a valve adapted to slide on the piston, 90 a shaft on the bed-plate, crank-wheels and an eccentric on the shaft, pitmen connecting the slides or flanges of the cylinder with the crank-wheels, and means connecting the valve in the piston with the eccentric on the shaft, 95 substantially as set forth.

6. In a steam-engine, the combination, with a bed-plate and guides mounted thereon, of a cylinder mounted between and adapted to slide on said guides, a stationary piston in the 100 cylinder having steam inlet and outlet ports, a valve located in the piston, a shaft mounted on the bed-plate, crank-wheels on said shaft, an eccentric on the shaft, pitmen connecting the cylinder and crank-wheels, a slide 105 mounted on the guides, a valve-rod connecting said slide with the valve, and a rod or pitman connecting said slide with the eccentric on the shaft, substantially as set forth.

In testimony whereof I have signed this 110 specification in the presence of two subscribing witnesses.

SIDNEY THOMAS BRUCE.

Witnesses:

J. V. CHASE,

JNO. B. PERKINS.