

G. COOK.
BALANCED SLIDE VALVE.

Patented Oct. 9, 1894.

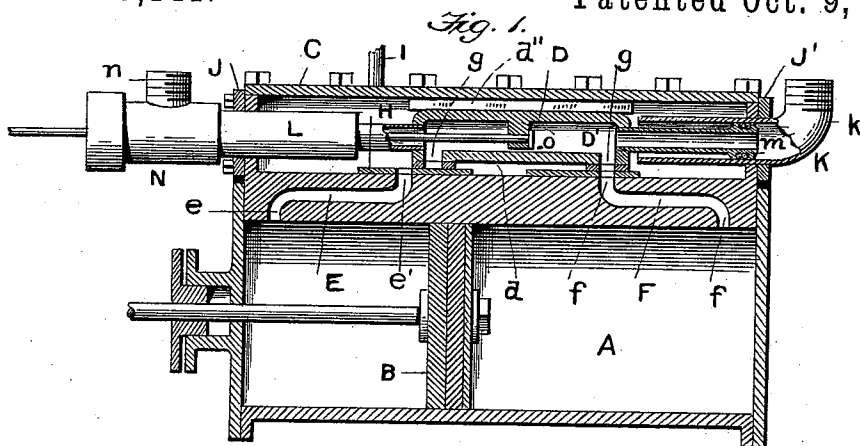


Fig. 2.

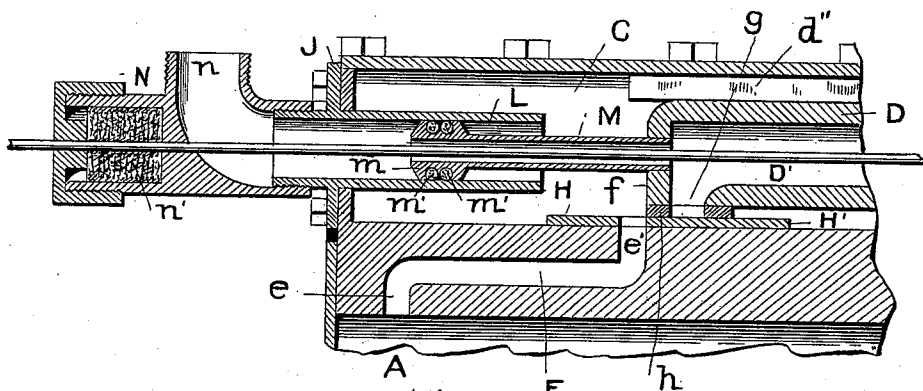


Fig. 3.

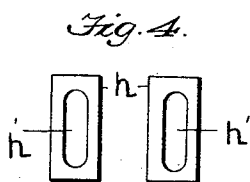


Fig. 4.

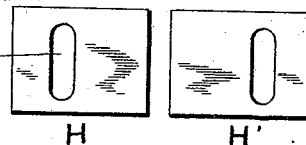
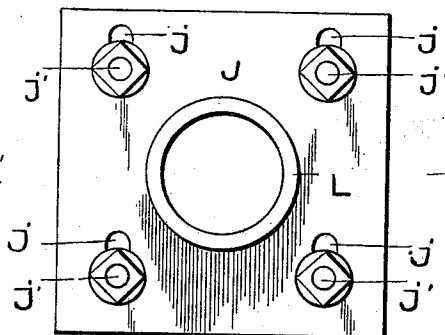


Fig. 5.

Witnesses:

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UNITED STATES PATENT OFFICE.

GEORGE COOK, OF BUFFALO, NEW YORK.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 527,141, dated October 9, 1894.

Application filed April 26, 1894. Serial No. 509,125. (No model.)

To all whom it may concern:

Be it known that I, GEORGE COOK, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Balanced Slide-Valves for 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.

This invention relates to slide valves and is more particularly designed as an improvement upon the "Steam chest for engines" patented to me on the 13th day of March, A. D. 1894, No. 516,264; and the objects of the present invention are, first, to so construct the valve as to admit live steam to the lower side thereof and thereby balance the valve to cause it to move freely; secondly, to so construct the steam passages in the cylinder and the valve as to diminish the length of the passages and reduce to a minimum the area of the passages in which the steam passes; thirdly, to provide wear plates between the chest and valve which can be renewed whenever they are worn at a small cost; fourthly, to simplify the construction of the exhaust devices with a view to enabling the engineer or machinist to ascertain when the valve and pistons are properly fitted to their seats; and finally, to improve the parts in the details of construction so as to promote the efficiency and durability of the chest and valve and to save the expense of refacing the valve and seat.

With these ends in view, the invention consists in the construction and combination of parts which will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional view partly in elevation. Fig. 2 is an enlarged vertical sectional view through a portion of one end of the cylinder and the valve. Fig. 3 is an end view showing the plate by which the valve and exhaust tubes may be adjusted to compensate for wear. Fig. 4 is a detail view showing the wear plates on the valve. Fig. 5 is a detail view of the wear plates inside the valve chest which form the seats for the sliding valve.

Like letters of reference denote like parts in all the figures, referring to which—

A denotes the cylinder; B, the piston therein; C, the valve chest, and D the valve. In the wall of the piston cylinder adjacent to the valve chest are the steam passages E, F, which have their ports *e, f*, near the ends of the cylinder A as usual, but in order to diminish the area of steam surface of these passages they are not made as long as the passages shown in my former patent. Hence the other ports *e', f'*, are separated some distance from each other where they open into the valve chest C, as seen in Fig. 1. The valve D is cast in a single piece of metal to form the internal exhaust chamber D' and the recess or space *d* in the lower under surface of the same, said valve being provided at its ends with the feet *f, f*, in which are provided the exhaust ports *g, g'*, which open into or communicate with the exhaust chamber D'. The feet *f, f*, of the valve are faced with the wear plates *h, h*, through which are formed the slots *h'*, see Fig. 4, that are in line with the respective exhaust ports *g, g'*; and said slotted wear plates, *h, h*, are brazed or otherwise suitably united to the valve so that they can be removed when worn and replaced by other wear plates, thus saving the cost of refacing the valve by the expensive methods and machinery now used. The seat for the valve is provided in the steam chest by the plates H, H', which are suitably united to the valve and slotted at *h''* (see Fig. 5) to align with the ports *e', f'* of the steam passages E, F, in the cylinder; and in practice I prefer to make the plates *h, h*, on the valve of brass while the plates H, H', forming the valve seat may be made of cast iron or steel, but it is evident that these particular materials can be changed. By having the recess *d* in the lower side of the slide valve, which recess extends to and through the sides of the valve, the live steam in the chest, which is supplied by the pipe I, is permitted to pass beneath the valve and thus the steam pressure on top and bottom of the valve is equal, whereby the valve is balanced and made to work freely and easily in the valve chest. The usual top plate *d''* may be provided on the top side of the valve, or it may be omitted, as desired.

To the ends of the steam chest I apply the adjustable plates J, J', which are provided with the vertical slots *j*, see Fig. 3, through which slots are passed the bolts *j'* that fasten the plates to the heads of the chest in a manner to permit of vertical adjustment of the plates and the slide valve to compensate for wear between the plates *h*, H, H', and secure the necessary tight joints between the valve and its seat. In these adjustable plates J, J', are secured the exhaust pipes K, L, which extend some distance into the chest and are arranged in line with each other and with the hollow piston stems M, M, which are attached to and reciprocate with the slide valve. The exhaust pipes are made of uniform diameter throughout their length and are thus free from shoulders or other projections on their inside surfaces, whereby the machinist or engineer may look through the exhaust pipe L, when the stuffing box casting N is detached, and observe whether the head on one of the hollow pistons M is properly centered in the exhaust pipes or whether the valve is properly fitted to its seat. The exhaust pipe L may be made integral with or attached to its plate J, and on the outer end of this pipe L, which is externally screwed the elbow *n* of the casting N, the other end of the elbow *n* being extended beyond one side of the casting N to enable an external exhaust pipe (not shown) to be coupled thereto. The casting N is thus made so its elbow *n* can be turned on the pipe L to have its outer end face in any radial direction, to enable the exhaust steam to be led off to any suitable place; and this casting N is further provided, at its outer end, with a stuffing box *n'*, through which passes the valve rod O that extends through the pipe L, one of the hollow piston stems M, and into the exhaust chamber D' of the valve D, said inner end of the valve rod having its head attached to a lug *o* cast in the inner top or bottom side of the valve D. See Fig. 1.

The exhaust pipe K is threaded into the plate J and provided with an elbow *k* which can be turned with the pipe K to face in any proper direction; and in these exhaust pipes K, L, work the piston stems M, M, which are provided with the enlarged heads *m*, *m*, the latter being grooved circumferentially to receive the packing rings *m'* by which the necessary tight joints are secured between the

reciprocating piston stems and the exhaust pipes.

It is evident that the exhaust steam admitted to exhaust chamber D' is free to pass in opposite directions through the hollow piston stems and the exhaust pipes, thus providing for the free escape of the steam from both ends of the chest and reducing the impact or pressure of the exhaust steam or reduce the jar and prevent loosening of the bolts and other parts.

The operation and advantages of my improvements will be readily understood by those skilled in the art from the foregoing description taken in connection with the drawings.

Having thus fully described my invention, 70 what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a piston cylinder and a steam chest, of the fixed exhaust pipes, the chambered slide valve having the live steam recess *d* in its under side, and the hollow piston stems connected to the valve to communicate with the exhaust steam chamber therein and provided with the heads which fit tightly in the exhaust pipes, substantially as described.

2. The combination with a piston cylinder, and a steam chest, of the slotted seat-plates on the inside of the steam chest, the chambered slide valve provided with the slotted wear plates which ride upon the seat plates, the exhaust pipes and the hollow piston stems attached to the slide valve and working in the exhaust pipes, substantially as described.

3. The combination with the piston cylinder and a steam chest, of the exhaust pipe K attached to one head of the steam chest, the other exhaust pipe L of uniform diameter attached to the other head of said steam chest, the casting N attached to the protruding end of the exhaust pipe L and having the elbow *n* and the stuffing box, a slide valve, the hollow piston stems attached to the slide valve and working in the exhaust pipes, and the valve stem, substantially as described.

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

GEORGE COOK.

Witnesses:

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