(Model.)

J. I. EAVENSON.

Direct Acting Steam Engine.

No. 241,636. **Patented May 17, 1881.**

Fig. 1.

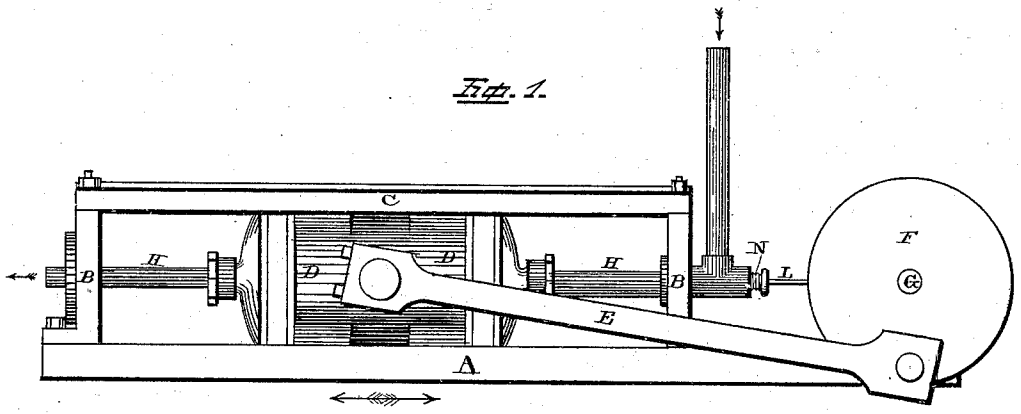


Fig. 2.

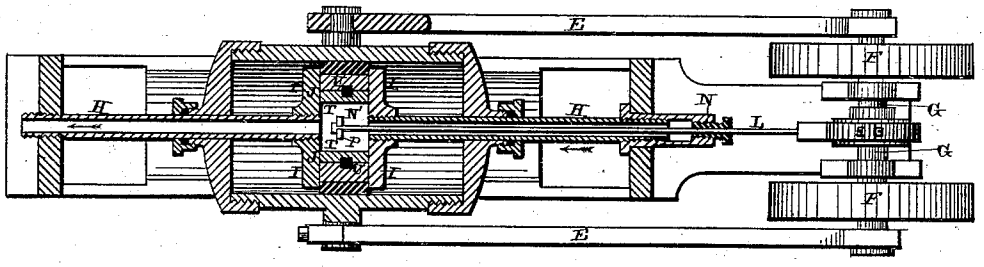


Fig. 3.

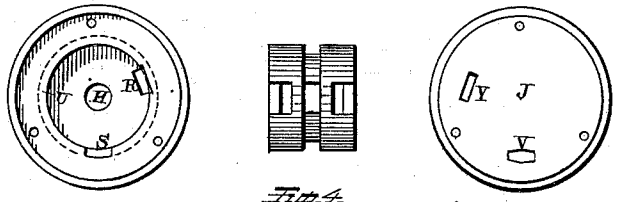


Fig. 4.

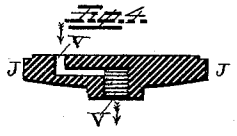
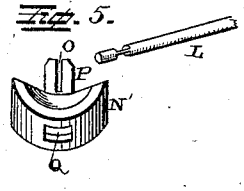


Fig. 5.



Witnesses.

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UNITED STATES PATENT OFFICE.

JAMES I. EAVENSON, OF PAOLI, PENNSYLVANIA.

DIRECT-ACTING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 241,636, dated May 17, 1881.

Application filed March 18, 1881. (Model.)

To all whom it may concern:

Be it known that I, JAMES I. EAVENSON, of Paoli, in the county of Chester and State of Pennsylvania, have invented certain new and useful Improvements in Direct-Acting 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in that class of steam-engines in which the cylinder is made to move and the piston remain stationary; and it consists, first, in providing suitable guides for the cylinder, by means of which all lateral strain is taken from the pipe which conveys steam to and from the cylinder; second, in the peculiar construction of the hollow piston and the valve working therein; third, in the manner of attaching the valve-rod to the valve, whereby the valve is prevented from twisting or turning, all of which will be more fully described hereinafter.

Figure 1 is a side elevation of my invention complete. Fig. 2 is a horizontal section through the same. Figs. 3, 4, 5 are detail views.

A represents the bed-plate of the engine, which is made concave upon its top and provided with two standards, B, upon the top of which is adjustably secured in any suitable manner the guide C, which bears upon the top of the endwise-moving cylinder D. This guide is also made slightly concave on its under side, and between the concave surface of the bed-plate and the concave surface of the guide the cylinder is made to reciprocate back and forth by means of steam, and the motion is conveyed to the two connecting-rods E, which have their outer ends connected to the wrist-pins on the two driving-wheels F, or to cranks on the driving-shaft G. Instead of two connecting-rods, as here shown, a single forked rod may be used, in which case but a single driving wheel or crank will be necessary.

Secured in the two standards which rise from the bed-plate A is the pipe H, which conveys steam to and carries it away from the steam-cylinder, and which pipe passes through the center of the cylinder, as shown in Fig. 2.

Placed midway between the two standards, and in the center of the pipe, is the hollow piston I, which, instead of being reciprocated back and forth in the usual manner, here remains stationary while the cylinder is reciprocated back and forth over it. One end of the steam-pipe passes directly into this hollow piston, but the opposite end of the piston is closed by the follower J, so as to prevent the steam from passing straight on through the pipe. This follower J is made removable, so that the packing-rings can be placed upon the piston in the usual manner and access given to the valve.

The valve-rod L has its outer end operated by an eccentric on the driving-shaft in the usual manner, and this rod passes through the stuffing-box N in one end of the inlet portion of the steam-pipe. The rod extends through the steam-pipe to the center of the piston, where it is connected to the steam-valve N′. In order to prevent this valve from turning or twisting in the piston, the opposite sides of the valve-rod are cut away, as shown, and this thin or reduced part of the rod is then inserted in a slot, O, made in the center of the projection P, which extends upward from the top part of the valve. As the rod cannot turn in any of its movements, and as the valve cannot turn on the rod, owing to the peculiar construction above described, it will readily be seen that the valve will always remain in any position into which it has been adjusted. The valve-seat and the valve being round, as here shown, the valve will fit more closely to its seat the more it is worked, and as the slot in the projection will allow the valve to sink downward, it will readily be seen that the valve can be worn almost entirely away without needing repairs. No sinking down of the valve will have any effect upon the valve-rod, for the connection between the two is loose enough to allow the valve a vertical movement without affecting the rod in the slightest. In the under side of this valve is made a recess, Q, which recess acts in the same manner as the recess in the ordinary slide-valve when it moves back and forth over the ports.

Inside of the piston, which has the steam-port R made through it at one end, is a longitudinal recess, S, in one side for the exhaust, and a circular groove made around its inside

and connected with this exhaust. Placed inside of this piston, which is bored out perfectly round at its center, is the valve-seat T, which has the usual three ports made through it, and a groove, U, running around its side, and which groove corresponds with the groove made in the interior of the piston itself. The central one, or the exhaust of the three ports, connects directly with these two grooves, so that all the exhaust-steam which passes through the piston passes through these grooves, and from the groove through the opening V in the follower, and from this opening V in the exhaust-pipe.

As the steam enters into the piston it passes through one of the ports made in each of its ends into one end of the cylinder, and this steam, acting upon the inner end of the cylinder, forces the cylinder endwise the full length of its stroke, and then the eccentric shifts the valve, and steam is admitted into the opposite end of the cylinder, and the cylinder is forced in the opposite direction. The instant the valve shifts so as to admit steam into the opposite end of the cylinder the exhaust-steam passes through the port by which it was admitted under the valve, and through the exhaust-port into the exhaust-pipe. In this manner the cylinder is made to reciprocate back and forth, while the piston remains stationary. There is also made a port, Y, through the follower for the purpose of admitting the steam into that end of the cylinder which is next to the follower.

A separate and independent valve-seat is here shown, so that in case of wear it can be removed and replaced by another one; but this is not absolutely necessary, for the passages may be made directly in the piston itself; but the valve-seat is greatly to be preferred, as it enables the parts to be readily replaced when worn.

The two guides between which the cylinder reciprocates are here shown and described as being convex on their inner sides, but any other shape that will answer will do equally as well, as I do not limit myself to any precise shape or construction.

One of the great advantages gained by this construction of engine is that the ports through which the steam passes are made so much shorter than those used in connection with the ordinary slide-valve that a great saving in steam is effected.

Having thus described my invention, I claim—

1. In a steam-engine, the combination of a hollow piston, a valve, N, having a curved bottom, and the piston-rod L, the valve and rod being so connected that the valve can sink downward independently of the rod, but is prevented from moving laterally, substantially as shown.

2. In a steam-engine having a stationary hollow piston, the combination of the circular inserted valve-seat T, having the groove in its side for the passage of steam, and the valve N′, the parts being arranged to operate as shown.

3. The combination of the bed-plate A, the guide C, the stationary piston and steam-pipe, and the endwise-moving cylinder D, the cylinder being guided in its movements by the bed-plate and guide, between which it is held, substantially as set forth.

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

JAMES I. EAVENSON.

Witnesses:

A. C. KISKADDEN,

W. W. MORTIMER.