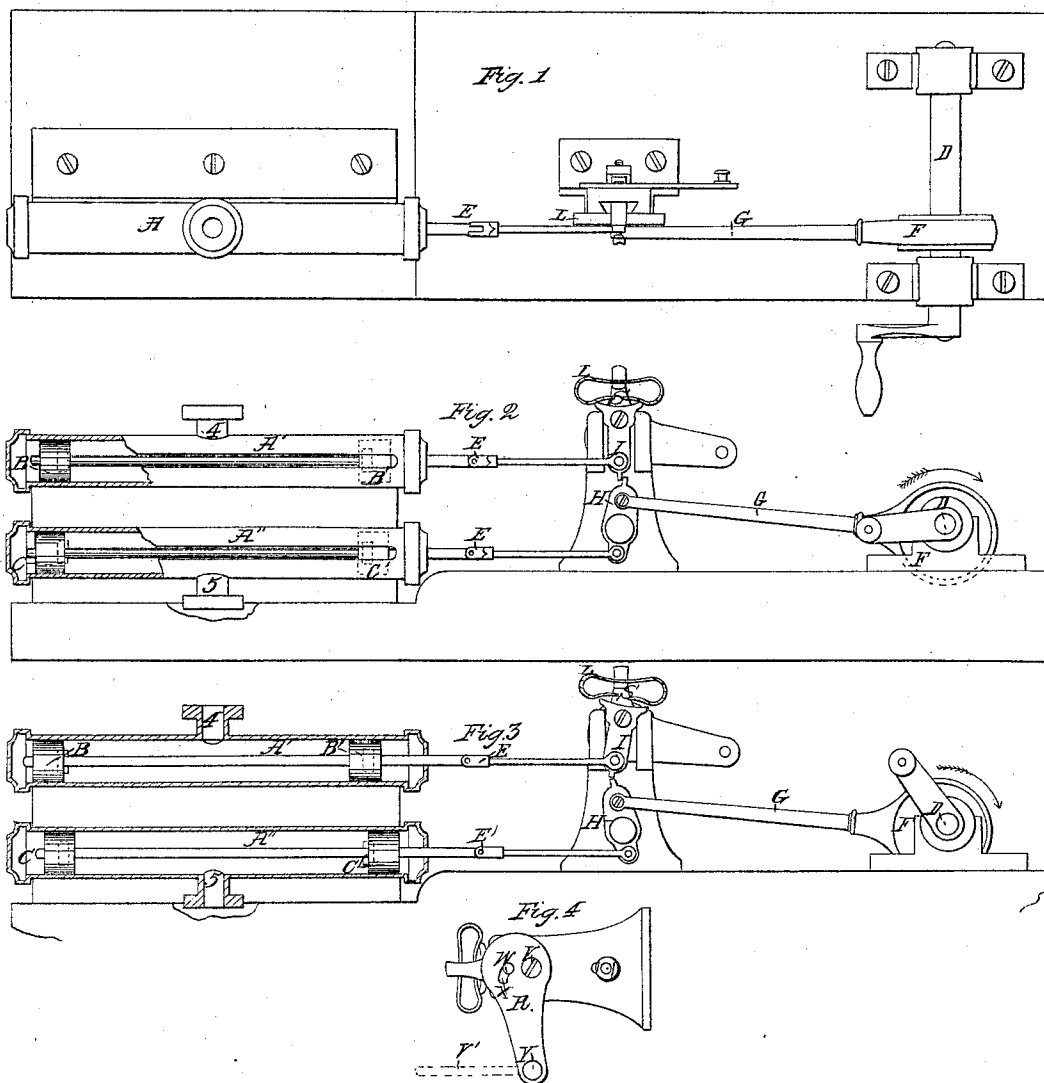


W. Smith,
Steam-Engine Valve-Gear.
N^o 31,335. Patented Feb. 5, 1861.



Witnesses:

J. H. Child
Baquet

Inventor:

W. Smith

UNITED STATES PATENT OFFICE.

WILLIAM SMITH, OF PHILADELPHIA, PENNSYLVANIA.

VALVE OF STEAM-ENGINES.

Specification of Letters Patent No. 31,335, dated February 5, 1861.

To all whom it may concern:

Be it known that I, WILLIAM SMITH, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in the Valve-Motion of Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1, is a plan of the valve-arrangement. Fig. 2, is an elevation of parts with the toes touching each other. Fig. 3, is an elevation of parts at points of cut-off. Fig. 4, is the back of the lever for raising and lowering the toe which is tripped.

The nature of my invention consists in so arranging the strong steam valve that the steam may be cut off at any point of the stroke. To accomplish this object, I give the strong steam valve a variable intermittent motion by means of the devices hereafter described.

In the drawing, A, represents the steam-chest. A' is the main steam chest and A'' is the exhaust steam-chest.

B, B', represent the valves by means of which the steam is let into the cylinder.

C, C', represent the valves by means of which the steam is let out of the cylinder.

E, E' are the valve rods.

D, is the fly wheel shaft.

F, is the eccentric.

G, is the eccentric rod.

H, is the rock-arm.

I, is a lever.

L is a spring.

The exhaust-valves C, and C', are constructed and operated in any manner in which exhaust valves are now constructed and operated.

The valve rod E, (which is connected with the main steam valves B, and B',) is connected permanently with the lever I. This lever I, has its fulcrum upon a plate S, which slides up and down in a groove. The lower end of this lever I, has a toe projecting downward toward a corresponding toe upon the rock-arm H. A spring L, is so arranged as to bear upon the lever I, and thereby retain it always in a perpendicular position.

Upon the back of the upright, in which the plate S, moves perpendicularly, is a lever R, moving upon a fulcrum V, and in which

is an eccentric slot X, in which a pin, attached to the plate S, moves. This slot and pin are so arranged that a slight motion of the lever upon its fulcrum will cause the plate S, to be moved up and down and thus cause the two toes to approach, or recede from, each other. The governor may be connected with this lever R, by a rod V', or in any other convenient manner.

The valves used in this device are the kind known as piston valves. Cutting off the steam by means of auxiliary arrangements is far inferior to cutting off the steam by means of the main valves themselves. The advantage of the latter method is in the great saving of steam effected by it, and the increase of power. In other methods of cutting off steam by the valves themselves, the machinery employed is generally complicated and expensive.

The toe upon the lever I, may be made to slide horizontally. In such case, the lever I, is replaced by perpendicular rods which by means of the spring L, are pressed upon the toe and keep it in its position.

The mode of operation of my cut-off is as follows:—The steam is admitted through the pipe into the steam chest. By means of the toe on the rock-arm H, striking against the toe on the lever I, one of the valves is opened from the steam chest A' into the cylinder. As soon as the toe on the rock-arm H, has passed by the toe on the lever I, the spring L, forces the lever I, to its perpendicular position again, and of course by means of the rod E, closes the valve. The motion of the valves to the steam chest A', it will thus be seen, have an intermittent motion, being kept open during the time the two toes are passing each other and closing the moment they have passed. The steam is permitted to pass from the cylinder by means of the valves C, C', in the exhaust steam chest A'', which are worked by means of the rod E' which is connected indirectly with the eccentric. It will be seen that the motion of these valves is continuous. In order to cut off the steam at any point of the stroke, the toes, by means of the device hereinbefore described, are approached together or are drawn apart. By approaching them, the toes will of course remain in contact longer, and thus keep the valve open longer; the reverse taking place when they are drawn apart. By connecting

the lever R, with the governor, the toes are caused to approach or are drawn apart as the working of the engine may demand.

Having thus described my improvement, what I claim as my invention, and desire to secure by Letters Patent is,

The arrangement and combination of the

rock arm H, lever I, sliding plate S, spring L lever R and piston valves B B' substantially as described.

WM. SMITH.

Witnesses:

J. BAQUET,

J. G. MINER CHILD.