

(No Model.)

2 Sheets—Sheet 1.

J. M. POWELL.  
STEAM ENGINE.

No. 466,799.

Patented Jan. 12, 1892.

Fig 1

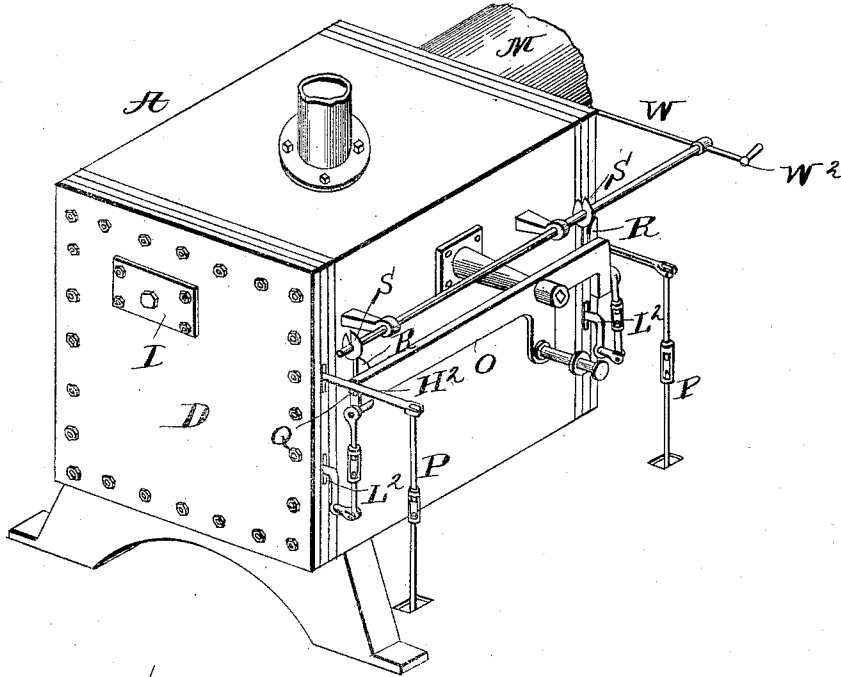
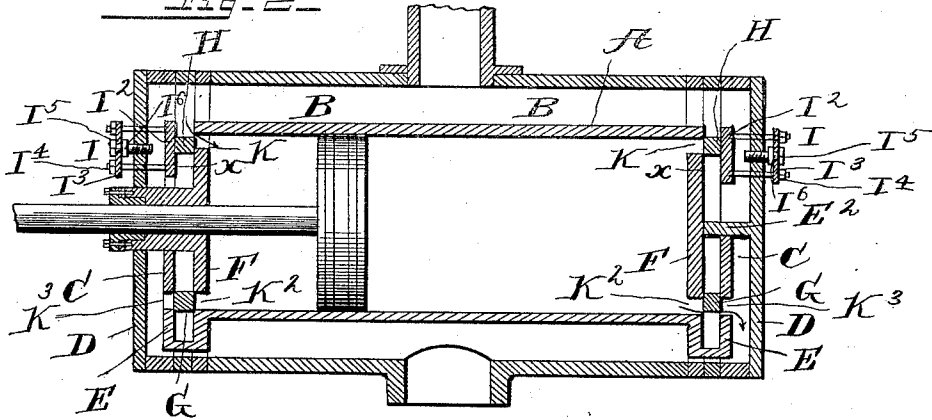


Fig 2



Witnesses

J. W. Kingbery  
W. O. March

Inventor

Joseph M Powell

by S. C. & S. B. Haseltine

his Attorneys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

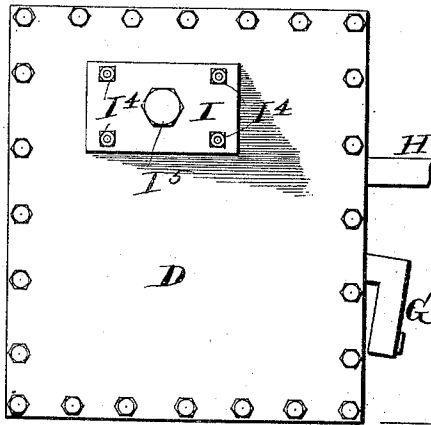


Fig. 5.

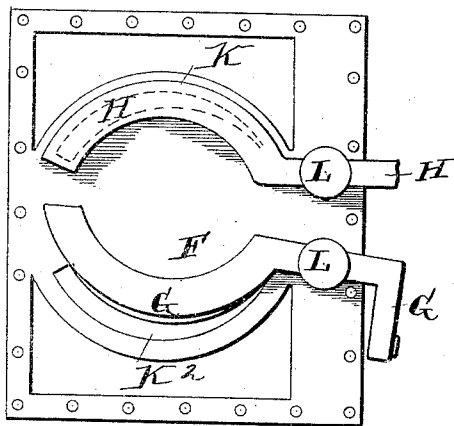


Fig. 4.

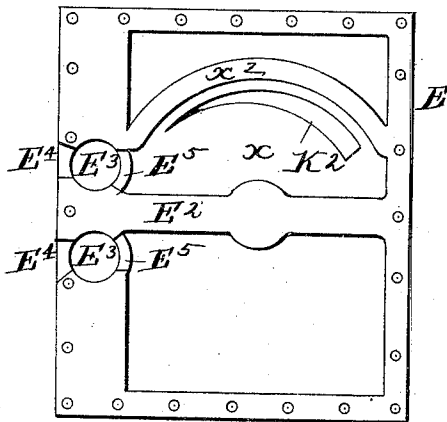
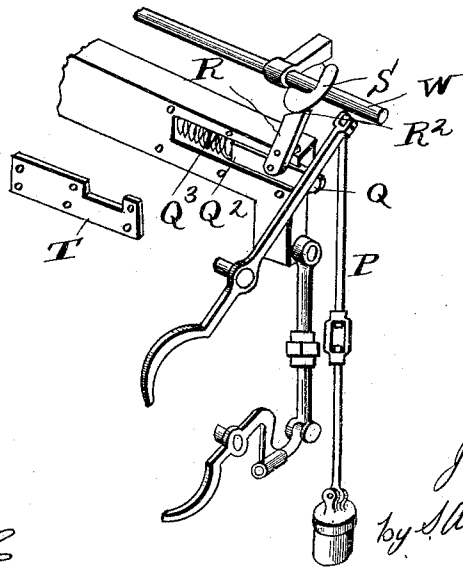


Fig. 6.



Witnesses

J. D. Kingbery  
H. O. Maib

Inventor

Joseph M. Powell

by A. D. & C. Haseltine  
his Attorneys

# UNITED STATES PATENT OFFICE.

JOSEPH M. POWELL, OF SPRINGFIELD, MISSOURI.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 466,799, dated January 12, 1892.

Application filed September 7, 1891. Serial No. 405,037. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH M. POWELL, a citizen of the United States, residing at Springfield, in the county of Greene, and State of Missouri, have invented certain new and useful Improvements in Automatic 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 consists of improvements in automatic steam-engines, the object of which is to provide a cheap, simple, and durable steam-chest cut-off and valve. These objects I attain by means of the device hereinafter particularly described and claimed, and illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a view in elevation of the entire device. Fig. 2 is a vertical longitudinal section of the cylinder and steam-chests. Fig. 3 is the bonnet or cap on the end of the steam-chest. Fig. 4 is a view of the sides of the steam-chest and exhaust-valve seat. Fig. 5 is a view of the plate which forms the cylinder-head, showing the ports into the end of the cylinder with the valves, also the openings for the steam to enter the steam-chest. Fig. 6 is a detailed view, enlarged, to show the mechanism for operating the valves.

Similar letters of reference indicate corresponding parts in the several figures.

A is an ordinary cylinder.

B B are the steam-passages.

C are the steam-chests on the ends of the cylinder. The steam-chests are formed of the bonnet or cap D, the cylinder-head E, and the piece E, which forms the sides of the steam-chest and has a dividing-partition E<sup>2</sup>. Said partition divides the steam from the exhaust. In the exhaust part of the chest a valve-seat is formed with a plate X, having a projecting ridge or rim X<sup>2</sup>, and a port K<sup>3</sup>, corresponding with the port in the cylinder-head. Thus the exhaust-valve G works between two ports K<sup>2</sup> and K<sup>3</sup> to lessen the amount of clearance-space, so that the clearance-space of both the supply-valve H and exhaust-valve G is only the thickness of the cylinder-head. Valve H for the supply has a balance-valve I, having

a seat I<sup>2</sup> to lessen the friction of the valve H. Said balance-valve consists of two plates—an inner plate I<sup>3</sup>, forming the seat for the valve H, and the outer plate I<sup>4</sup>. Said plates are connected by stud-bolts I<sup>4</sup> for holding the plates in any given position relative to each other, passing through the bonnet-plate D, and plate I<sup>3</sup> is provided with an adjusting-screw I<sup>5</sup> for raising and lowering the plate I<sup>3</sup>, thereby adjusting the valve-seat I<sup>2</sup>. This I accomplish by means of screw-threads in the bonnet D, and on the end of the adjustable screw I<sup>5</sup> the other end of the said screw has shoulders or projections I<sup>6</sup> on each side of the plate I<sup>3</sup>, thus forming a swivel, so that the plate I<sup>3</sup> will have to rise or fall as the screw I<sup>5</sup> is turned.

The ports to the supply K and exhaust K<sup>2</sup> are made long, and preferably with sides formed in the shape of an arc of a circle, or nearly crescent shape, and connect with elongated steam passage-ways B B<sup>2</sup>. The valves H and G are made curved to fit and slide back and forth over the ports, and for this purpose are provided with self-packing fulcrums L, which move back and forth. For this purpose the side piece E is provided with openings E<sup>3</sup> to receive the fulcrums L and slots E<sup>4</sup> E<sup>5</sup> to permit the valve-stems to work back and forth.

The end of the cylinder through which the piston-rods pass is provided with a steam-chest which has a collar M, which may be made in two or more pieces, so that it may be removed to get at the valves without removing any other machinery.

The valves H and G are operated automatically thus: By means of an ordinary eccentric-rod on the main shaft I connect with the wrist N on the working beam or lever O. Said lever O is connected by means of an adjustable valve-rod P, having pivoted or swivel connections with the lower or exhaust valve stem S<sup>2</sup>, so as to move smoothly back and forth. The valve-stem H<sup>2</sup> of the supply-valve is connected with a dash-pot or other suitable device for closing the valve, the said valve being opened by the upper or back stroke of the lever O. The valve would be closed by the lever O moving in the opposite direction, provided it were not sooner tripped. I trip it in

any suitable way by connection with the governor, which is so adjusted as to cut off the supply when the desired speed is reached at each stroke of the piston. This I accomplish  
 5 by providing a bolt Q in the end of the lever O, which is provided with a shoulder Q<sup>2</sup> and a spring Q<sup>3</sup> for holding the bolt forward and is hinged to a trip-lever R, said lever having a beveled end R<sup>2</sup>, against which a spiral piece  
 10 S operates to push the end of the lever R and push back the bolt Q, thus tripping the valve H. Bolt Q is placed in a slot in the lever O and inclosed by a suitable plate T, which is riveted or bolted in place. The spiral piece  
 15 S is placed upon a rocking shaft W, which is operated by an arm W<sup>2</sup>, attached to a lift-rod or spindle of the governor. The rocking shaft W has suitable bearings connected to the cylinder or steam-chests.

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

1. A steam-chest on each end of a cylinder, formed of bonnet D, cylinder-head F, and  
 25 sides E, the chests being divided and provided with curved elongated ports K K<sup>2</sup>, combined with curved slide-valves G and H, substantially as shown and described.

2. In an engine, the combination of a self-  
 30 packing fulcrum L on a slide-valve secured to the end of the cylinder and a balance-valve I with steam-chest C on the ends of the cylinder, substantially as shown and described.

3. In an engine, the exhaust-valve chest on  
 35 the end of the cylinder, in combination with a curved slide-valve having a self-packing fulcrum, a seat-piece X, having a port X<sup>2</sup> to correspond with the port K<sup>2</sup>, and a chest C on the end of the cylinder, having a partition E<sup>2</sup>

and a steam-passage B<sup>2</sup>, all substantially as shown and described. 40

4. A supply-valve for a cylinder, consisting of a curved valve H, having a self-packing fulcrum for sliding over a curved port in the end of the cylinder, combined with a cylinder A, and a steam-chest C, and a balance-  
 45 valve I, all substantially as shown and described.

5. The combination of a sliding valve H, having a self-packing fulcrum and a steam-  
 50 chest on the end of a cylinder, with a balance-valve consisting of two plates I<sup>2</sup> I<sup>3</sup>, stud-bolts I<sup>4</sup>, and an adjustable screw I<sup>5</sup>, having shoulders I<sup>6</sup>, all substantially as and for the purpose specified. 55

6. In combination with sliding valves having self-packing fulcrums, the mechanism for operating them, consisting of an eccentric-rod for operating a working lever O, which is attached to the valve-stem of the exhaust-valve  
 60 G and opens the supply-valve by means of a sliding bolt Q and closes the supply-valve by a dash-pot tripped by a spiral piece S, operating on a pivoted lever R, all substantially as shown and described. 65

7. A device for tripping the supply-valve, consisting of a bolt Q, having a spring Q<sup>3</sup> and lever R, and a spiral piece S, attached to a rocking shaft W, which is connected to the governor of the engine, combined with a lever O, having a slot and a plate T, all substantially as and for the purpose specified. 70

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH M. POWELL.

Witnesses:

S. A. HASELTINE,  
 B. L. FERRIS.