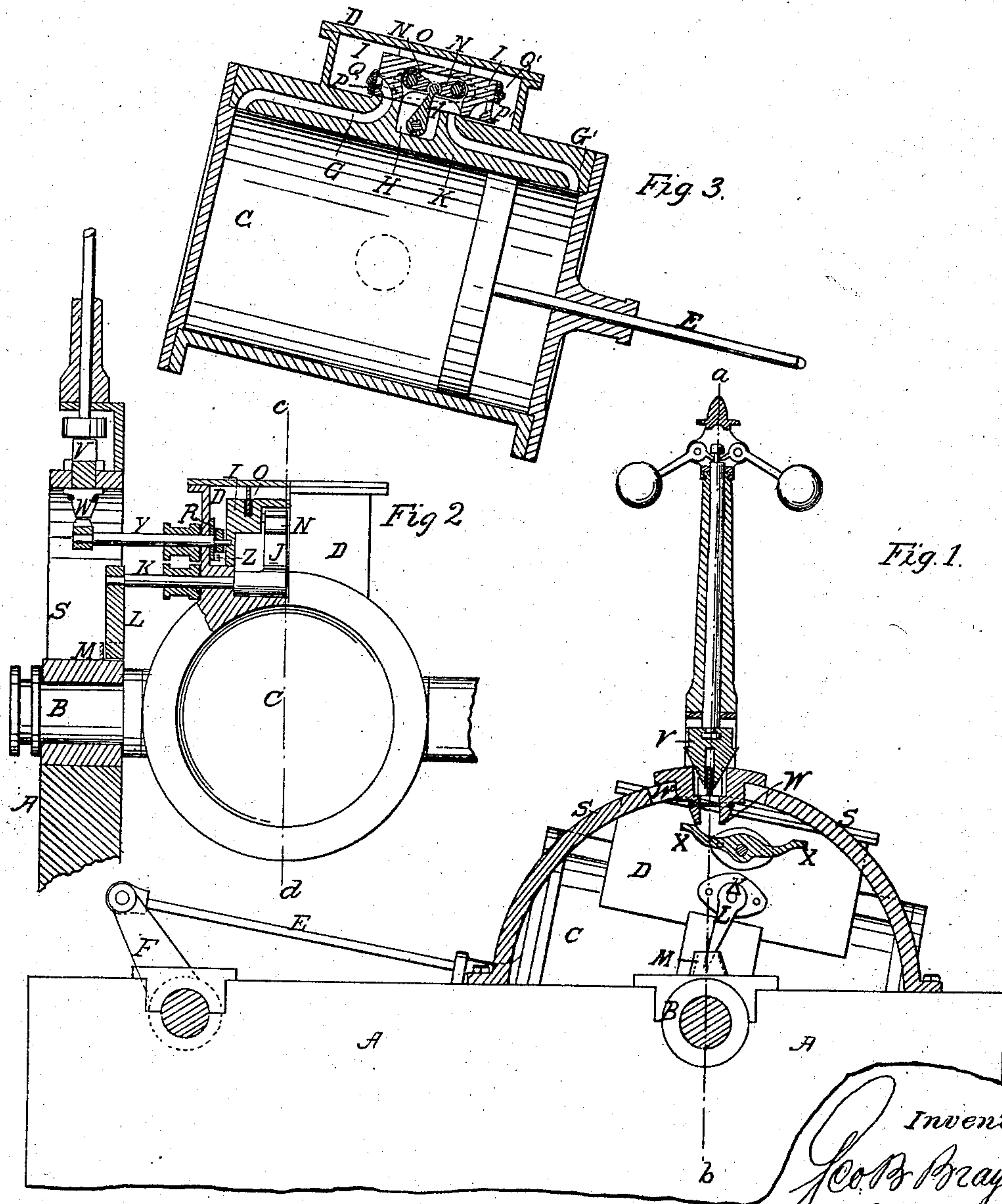


G. B. BRAYTON
STEAM ENGINE.

No. 47,792.

Patented May 23, 1865.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE B. BRAYTON, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 47,792, dated May 23, 1865.

To all whom it may concern:

Be it known that I, GEORGE B. BRAYTON, formerly of Providence, Rhode Island, but now of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam Machinery; and I hereby declare that the following, taken in connection with the accompanying drawings, is such a full, clear, and exact description of the same as will enable others to make and use the same.

This invention relates to the valvular arrangement of all kinds of reciprocating steam-engines, and is designed to secure a simple and easy mode of adjusting the cut-off of the steam without its being necessary to interfere with or adjust any of the actual moving parts. Provision is at the same time made for the perfect balancing and rendering uniform the action of reciprocating steam-engines.

The main features of my improved steam-engine consist in the combination, with an ordinary slide or D valve, of a variable and self-adjusting cut-off arrangement operated within the steam-chest through the agency of cams and levers, or their mechanical equivalents, by the action of the governor. The manner in which the same is or may be carried into effect I have illustrated by the application of my invention to an oscillating steam-engine, although it may with but slight and obvious modifications be applied to a stationary engine. In this instance the steam-cylinder, which is hung by means of hollow trunnions, through which the live and exhaust steam are entered and exhausted, is provided with a steam-chest and the usual ports—i. e., the induction and eduction steam-ports and the middle exhaust or condenser-port. A D or slide valve, playing on the valve face or seat, is actuated, in the manner hereinafter described, by means of a toe located within the exhaust-port. Steam from the chest is admitted into the ports, not as usual, by the slide-valve clearing the port—i. e., at the sides of the said valve—but by means of channels cut through the slide-valve—i. e., through auxiliary ports in the slide-valve, which auxiliary ports terminate on the face and at each end, respectively, of the D-valve. Against the ends of the D-valve play reciprocating valves, whose function it is to admit and cut off steam automatically at the proper times to insure equable and

uniform action of the engine. This is effected in the manner as follows: A governor of centrifugal action, of otherwise ordinary or suitable construction, revolved by means of gear or band from some principal moving part of the engine whose operation it is intended to equalize and render uniform, actuates a spindle to play up and down according to the velocity of revolution imparted to the balls of the governor. This spindle carries at its lower extremity a double wedge, which in its up-and-down motion is caused to expand or contract inclines or cams. Against these cams or inclines are moved, by the action of the oscillating engine, a double cam-lever mounted on the end of a shaft which traverses the rear of the steam-chest through a suitable stuffing-box. To the other end of this shaft, within the steam-chest, is secured a lever, from the face of which project studs whereby the bar centrally pivoted to the slide or D valve is tilted or oscillated. By this tilting bar are carried and worked the auxiliary valves on the side faces of the main slide or D valve.

In the accompanying drawings I have shown an oscillating steam-engine constructed, arranged, and operating in accordance with this my invention.

In the said drawings, Figure 1 is an elevation, partly in section, of my improved steam-engine complete, the plane of section passing through the axis of the governor. Fig. 2 is an end view, partly in section, of the same, the plane of section passing through line *a b* in Fig. 1; and Fig. 3 is a vertical section, on line *c d* in Fig. 2, through the cylinder and steam-chest, exhibiting the method of working the main and auxiliary valves.

Upon a frame, A, in suitable bearings, B, is hung the steam-cylinder C, to which an oscillating motion is imparted by the piston-rod E, working directly on a crank, F. The cylinder is provided with steam-ports G and G' and a central exhaust-port, H, and is surrounded by a steam-chest, D, containing the slide or D valve I, to which the slide movement on the valve-face is given by means of a crank, J, mounted upon a rockshaft, K, which traverses a stuffing-box in the back of the steam-chest. On the outer end of the rock-shaft K is keyed or otherwise secured, at its upper end, a lever, L, while its lower end is engaged in a socket, M, fast to the frame, so as to be stationary. The cylin-

der in its oscillation carrying with it the shaft K, whose outside lever is engaged in the stationary socket M, it will be understood that it will impart a rocking motion to the said shaft, which is transmitted to the toe J. With this toe are combined two short toggle-levers, N, which are pivoted in the recess of the main slide-valve, affording a yielding connection, so that while the toe describes an arc of a circle the valves will be moved along the plane surface of and in contact with the valve-seat. The slide-valve is kept in place and truly guided in its course by means of a guide-bar, O, projecting from the chest-cover fitting a groove in the top of the main valve. The main slide-valve is provided with auxiliary ports P P', through which steam from the chest is admitted into the cylinder. These auxiliary steam-ports in the main slide-valve are curved so as to terminate, respectively, in the ends and under side of the slide-valve. Against the ends of the main slide-valve play the auxiliary slide-valves Q and Q', which are mounted on a balance-beam, R, pivoted to or hung in the rear of the main or D valve. This balance-beam receives its oscillating movement in the manner as follows: Upon a suitable bracket or standard, S, is mounted a governor, T, of centrifugal action—i. e., a governor consisting of two or more balls which are jointed to a revolving shaft driven directly by the engine, so that, according to the speed of revolution imparted to the shaft, the balls diverge from or converge toward the axis of revolution. The balls are also connected with a central rod, which is raised or lowered in its sleeve according to the position of the balls, and consequently according to the speed of the engine, which is dependent upon the supply of steam. If the speed of rotation exceed that calculated for safety, the supply of steam is to be diminished. This is effected in ordinary steam-engines by combining the governor with a throttle-valve in the main steam supply pipe. In this case, however, the steam is cut off at each stroke of the piston, so that the quantity of steam admitted will be such as to insure uniform action of the engine. This cutting off is effected by the auxiliary slide-valves Q and Q'. To this effect the central rod or spindle is provided at its lower end with a double wedge, U, which, as it moves up and down with the said central rod, causes a double or divided cam, W, held together by a spring, to diverge or converge, according to the position of the wedge. This cam is located centrally in relation to the cylinder—i. e., in line with the axis of the governor which passes through the center of the runnion. Through the steam-chest on the side of the governor passes another shaft, Y,

having on the end outside the chest a cam-lever, X, which is tilted by coming in contact with the cam W, placed in its path, when the engine is oscillated. This movement is participated in by a lever, Z, on the other end of the shaft Y, in the interior of the chest, which lever is provided with lugs which are arranged immediately underneath the balance-beam R, whereby the movement the cam-lever receives in its double oscillation—i. e., the oscillation of the cylinder and the oscillation on its own point of suspension—is directly transmitted to the balance-beam, which operates the variable cut-off or auxiliary slide-valves.

By this arrangement or mode of connecting the rocking cam lever with the balance-beam the main slide-valve is permitted to reciprocate without interfering with the operation of the auxiliary slide-valves.

Having thus described my said invention and the manner in which the same is or may be carried into effect, I would observe that I do not wish to be understood as limiting myself to the precise arrangement herein shown and described, nor as confining myself to the application of this invention to oscillating engines, it being obvious that this invention is susceptible of numerous modifications without departure from the principle thereof; but

What I claim is—

1. The variable and self-adjusting cut-off, arranged and operated by the governor as described, for equalizing and rendering uniform the action of steam-engines.

2. The combination, with the ordinary slide or D valve of auxiliary steam-ports and slide-valves, under the arrangement and for operation in the manner substantially as set forth.

3. The method herein described of connecting the oscillating arm with the slide or D valve, affording yielding connection, so as to admit of the valve reciprocating along the plane surface of and in contact with the valve-face.

4. The method herein described of operating the auxiliary valves, hung upon the end of an inert balance-beam by means of a rocking lever, yet so as to admit of traverse motion of the balance-beam, together with the main valve, substantially as shown and described.

5. Regulating the action of the auxiliary or cut-off valves by means of the cam expandible by the action of the governor, substantially as set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

GEO. B. BRAYTON.

Witnesses:

A. POLLAK,
C. PARTON.