

(Model.)

W. JOHNSON.
Valve Gear for Steam Engines.

No. 231,229.

Patented Aug. 17, 1880.

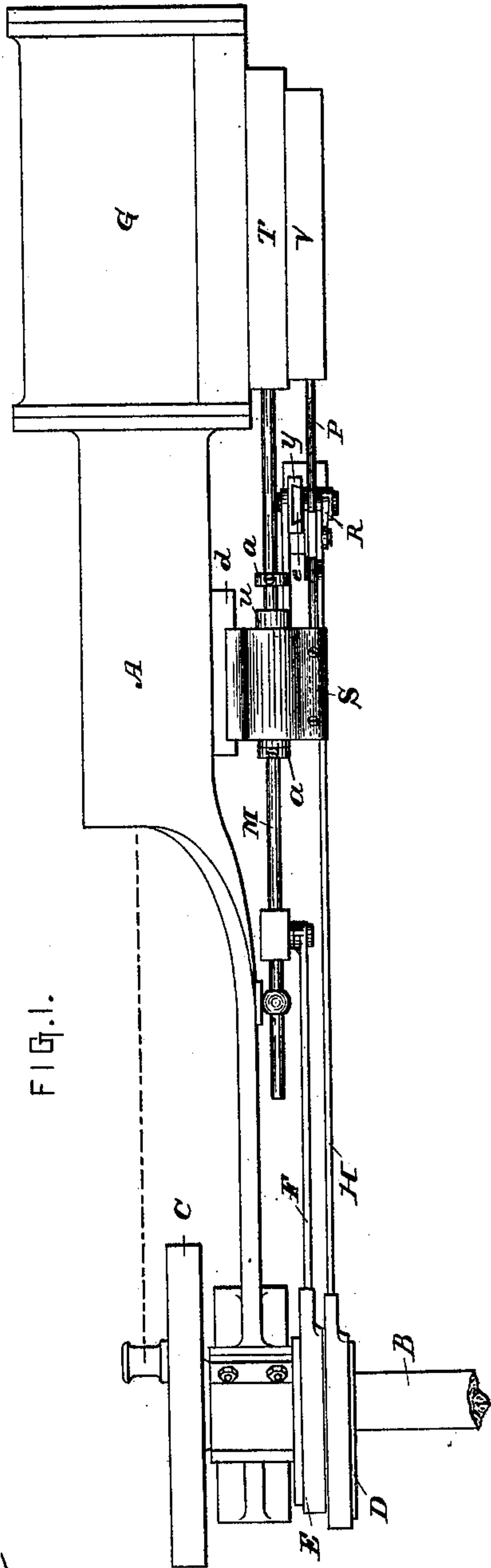


FIG. 1.

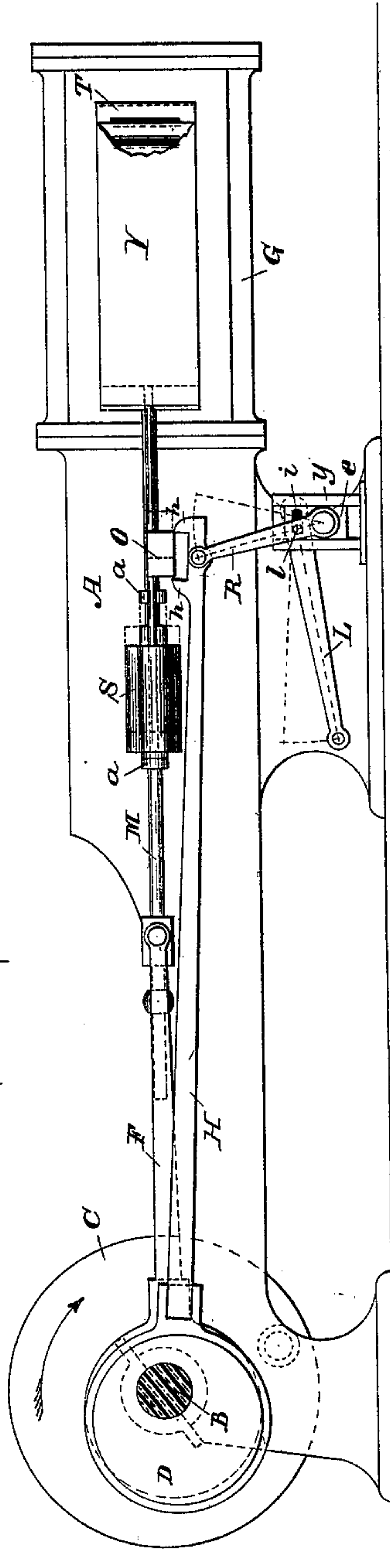


FIG. 2.

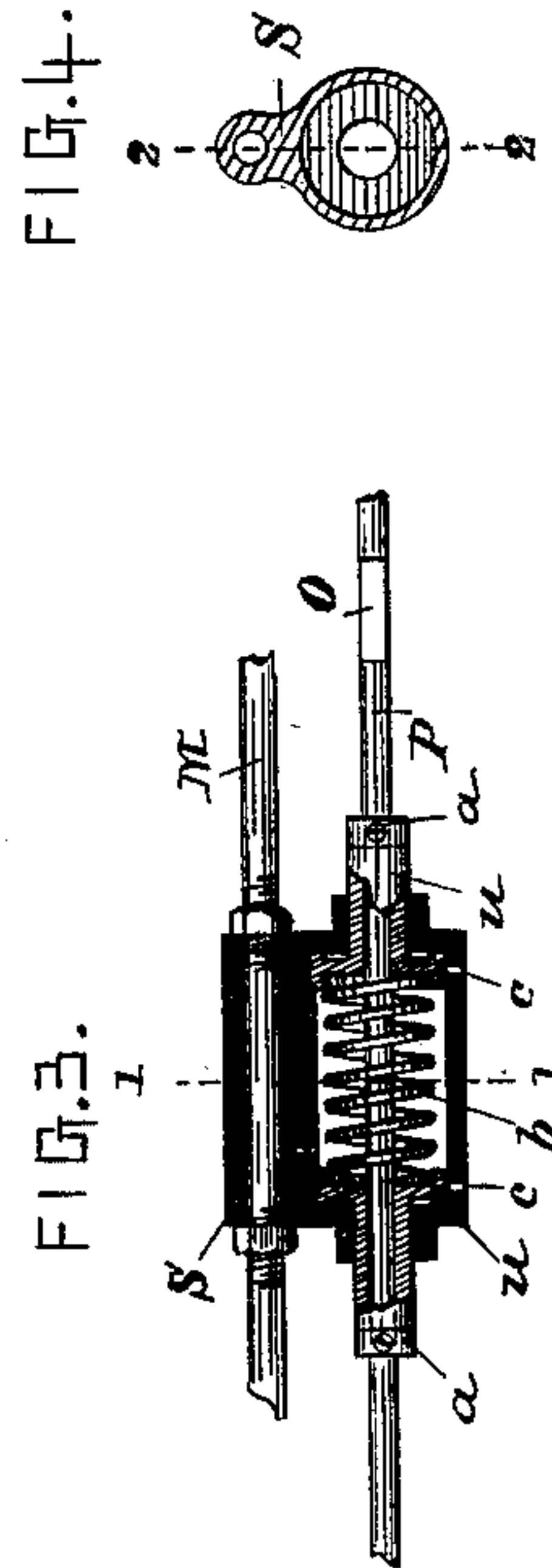


FIG. 3.

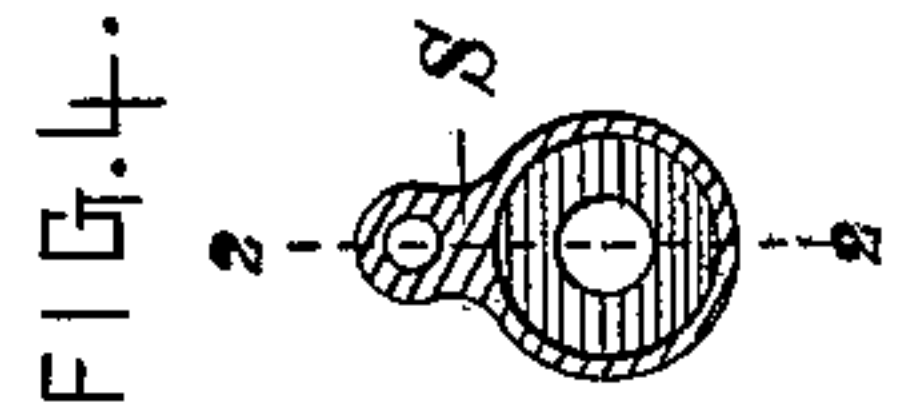


FIG. 4.

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VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 231,229, dated August 17, 1880.

Application filed June 24, 1880. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM JOHNSON, a citizen of the United States, residing at Lambertville, in the county of Hunterdon and State of New Jersey, have invented certain new and useful Improvements in Valve-Gears for 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention has reference to that class of steam-engines in which a high grade of expansion is obtained by cutting off the steam instantly and at a point in the stroke for the desired speed, said point being regulated automatically by the governor; and it consists, substantially, in causing the cut-off valve to open by means of tappets which have a peculiar rocking and reciprocating motion, and which are adjusted automatically by the governor, combined with an arrangement or device for closing the cut-off valve, said arrangement or device having a reciprocating motion approximating to that of the tappets which open the cut-off valve, whereby the operation is performed noiselessly and without jar.

In the accompanying drawings, Figure 1 is plan view. Fig. 2 is a side view. Fig. 3 is a sectional view of the valve-closing device on line 2 2 through Fig. 4; and Fig. 4 is a sectional view of the outside casing or spring-box for the same on line 1 1 of Fig. 3.

Similar letters refer to similar parts throughout the several views.

A is the engine bed or frame; G, the crank-wheel; B, the driving-shaft. E is the eccentric communicating motion to the main valve T, by means of straps, eccentric-rod F, and valve-rod M, in the usual manner.

D is the eccentric for operating the cut-off valve, having a throw exceeding in amount and so much greater than that of the eccentric E as will be sufficient to open the cut-off valve V.

H is the eccentric-rod for the cut-off valve, to which the tappets *h h* are firmly attached, said rod being pivoted to and supported by a rocker-arm, R, at a point equidistant from the said tappets, one of which is upon either side of said pivot-point, and by reason of which the said tappets have an up-and-down vibrating movement in connection with the reciprocating motion imparted by the eccentric, the up-and-down movement of the tappets being augmented by the action of the rocker-arm in swinging upon its center of motion, said center of motion being from a fixed stud or pin in a movable slide, *e*, in frame *y*. The said slide has a vertical adjustment by means of the arm L and pin *l*, working in a slot, *i*, in slide *e*, and which is operated automatically by the governor.

P is the cut-off-valve rod, upon which is a fixed tappet or block, O, and which is moved by contact with tappets *h h*.

S is the outside case or box containing the spring *b* and pistons *u u* for cushioning the force of spring *b* and closing the cut-off valves. *c c* are openings for the admission of air. Said outside case or spring-box is firmly attached to the cut-off-valve rod, as shown in Figs. 1 and 2, (or it may be attached to the main-valve rod M, as shown in Fig. 3,) and is movable therewith.

The outside case or spring-box, S, through which the main-valve rod M passes, is operated by means of collars *a a*, firmly attached to said rod, and which serve as abutments against which the hubs or projections of pistons *u u* alternately act when the spring *b* is compressed in opening the cut-off valve. The tappets, which in the drawings are shown as solid parts of the eccentric-rod and valve-rod, would in practice be made adjustable for the purpose of setting the valve and for taking up the wear of the parts. The eccentric-rod also, instead of being attached directly to the tappets, may give motion to a casting or other part upon which the tappets may be fastened. It will also be seen that the valve-closing arrangement or device may be greatly modified by changing the number and position of the

springs, combining levers therewith, or by substituting weights and levers therefor, without altering the real invention, as set forth.

The operation is as follows: Motion is communicated to the engine-shaft by the pressure of steam acting against the piston of the engine in the usual manner. Attached thereto is a governor of the ordinary type or kind, the balls of which, acting by centrifugal force, and being connected by suitable mechanism to the rocker-arm upon which the vibrating tappets are supported, cause the said rocker-arm to have an automatic vertical movement by which the said tappets are brought into a greater or less contact with the faces of the tappet or block upon the cut-off-valve rod, causing the cut-off valve to open more or less, and to remain open for a greater or less length of time, whereby the point of cut-off is varied for the desired speed of the engine. When the governor-balls drop or close to their normal position the faces of the tappets are in constant contact and give a positive full-stroke motion to the cut-off valve, which motion is in the same direction with the main valve, but of greater extent, by means of which the cut-off valve is both opened and closed by the action of the eccentric, and the steam is carried "full stroke," as it is termed, and does not act expansively, and when the governor-balls move outward from their normal position a tripping or release of the tappets take place and at a point automatically determined by the governor to maintain the desired speed. When the said tripping or release occurs the cut-off valve is instantly closed and the steam shut off from the cylinder by the action of the spring; and as the box or case by which the spring is held moves with the main valve and controls the position of the cut-off valve when the tappets are disengaged, both valves will thus move together and the steam remain shut off until the tappets are again brought in contact by reason of the greater throw of the cut-off-valve eccentric, as before described, when the spring is again compressed and the operation repeated for each stroke of the engine.

My invention does not consist in the exact form or construction or proportion of the parts or mechanism described; but

What I claim as my invention, and wish to secure by Letters Patent, is—

1. In valve-gear for engines, a main valve operated by an eccentric and a cut-off valve operated through the means of an eccentric, the latter valve, when not acting as a cut-off valve, acting with the main valve in performing the functions of a single valve.

2. In valve-gear for engines, the main valve, operated through the means of an eccentric, the said main-valve rod adapted to convey, through suitable mechanism, a reciprocating movement to the cut-off-valve rod when said valve-rod is not under control of the tripping

mechanism, whereby steam is withheld from acting upon the piston until the increased speed of the engine is reduced and the cut-off-valve rod again brought under control of the tripping mechanism.

3. In valve-gear for engines, the main valve, operated by an eccentric, and a cut-off valve, the cut-off valve moved in the same direction as the main valve through suitable means, but at a greater speed, as and for the purpose set forth.

4. In valve-gear for engines, two eccentrics, each of different throws, the eccentric having the least throw being adapted to control the main valve and the eccentric having the greatest throw adapted, through an automatic locking mechanism, to control the movements of the cut-off valve through the whole stroke of the engine or release the same at any desired point in said stroke, as and for the purpose set forth.

5. In valve-gear for engines, two eccentrics of different throws, and both set relatively in the same relation with the position of the crank, whereby the valves travel in the same direction, but at different speeds.

6. In valve-gear for engines, the cut-off-valve rod, supported by the main-valve rod and operated upon by an eccentric, the said eccentric being connected to a rocking arm, which governs the cutting off at each stroke of the engine in accordance with the required expansion.

7. In valve-gear for engines, the cut-off-valve rod, combined with the main-valve rod, and operated upon by suitable connections from an eccentric, which connections have a greater movement than the connections which move the main valve, the said connections which control the cut-off valve being governed automatically for varying the point of releasing the cut-off-valve rod, as and for the purpose set forth.

8. In valve-gear for engines, a cut-off-valve rod provided with projecting faces, the said faces being acted upon by tappets upon an eccentric-rod, which is supported upon a rocking arm adjusted through automatic means, according as the speed of the engine varies.

9. In valve-gear for engines, the main-valve rod, actuated by an eccentric and supporting a case containing means for moving the cut-off rod when the latter rod is released from tappets actuated by suitable means from an eccentric, as and for the purpose set forth.

10. In valve-gear for engines, the main-valve rod and cut-off rod, combined with a casing provided with a spring for moving the cut-off rod when the said rod is released by suitable tripping mechanism, as and for the purpose set forth.

11. In valve-gear for engines, the main-valve rod, provided with collars and supporting a casing, to which the cut-off rod is at-

tached, the said casing containing a spring and pistons, whereby movement is given to the cut-off rod when released and the said movement cushioned when near the end of its stroke, as and for the purpose set forth.

12. In valve-gear for engines, the main and cut-off valves, combined with the two eccentrics E and D, the latter having a greater throw than the former, the eccentric-rods F and H, the latter provided with tappets *h h*, the casing S, spring *b*, pistons *u u*, collars *a a*, and tappet

or block O, rocking arm R, the slotted sliding block *e*, frame *y*, and governor-connecting arm L, provided with pin *i*, substantially as shown and described.

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

WM. JOHNSON.

Witnesses:

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GEO. W. WARD.