

(No Model.)

2 Sheets—Sheet 2.

L. B. CARRICABURU.

STEAM ACTUATED VALVE.

No. 303,703.

Patented Aug. 19, 1884.

Fig. 3.

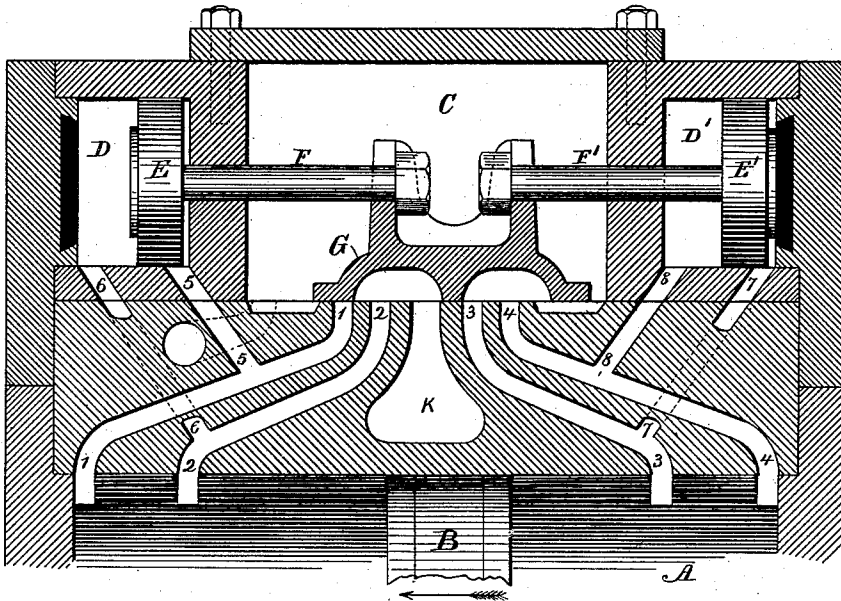
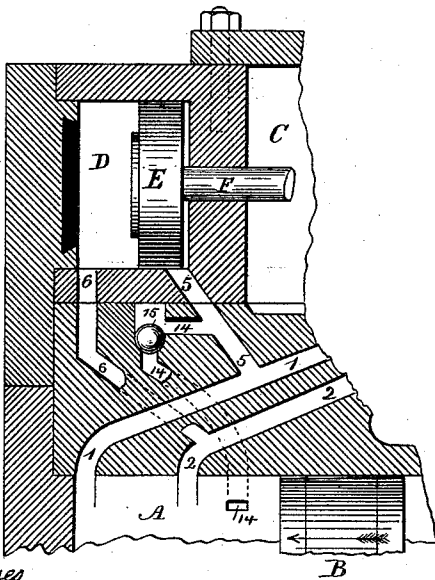


Fig. 4.



Witnesses

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LEON B. CARRICABURU, OF NEW YORK, N. Y.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 303,703, dated August 19, 1884.

Application filed January 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, LEON B. CARRICABURU, of the city and State of New York, have invented an Improvement in Steam-Actuated Valves, of which the following is a specification.

In my present invention I make use of two ports at both ends of the cylinder, one or both of which are open for the admission of live steam, but only one conveys away the exhaust, the adjacent one being covered by the valve. The steam-piston, when it passes by the exhaust-port, compresses the confined steam, and said steam passes through a port and acts upon a piston that gives motion to the valve. As soon as the steam is admitted by the movement of the valve the pressure continues to act upon the valve-moving piston to insure the full movement, and I construct the ports with reference to the valve in such a manner that steam will pass in to move the valve correctly, even if the valve may accidentally occupy a central position over the ports, thus preventing the engine stopping by the arresting of the movement of the valve.

In the drawings, Figure 1 is a vertical section of the valve-chest and valve. Fig. 2 is a plan of the valve-seat, the same being adapted to a **D** slide-valve. Fig. 3 is a section of the parts with a **B** slide-valve; and Fig. 4 represents the parts, with the addition of a port and valve for live steam to act in addition to the compressed exhaust.

The steam-cylinder **A** and piston **B** are of ordinary character. The steam-chest **C** is provided with two cylinders, **D** and **D'**, in which are the valve-moving pistons **E** **E'**, with rods **F** **F'** to the valve **G**. In Fig. 1 the operative piston and its rod push the **D**-valve and move it and the other piston-rod and piston, and in Fig. 3 the operative piston and its rod pull the **B**-valve and move it and the other piston and rod, the parts otherwise being similar. There are ports 1 and 2 from the valve-seat to one end of the steam-cylinder, and similar ports, 3 and 4, to the other end of the cylinder. The length of the valve-faces and their distances apart are such that one end port, 1, will be covered while the adjacent port 2 is open for the exhaust, and the steam-port 4 will also be open. The exhaust-

chamber is at **K**. With the **D**-valve, Fig. 1, there is a branch port, 5, leading from the port 1 to the cylinder **D**, behind the piston **E**, and a branch port, 6, from 2 to the cylinder **D**, in front of the piston **E**. There are similar ports, 7 and 8, from 3 and 4, respectively, to the cylinder **D'**. If the steam is passing by 4 into the cylinder **A**, the port 1 is closed at its upper end by the valve **G**, the exhaust 2 is open to **K**, and the ports 7 and 8 are open to **D'**, so that the pressure is equal at both sides of the valve-moving piston **E'**, and the piston **B** will receive motion in the direction of the arrow. The exhaust-port 2 being open, the exhaust-pressure will be the same at both sides of the piston **E**, because both 5 and 6 are open by 1 and 2 into the cylinder **A**; but as soon as the piston **B** passes the port 2 it closes the same, and the confined exhaust-steam is compressed in the cylinder **A**, ports 1 and 5, and behind **E**, (the exhaust in front of **E** remaining open by 6 and 2 to **K**,) and as soon as the accumulated pressure is sufficient the piston **E**, the valve **G**, piston **E'**, and rods **F** **F'** are moved and the valve **G** admits steam by 1 and closes the port 4, and allows the exhaust by 3 to **K**. If the valve **G** does not move fully, the steam admitted by 1 will pass through 5, insuring the complete movement of **E**, and this takes place before the steam is admitted into 2 and 6 by the piston **B** moving in the opposite direction and uncovering the port 2. The pistons **E** and **E'** will remain quiescent in consequence of there being equal pressure upon both of the surfaces. The same operations take place as the piston **B** approaches the port 4, the exhaust-steam is confined after the piston passes the exhaust 3, and is compressed and eventually moves the piston **E'** and valve **G** in the other direction, admitting steam by 4 into the cylinder **A**, and also by 8 into the cylinder **D'**, to insure the full movement of the valve-moving piston and the valve back to the position shown in Fig. 1.

The length of the valve **G** is slightly less than the distance between the outer edges of the ports 1 and 4; hence both ports cannot be entirely covered at the same time, or else there is a small notch cut in each end of the valve, as seen at 12 in Figs. 1 and 2, or in the outer edges of the ports 1 and 4, for the same

purpose, so that steam can pass into both ports 1 and 4, and the piston B being at one end and covering the port 2, (or the port 3,) the steam will continue to act upon the piston E, (or E'), and will move the same and its connected valve G, the pressure on the other valve-moving piston being equalized, hence the full movement of the valve is insured. The same effect is produced if the piston B is covering either port 2 or 3, because the piston B, in covering the port 2 or 3, acts as a valve to exclude steam from the valve-moving piston at the side opposite to that upon which the live steam is acting.

In place of the notches 12, holes may be made through the valve at or near the ends, or through the valve-seat into the port; or there may be small grooves made in the face of the valve, or of the valve-seat, or both, to admit steam in the same manner as the said notches 12, and to effect the same object.

The parts shown in Fig. 3 operate with the B slide-valve to produce the same opening and closing of the ports and movements of the valve, as aforesaid; but in consequence of the ports 5 and 8 leading to the respective cylinders D and D', at the sides of the pistons E E' next to the valve, the valve will be pulled along, instead of being pushed, as in Fig. 11, and this is the proper motion to be given to the B slide-valve, for it will be seen that when the steam is passing by 4, (or by 3 and 4,) with the cylinder A, the pressure through 7 and 8 upon E' is equal at both sides, and the exhaust in D is open at both sides of the valve-moving piston until the steam-piston B covers the exhaust-port 2, and the confined steam is compressed until its force is sufficient to act through the ports 1 and 5 and draw the valve G toward the valve-moving cylinder E, reversing the position of the valve G and admitting steam by 1 and 5 to the cylinders A D and causing the piston B to move the other way.

If desired, there may be a third port, 14, at each end of the cylinder, as shown in Fig. 4, the same opening into the steam-cylinder at rather more than the thickness of the piston from the end, and such port leads at one end to the port 5 and at the other end to the port 8, and in such ports 14 there are valves 15, opening toward the valve-moving cylinders. The object of these ports 14 is to insure the movement of the valve-moving pistons and valve when the engine is moving slowly, for it will be apparent that the piston B not only compresses the confined steam, but it also uncovers the port 14, admitting live steam from the cylinder A to act directly on the valve-moving piston, so as to insure the proper

movement if the compressed exhaust is insufficient. The valve 15 in each port 14 prevents the steam exhausting through 14 when the valve has been moved.

I claim as my invention—

1. The combination, with the steam-cylinder and piston and the valve, of the valve-moving pistons, the cylinders for the same, and two ports near each end of the steam-cylinder, and branch ports to the respective valve-moving cylinders at each side of the pistons, substantially as set forth.

2. The combination, with the valve and its valve-moving pistons, of the steam-cylinder, and two ports at each end, with branch ports to the valve-moving cylinder and pistons, substantially as set forth, whereby the steam-piston, near each end of its stroke, closes one of the ports and compresses the exhaust-steam and causes the same to actuate the valve-moving piston, substantially as set forth.

3. In combination with the steam-piston, the valve-moving pistons and valve, a valve-seat with steam, the main ports slightly different in length from the valve, so that steam cannot be entirely excluded from the ports, and branch ports from the main ports to the valve-moving cylinders and pistons, substantially as set forth.

4. The branch ports 14 and valves 15 therein opening toward and in combination with the valve-moving cylinders and pistons and valve, and the ports 1 2 3 4 and branch ports 5 6 7 8, substantially as set forth.

5. In a steam-engine having valve-moving pistons and ports between the steam-cylinder and the cylinders of the valve-moving pistons, valves in two of such ports opening toward such valve-moving cylinders, substantially as set forth.

6. The combination, with a piston and steam-cylinder, of a valve, two steam-ports passing from the valve-seat to each end of the steam-cylinder and valve-moving pistons, cylinders for the same, and ports, substantially as specified.

7. The combination, with a piston and steam-cylinder, of a valve having the notches 12, two steam-ports passing from the valve-seat to each end of the steam-cylinder and valve-moving pistons, cylinders for the same, and ports, substantially as specified.

Signed by me this 10th day of January, A. D. 1884.

L. B. CARRICABURU.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.

Correction in Letters Patent No. 303,703.

It is hereby certified that in Letters Patent No. 303,703, granted August 19, 1884, upon the application of Leon B. Car^{re}caburu, of New York, New York, for an improvement in "Steam-Actuated Valves," errors appear in the printed specification requiring correction, as follows: In line 33, page 2, the word "with" should read *into*, and in line 83, same page, the word "steam" should be omitted after the word "with" and inserted after the word "main" in the same line; and that the Letters Patent should be read with these corrections therein to conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 23d day of September, A. D. 1884.

[SEAL.]

H. M. TELLER,

Secretary of the Interior.

Countersigned:

R. G. DYRENFORTH,

Acting Commissioner of Patents.