

(No Model.)

2 Sheets—Sheet 1.

S. M. VAUCLAIN.

COMBINED STARTING AND BLOW-OFF VALVE.

No. 471,836.

Patented Mar. 29, 1892.

FIG. 1

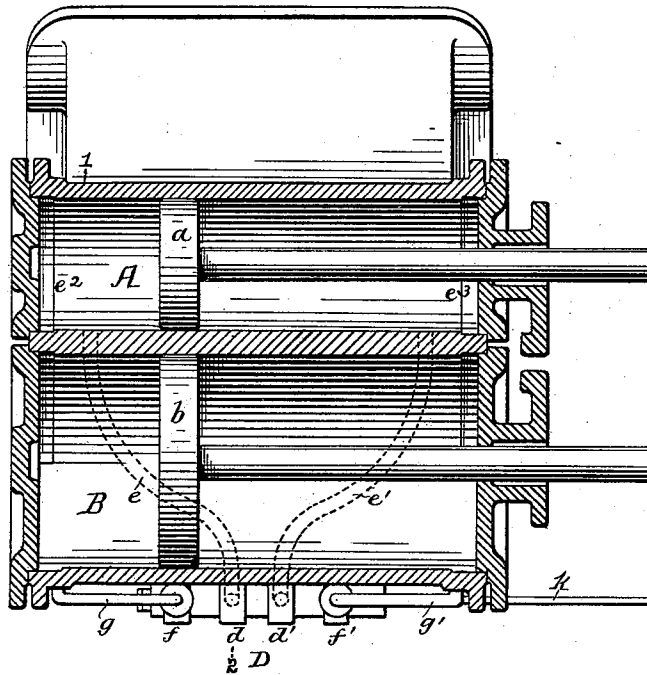
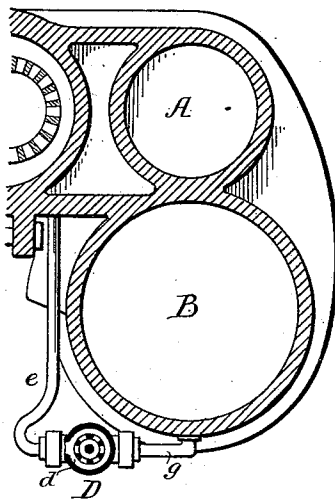


FIG. 2.



Witnesses:

A. V. Groupe
R. Schleicher.

Inventor:

Samuel M. Vauclain
by his Attorneys
Hudson & Lowry

2 Sheets—Sheet 2.

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The diagram illustrates the internal components of a differential gear. It shows a central shaft with several gears and components labeled with letters and numbers. The labels include f , f' , h , h' , h^2 , a , a' , d , d' , e , e^2 , i , i^2 , k , k^2 , k^3 , k^4 , k^5 , k^6 , k^7 , k^8 , k^9 , k^{10} , k^{11} , k^{12} , k^{13} , k^{14} , k^{15} , k^{16} , k^{17} , k^{18} , k^{19} , k^{20} , k^{21} , k^{22} , k^{23} , k^{24} , k^{25} , k^{26} , k^{27} , k^{28} , k^{29} , k^{30} , k^{31} , k^{32} , k^{33} , k^{34} , k^{35} , k^{36} , k^{37} , k^{38} , k^{39} , k^{40} , k^{41} , k^{42} , k^{43} , k^{44} , k^{45} , k^{46} , k^{47} , k^{48} , k^{49} , k^{50} , k^{51} , k^{52} , k^{53} , k^{54} , k^{55} , k^{56} , k^{57} , k^{58} , k^{59} , k^{60} , k^{61} , k^{62} , k^{63} , k^{64} , k^{65} , k^{66} , k^{67} , k^{68} , k^{69} , k^{70} , k^{71} , k^{72} , k^{73} , k^{74} , k^{75} , k^{76} , k^{77} , k^{78} , k^{79} , k^{80} , k^{81} , k^{82} , k^{83} , k^{84} , k^{85} , k^{86} , k^{87} , k^{88} , k^{89} , k^{90} , k^{91} , k^{92} , k^{93} , k^{94} , k^{95} , k^{96} , k^{97} , k^{98} , k^{99} , k^{100} . The diagram is a cross-sectional view showing the arrangement of these components within the housing.

Inventor:
Samuel M. Vauclair
by his Attorneys
Howan & Howan

UNITED STATES PATENT OFFICE.

SAMUEL M. VAUCLAIN, OF PHILADELPHIA, PENNSYLVANIA.

COMBINED STARTING AND BLOW-OFF VALVE.

SPECIFICATION forming part of Letters Patent No. 471,836, dated March 29, 1892.

Application filed December 7, 1891. Serial No. 414,279. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL M. VAUCLAIN, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improved Combined Starting and Cylinder Blow-Off Valves for Compound Engines, of which the following is a specification.

The object of my invention is to combine the cylinder-cocks with the starting-valves of a compound engine, so that one set of levers and connections are dispensed with and the mechanism in the cab simplified, as fully described hereinafter.

I have illustrated my invention as applied to a locomotive having the high and the low pressure cylinders on each side; but it will be understood that my invention can be applied to other types of compound locomotives and compound engines.

In the accompanying drawings, Figure 1 is a sectional view of the high and the low pressure cylinders of a compound engine. Fig. 2 is a transverse sectional view on the line 1-2, Fig. 1. Fig. 3 is a sectional view of a combined starting and cylinder valve casing, the valve being open. Fig. 4 is a view similar to Fig. 3 with the valve moved at one-half its stroke, and Fig. 5 is a view similar to Fig. 3 with the valve closed.

Referring to Figs. 1 and 2, A is the high-pressure cylinder, B is the low-pressure cylinder, *a* is the high-pressure piston, and *b* the low-pressure piston. The admission of steam to the cylinders is controlled by the main valve, (partially shown in Fig. 2,) the construction shown being that described and claimed by me in prior United States patents, and therefore need not be described in detail, as the arrangement of these parts is immaterial to the proper carrying out of my invention.

In all locomotives the cylinders are provided with cylinder or blow-off cocks to allow the steam to blow off the water of condensation that accumulates in the cylinders. These valves are usually connected to a lever in the cab of the locomotive. Before the locomotive is set in motion these cocks are opened and the first admission of steam to the cylinders will clear the cylinders of the water of condensation.

In the preferred form of compound locomotive-engine a starting-valve is provided, this

starting-valve in many instances being connected to a starting-lever in the cab, so that when steam is admitted to the high-pressure cylinder high-pressure steam may be admitted also to the low-pressure cylinder. In the locomotive described above this is done by communicating both ends of the high-pressure cylinder through the medium of a passage, the flow of steam through this passage being controlled by a valve, so that at the will of the engine-driver the locomotive can be run either as a compound or double-cylinder high-pressure engine. This arrangement of parts necessitated two independent levers in the cab to be operated by the engine-driver when starting the engine, together with the throttle-lever and other mechanism.

The object of my invention, as stated above, is to so combine the starting mechanism and cylinder-cock-controlling mechanism as to dispense with one set of levers and connections and have one set of valves for both purposes. In the present instance the valves are on a single rod and within one casing; but it will be understood that this special arrangement need not be adhered to.

The valve-casing D is preferably placed in the position shown in Figs. 1 and 2, and has passages *d d'*, communicating in the present instance through the medium of pipes *e e'* with the steam-inlet ports *e² e³* at each end of the high-pressure cylinder A. The casing is also provided with ports *f f'*, communicating through pipes *g g'* with both ends of the low-pressure cylinder B. The valve-casing D, as shown in Fig. 3, has a cylindrical passage D' common to the inlet-ports *d d' f f'* and also common to the blow-off passages *i i' i²*, which are arranged as shown in Fig. 3, and communicate with the atmosphere, and it is through these passages that the water of condensation is blown off from the cylinders. In the cylindrical passage D' is the valve E, having three pistons *h h' h²*, arranged on the valve-stem *k*, as shown clearly in the drawings. The valve-stem is connected to a suitable operating-lever in the cab of the locomotive. This lever travels against a suitably-notched segment, so that the engine-driver by moving the lever full over to the first notch will know that the valve is in the position shown in Fig. 3, and if he moves

the lever full over to the reversed position he will know that the valve is in the position shown in Fig. 5; but if he only moves it midway of the two extremes he will know that the valve is in the position shown in Fig. 4.

When the several pistons of the valve E are in the position shown in Fig. 3, then both ends of both cylinders are open to the atmosphere, the two ports d d' communicating with the blow-off passage i , the port f communicating with the blow-off passage i' , and the port f' communicating with the blow-off passage i'' , as shown by the arrows. It will be noticed that the area of each port d d' is much greater than the blow-off passage i . Consequently live steam will pass from one end of the high-pressure cylinder to the other, and, owing to the position of the main valve of the engine, this live steam will pass to the opposite side of the low-pressure cylinder.

After the water of condensation has been blown off, if the engine-driver wishes to work the engine with both cylinders acting as high-pressure cylinders he moves the lever to the mid-position, throwing the valve E to the position shown in Fig. 4. The piston h of the valve will close the port f and the piston h' will close the port f' , cutting off the exhaust to the atmosphere through the blow-off passages i i' . At the same time the piston h' will cover the blow-off passage i , so that while high-pressure steam can pass from one end of the high-pressure cylinder to the other, as indicated by arrows in Fig. 4, and thence to one side of the low-pressure cylinder described above, the steam in its passage will not blow off the atmosphere. Thus high-pressure steam is introduced into both cylinders when the valve E is in the position shown in Fig. 4.

When the engine-driver wishes to run the engine compounding—that is, after he has started the train or is on a level or down grade—the lever connected to the valve E is thrown full over, and the valve assumes the position shown in Fig. 5. The valve in this position still closes the ports f f' from the low-pressure cylinder, and the piston h' closes the port d' , cutting off the communication between the ports d and d' of the high-pressure cylinder. The engine will then run compounding and the blow-off passages will be closed until the valve is moved to the position shown in Fig. 3. It will thus be seen that by this simple arrangement of parts one set of connecting-rods and lever mechanism is entirely dispensed with, thus reducing the parts to be manipulated by the engine-driver of a compound locomotive.

I claim as my invention—

1. The combination, in a compound locomotive-engine, of the high and low pressure cylinders, a valve-casing having ports communicating with each end of the high-pressure cylinder and ports communicating with each end of the low-pressure cylinder, blow-off passages in said casing communicating with the atmosphere, with a valve controlling the exhaust from the several ports through the blow-off passages and controlling the passage of steam from one end of the cylinder to the other, substantially as described.

2. The combination of the high and low pressure cylinders, a valve-casing having ports communicating with each end of each cylinder, blow-off passages in said casing, a valve, mechanism for operating said valve, the pistons on said valve being so arranged that on one movement the ports will be cut off from the blow-off passages while the two ends of the high-pressure cylinder are still in communication, and on a further movement of the valve the communication between the two ends of the high-pressure cylinder will be cut off and the blow-off passages remain closed, substantially as described.

3. The combination of the high and low pressure cylinders, a valve-casing D, having at each end ports f f' , one port communicating with one end of the low-pressure cylinder and the other port communicating with the other end of the low-pressure cylinder, ports d d' , centrally situated in the valve-casing, the port d communicating with one end of the high-pressure cylinder and the port d' communicating with the opposite end of the high-pressure cylinder, a blow-off passage i in the casing for both ends of the high-pressure cylinder, a blow-off passage i' for one end of the low-pressure cylinder, a blow-off passage i'' for the opposite end of the low-pressure cylinder, and a valve adapted to said casing, having pistons h h' h'' , the piston h controlling the exhaust from the port f , the piston h' controlling the exhaust to the atmosphere from the two ports d d' , and also controlling the passage of steam from one of said ports to the other, with mechanism for operating the valve, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL M. VAUCLAIN.

Witnesses:

FRANK H. MASSEY,
KENNETH RUSHTON.