

(No Model.)

C. S. FARRER.
ENGINE VALVE.

No. 533,165.

Patented Jan. 29, 1895.

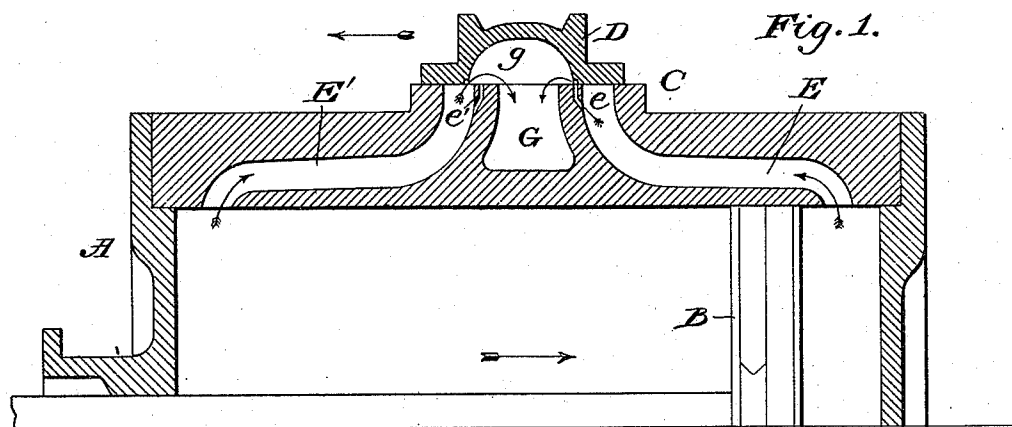


Fig. 2.

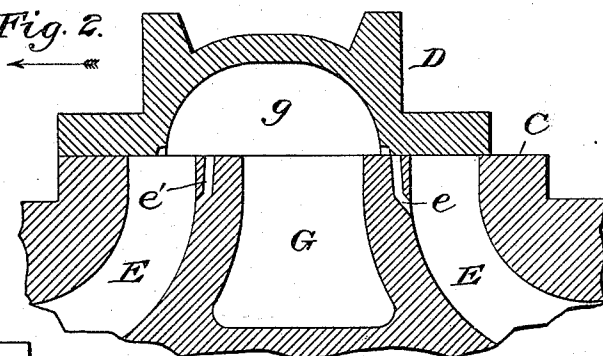


Fig. 4.

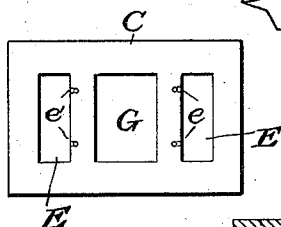


Fig. 5.

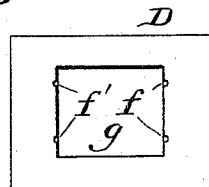


Fig. 3.

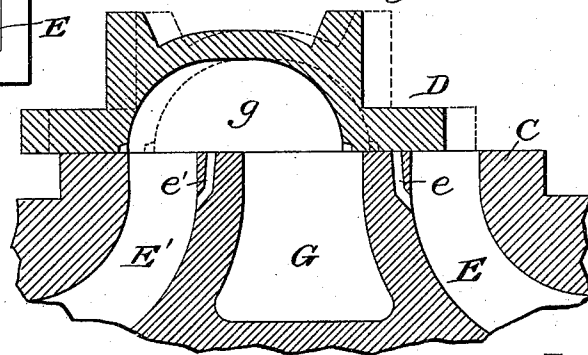
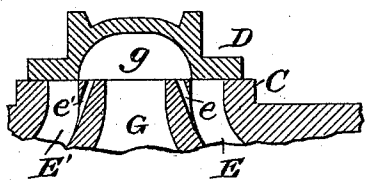


Fig. 6.



Witnesses

T. A. Conner,
Chas. E. Pierson.

Fig. 8.

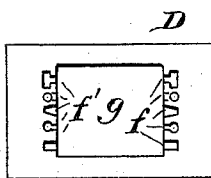
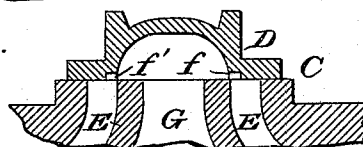


Fig. 7.



Inventor

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UNITED STATES PATENT OFFICE.

CHARLES S. FARRER, OF DUNMORE, PENNSYLVANIA.

ENGINE-VALVE.

SPECIFICATION forming part of Letters Patent No. 533,165, dated January 29, 1895.

Application filed October 2, 1894. Serial No. 524,763. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. FARRER, a citizen of the United States, residing at Dunmore, in the county of Lackawanna and State of Pennsylvania, 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.

This invention relates to engines, but more particularly to steam engines having a slide valve for controlling the admission of the steam into or the exhaust from the cylinder.

In steam engines it is a well known fact that when the steam is cut off before the piston has made its full stroke so as to take advantage of the expansive force of the steam, there occurs a back pressure on the piston due to the compression of the steam on the opposite side of the piston as it advances, which back-pressure directly opposes the action of the expanding steam. This materially detracts from the efficiency and economy of the engine, as it requires a greater pressure on the opposite side of the piston to move it than would be required if this back-pressure were not present. Devices have been proposed for overcoming this difficulty, but they are usually inefficient, complicated or they require an engine of special construction to accomplish the desired ends.

The primary object of my invention is to overcome the objectionable features referred to by providing a simple, effective and inexpensive means for obtaining an even compression of the gas or steam at each end of the cylinder by relieving the exhaust and consequently the back-pressure.

A further object is to provide means whereby engines already constructed may be readily changed or made to embody this feature of relieving the back-pressure with very little expense.

With these and other objects in view the invention consists in the construction and combination of the several parts as will be hereinafter more fully described and then defined in the claims at the end of the description.

Referring to the accompanying drawings,

forming a part of this specification, Figure 1 is a longitudinal section of one form of steam engine and valve illustrating one mode of relieving the back-pressure. Fig. 2 is a fragmentary longitudinal section of the valve and valve-seat with the valve in a different position from that of Fig. 1. Fig. 3 is a view similar to Fig. 2 except that the valve is shown in a different position. Fig. 4 is a plan view of the valve seat with the relief ports in the bridge of the same. Fig. 5 is an inverted plan view of the valve. Figs. 6 and 7 are fragmentary longitudinal sectional views of slightly modified forms; and Fig. 8 illustrates different forms of relief ports that may be employed.

In the drawings I have merely illustrated sufficient of the steam engine as will properly show the working of my invention, for the reason that the piston and valve may be operated in any well-known or approved manner, and the piston cylinder and valve be of any suitable construction to suit the requirements of the case.

Referring to Fig. 1, A designates a cylinder; B, a piston working therein; C, the valve-seat arranged on the cylinder; D, a valve adapted to reciprocate back and forth on the valve-seat. E, E', are the inlet or steam ports and G the exhaust port, all of which form a part of a well-known type of engine. Hence further description of the construction and operation of the parts is not thought necessary.

I have shown the valve D with sufficient lap to cut off the steam at less than one-half stroke, so as to utilize the expansive force of the steam for the remainder, though this amount of lap may be varied at will. This lap would cause the steam on one side of the piston to be compressed thereby causing a back pressure, or an opposing force to the piston, but to prevent this and to relieve the compression I provide relief or auxiliary ports, e, e, and e', e', located in the bridge of the valve-seat and extending downwardly and outwardly to meet the ports E and E' respectively. These relief ports may be of any suitable size and preferably have their opening in the seat arranged to be closed a little before the valve reaches its extreme throw so that there will be a slight compression at or

near the end of the stroke only. At $f, f,$ and $f', f',$ are also relief ports located in the face of the valve D and open into the recessed portion or exhaust cavity g of said valve, the said ports of the valve serving to supplement the ports of the valve-seat.

The operation of the engine will be understood from the foregoing description. It will be seen, if we assume that steam has already entered the port E' and the positions of the valve D and piston are the same as shown in Fig. 1, that the compression, which occurs after the exhaust is closed, will continue to be relieved through the relief ports $e, e,$ until the valve reaches the position shown in Fig. 2. Slight compression will now take place to merely cushion the piston and will continue till the valve reaches the position shown in dotted lines in Fig. 3, at which time the steam will begin to enter the inlet port E to cause the return movement of the piston. The steam will continue to enter this port till the valve reaches its extreme throw, as shown in full lines in Fig. 3, when the valve will move in the opposite direction, causing the operation just described to be reversed. This construction provides a simple and efficient means for relieving the back-pressure with very little additional cost or labor.

It is obvious that I may alter the construction somewhat if so desired, as, for instance, in Fig. 6 the relief ports in the valve are dispensed with entirely, while in Fig. 7 the relief ports in the valve-seat are dispensed with. In both of these cases, however, the relief ports extend a sufficient distance to be the equivalent of the combined ports of the valve and valve-seat shown in Fig. 1, when under like conditions. I may alter the size, shape or manner of forming the relief ports of either the valve or seat, some of which forms are shown in Fig. 8. I, therefore, do not wish to confine myself to the exact construction shown as other changes may be made if so desired. Nor do I confine myself to any particular form of engine, as the invention may be applied to various forms without altering the character of the invention.

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

1. A steam engine comprising a cylinder, a piston located in the cylinder, inlet and exhaust ports located in said cylinder, a valve having an exhaust cavity arranged to control the inlet and exhaust ports, together with relief or auxiliary ports adapted to form a communication between the inlet ports and the exhaust cavity of the valve, whereby the back pressure in the cylinder may be relieved by the movement of said valve, substantially as described.

2. A steam engine comprising a cylinder having inlet and exhaust ports arranged therein, a piston adapted to work in said cylinder, a valve arranged to move back and forth to control the inlet and exhaust ports, relief ports located in the valve-seat and communicating with the inlet ports, the said relief ports arranged to be placed in communication with the exhaust port by said valve, whereby the back-pressure in the cylinder may be relieved, substantially as described.

3. A steam engine comprising a cylinder having inlet and exhaust ports arranged therein, a piston working in said cylinder, a valve arranged to move back and forth to control the inlet and exhaust ports, relief ports in the under face of the valve extending into the exhaust cavity of said valve and adapted to be placed in communication with the inlet and exhaust ports, whereby the back-pressure in the cylinder may be relieved, substantially as described.

4. A steam engine comprising a cylinder having inlet and exhaust ports arranged therein, a piston working in said cylinder, a valve arranged to move back and forth to control the inlet and exhaust ports, relief ports in the valve, together with relief ports located in the valve seat and communicating with the inlet ports, the said relief ports arranged to be placed in communication with the exhaust port, whereby the back-pressure in the cylinder may be relieved, substantially as described.

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

CHARLES S. FARRER.

Witnesses:

T. J. WILLIAMSON,
THOMAS T. PALMER.