

J. F. Troxel,

Reciprocating Steam Engine,

No. 65,453.

Patented June 4, 1867.

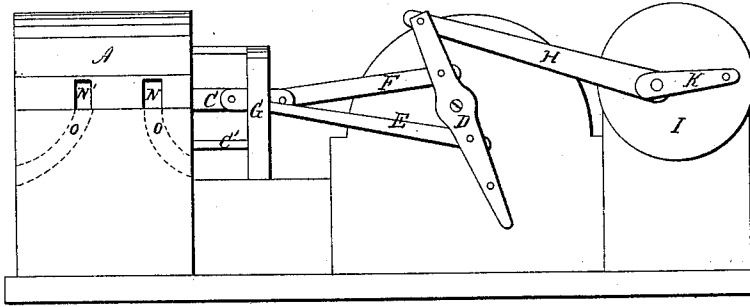


Fig. 1.

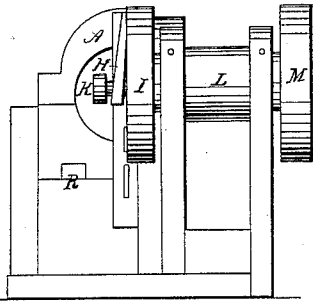


Fig. 2.

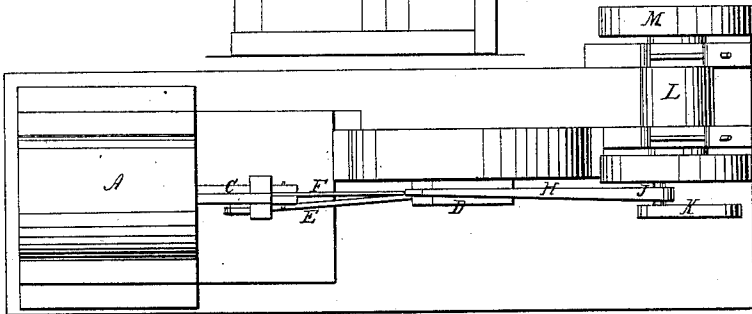


Fig. 3.

Fig. 4.

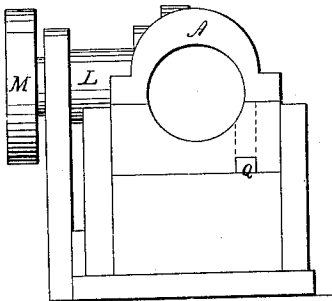


Fig. 5.

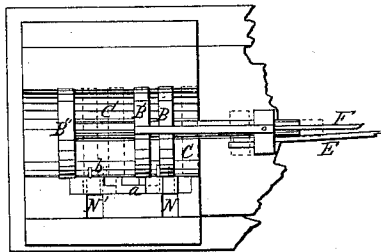
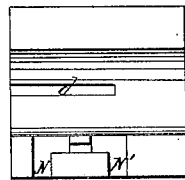


Fig. 6.



Witnesses;  
W. H. Burridge  
Frank Alden.

Inventor;  
J. F. Troxel

# United States Patent Office.

J. F. TROXEL, OF BLOOMSVILLE, OHIO.

Letters Patent No. 65,453, dated June 4, 1867.

## IMPROVEMENT IN STEAM ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, J. F. TROXEL, of Bloomsville, in the county of Seneca, and State of Ohio, have invented certain new and useful Improvements in Steam Engines; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side view of the engine.

Figure 2 is a front end view.

Figure 3 is a top view.

Figure 4 is a rear end view.

Figure 5, a horizontal section of the cylinder showing the arrangement of the pistons.

Figure 6 is a detached section to which reference will be made.

Like letters of reference refer to like parts in the several views.

A, fig. 1, is the cylinder; B B' B'', fig. 5, the pistons; C C', the piston-rods, by means of which the pistons are connected to the lever D by the links E F. It will be seen that the piston B' is provided with two rods, which are connected to the cross-head G, the purpose of which is to give a more even and uniform movement to the piston. H is a link connecting the lever D to the crank-wheel I. It will be observed that the wrist J of the crank-wheel is provided with an arm, K, fig. 3, which reaches across the face of the wheel, as seen in fig. 1, and to which reference will hereafter be made. L, fig. 2, is the main shaft upon which the crank-wheel is keyed, and M a pulley by which the machinery is driven. It will be seen that the cylinder is not provided with stationary heads, as is the cylinder of the ordinary steam engine, but that the ends are open and the pistons B B'' are made to answer the place of heads, and which are made to move in the cylinder reciprocally in the following manner:

I induct steam into the cylinder and between the piston-heads B B' through the ports N. The pressure of the steam, together with its expansion, causes the pistons B B' to traverse from each other in opposite directions, B toward the front end of the cylinder, and B' toward the centre, as indicated by the dotted lines *e*, each traversing one-half the length of the cylinder, making one-half stroke. As the piston B moves toward the end, the piston B' approaches B', and in so doing B'' shoves along the sliding valve *a* by the pin *b*, which closes the induction port N, at the same time opening the exhaust port O immediately under the induction ports, and down through which the steam exhausts, and out at the end of the bed of the cylinder from the exhaust port Q, fig. 4, and so, on the reverse action of the piston *e*, the steam is inducted into the cylinder and between the pistons B' B'' through the port N', the pistons are again forced from each other by the pressure and expansion of the steam; B'' traversing toward the end of the cylinder, and B' toward the centre, and in so doing shifts the valve *a*, thereby closing the induction port N' at the proper moment to cut off the steam and open the induction port O', and down through which the steam exhausts from the port R, fig. 2, at the front end of the cylinder bed, and so on alternately, the engine taking steam through the port N, and exhausting the inducted steam through the throat O and port Q, and in the reverse action taking steam through the port N, and exhausting through the throat O' and port R. Fig. 6 shows the throats of the induction ports N N' through which the steam enters the cylinder above the sliding valve *a*. *d* is a groove cut in the upper side of the cylinder, and in which the piston-rod C slides. A corresponding groove is cut in the lower side of the cylinder for the reception of the rod C'. No special way is proposed by which to keep the pistons steam-tight. The plan usually adopted in the ordinary steam engine, viz, metallic ring packing, &c., with some slight modifications in order to adapt it to the nature of the case, is applicable to this engine. The piston-rods C' are to work in closely fitting grooves, and the openings in the periphery of the head through which the rods of the centre head pass may be provided with stuffing-boxes devised for the special purpose. In this particular no trouble is apprehended, as several ways may be suggested for this purpose. The special arrangement, substantially as shown in the drawings, and herein described, is only claimed. As above described, the pistons are connected to the oscillating lever D by the links E and F, making the oscillation of the lever at the point of connection equal to a half stroke of the engine, each piston acting at equal distances from the centre of vibration, also reversely to each other. The intervention of this oscillating lever between the power and crank-wheel may be omitted, if so

desired, and the connection made directly to the crank, which, as above said, is so constructed as to allow of this change in the arrangement of the connections.

What I claim as my improvement, and desire to secure by Letters Patent, is—

1. The special arrangement of the pistons B B' B'', rods C C', cross-head G, and links F, in combination with the lever D, link H, and crank-wheel I, for the purpose and in the manner substantially as described.

2. The sliding valve *a*, as arranged in combination with the pistons B B' B'', and operated in the manner as and for the purpose herein substantially set forth.

J. F. TROXEL.

Witnesses:

W. H. BURRIDGE,

FRANK ALDEN.