F. OGDEN.

2 Sheets—Sheet 1.

Valve-Gear for Engines.

No. 205,759. Patented July 9, 1878.

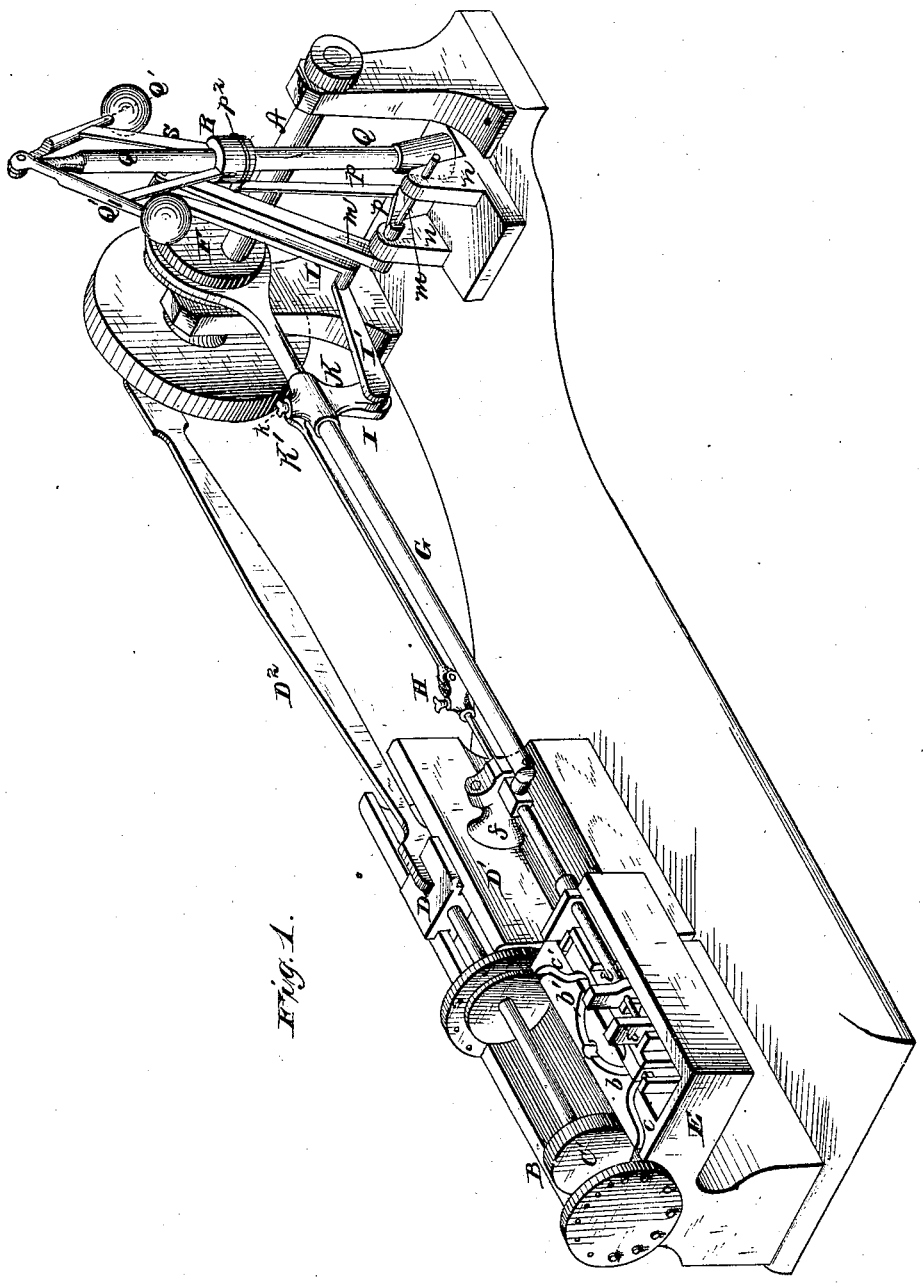

Fig. 1.

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2 Sheets—Sheet 2.

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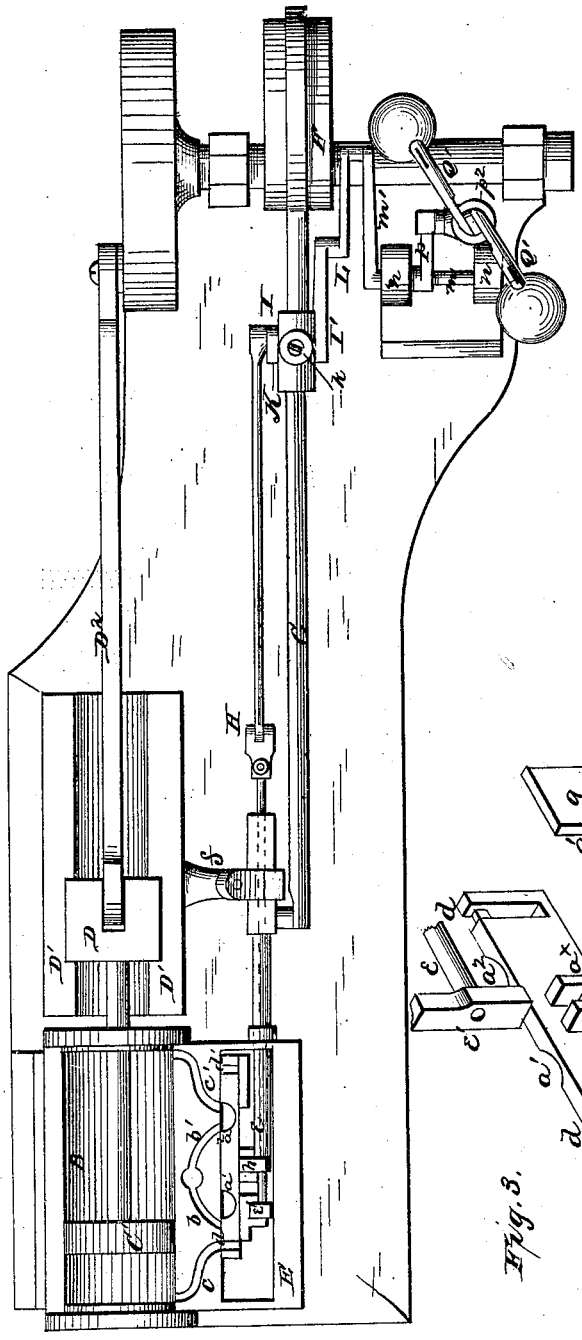

Fig. 2.

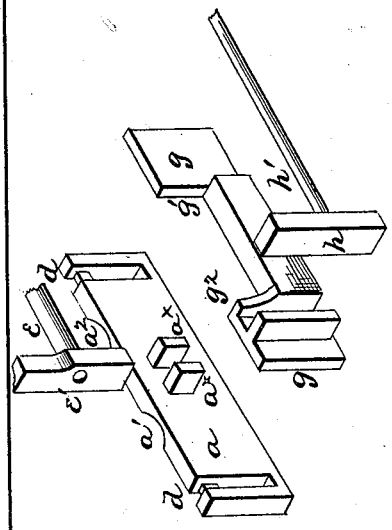

Fig. 3.

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UNITED STATES PATENT OFFICE.

FERRIS OGDEN, OF MANSFIELD, OHIO, ASSIGNOR TO THE AULTMAN & TAYLOR COMPANY, OF SAME PLACE.

IMPROVEMENT IN VALVE-GEARS FOR ENGINES.

Specification forming part of Letters Patent No. **205,759**, dated July 9, 1878; application filed May 28, 1878.

To all whom it may concern:

Be it known that I, FERRIS OGDEN, of Mansfield, county of Richland, State of Ohio, have invented certain new and useful Improvements in Valve-Gears for Steam-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of a steam-engine, with the upper portions of the cylinder and steam-chest removed to show the arrangement of the working parts. Fig. 2 is a plan view of the same; and Fig. 3 shows, in perspective, the parts of the valve and cut-off in detail.

Similar letters of reference denote corresponding parts wherever used.

My invention relates to a novel arrangement of cut-off gear in connection with the governor and valve eccentric-rod, whereby the cut-off, operated from the eccentric, is automatically adjusted or regulated by the action of the governor.

It further relates to a novel construction and arrangement of the slide-valve and cut-off and their actuating devices, as hereinafter explained.

In the accompanying drawings, A represents the main driving or crank shaft; B, the steam-cylinder; C C′, the piston and its stem; D D^1, the cross-head and ways, and D^2 the connecting-rod; E, the steam-chest; F, the eccentric; G, the eccentric-rod, and Q the steam-governor, said parts being constructed and arranged, except in particulars hereinafter specified, in any usual or preferred way.

The valve is of that class known as a "slide-valve," and consists of a plate, *a*, (see Fig. 3,) recessed on its face adjacent to the seat to form passages a^1 a^2, opening alternately, as the plate is reciprocated, into the exhaust-passages *b b′* from the passages *c c′*.

The slide *a* is further provided, near its ends, with steam ports or passages, in the form of slots or perforations *d d′*, opening also alternately into the ports or passages *c c′* as the plate is reciprocated. The outer face of this plate *a* has lugs or ears $a^\times$ $a^\times$ formed upon it, near midway of its length, between which a block, *e′*, on the valve-stem *e* is placed, said block engaging with the valve through said lugs or ears for imparting the reciprocating motion.

The valve-stem is made tubular, and reciprocates in ways or guides formed one in the end of the steam-chest, and another in a bracket or lug, *f*, attached to the cross-head frame or other suitable point of support.

Upon the outer face of the valve-plate *a* is a second plate, *g*, cut away centrally on its upper face at g^1 to accommodate the lugs $a^\times$ and the block *e′*, engaging therewith, as shown, for permitting the plate *g* to rest snugly against and to move in contact with the outer or rear face of valve *a*. This second slide, forming the cut-off, is recessed on its outer face g^2 to receive a block, *h*, said block being attached to a stem, *h′*, having its bearings in and reciprocating through the tubular valve-stem *e*, the relation of the parts when in working position being shown in Figs. 1 and 2.

The tubular valve-stem has the eccentric-rod G pivoted to it upon one side at a point between its bearings, thus throwing it out of line with said rod, as shown, and the cut-off rod, extending through the tubular valve-stem, has a connecting-rod, H, pivoted to it, said rod, at its opposite end, being connected with an upright crank-arm, I, attached to a rock-shaft mounted in the lower end of a pendent bracket, K, on the eccentric-rod G. The upper end of this bracket is provided with a sleeve, K′, surrounding the eccentric-rod, and adapted to slide thereon, and to be held at any desired point of adjustment by means of a set-screw, *k*, for adjusting the vibration of link L, hereinafter described, with relation to its rock-shaft, so that the steam shall be shut off equally in each end of the cylinder, no matter in what position said rock-shaft and link shall be held by the governor.

The rock-shaft to which arm I is attached has a horizontal crank-arm, I′, connected with its opposite end, to the outer swinging end of which the lower end of a link, L, is pivoted, the other end being connected with a crank-arm, *m′*, on a rock-shaft, *m*, mounted in suitable bearing-uprights *n n* on the frame or bed-plate of the engine.

A second crank-arm, p, on the shaft m, extends horizontally into the same transverse plane with the upright governor-shaft Q, and is connected by an upright link, p^1, with a strap or fork, p^2, engaging with or surrounding a sleeve or collar, R, on said shaft. The collar R is adapted to slide up and down freely on its shaft Q, and is connected by links s with the arms Q′, to which the governor-balls are attached, the arrangement being such that as the arms are raised or lowered by the varying velocity of the governor-shaft the sleeve R will rise or fall with them, operated by the links s, thus raising or lowering the link p^1 and rocking the shaft m through the crank-arm p, thereby giving an earlier or later movement to the arms I I′, and through them to the cut-off valve g.

By this arrangement of parts it will be seen that while the cut-off is connected through the bracket or arm K with the eccentric-rod, and is reciprocated thereby, its connection therewith is made through a crank-arm, I, which, in the movement of the eccentric rod, is vibrated through its connection with the stationary arm m', and imparts a movement to the cut-off independent of the valve for effecting the cutting off of the steam at any desired point.

When the engine, with the cut-off properly adjusted, is in motion, the movement of the cut-off relatively to the slide is regulated automatically through its connection with the governor, as follows: Supposing the parts to be in the position shown in the drawings, the engine running at low speed, as the speed is increased the governor-balls will be thrown outward and upward in the usual manner, raising the sleeve or collar, and, through the connections described, rocking the arm p and and shaft m upward and forward. By this movement the arm m' will be thrown forward, vibrating the point of support of the link L forward and changing its relation to the arm I′, vibrating or moving the latter, and through it the arm I, thus moving the stem H and changing the relation of the cut-off to the valve, causing the steam to be cut off from the cylinder earlier in the stroke of the piston than when the governor was moving at a lower rate of speed. Thus the velocity of movement of the governor is made to automatically vary the point at which the supply of steam to the cylinder is cut off, and thereby to regulate, in return, the speed of the engine.

The manner of connecting the link p^1 with the sliding collar R may be varied—as, for example, the upper end of the link p^1 may pass through a guiding-bracket, with a groove in the collar, in such a manner as to insure its endwise movement therewith, while permitting the free rotating of the collar. The governor-shaft may be connected with and driven from the main driving or crank shaft in any usual or preferred manner.

It will be seen that by my arrangement of the cut-off gear the second eccentric ordinarily employed for actuating the cut-off independently of the valve is dispensed with, a single eccentric being made to perform the work of actuating both the valve and the variable cut-off, while at the same time the latter is automatically adjusted and controlled by the governor.

Parts of the engine not particularly described may be constructed and arranged in any usual manner.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The adjustable bracket K, connected with the eccentric-rod which operates the main valve, and carrying the rock-shaft or arms, through which an independent movement is imparted to the cut-off valve, substantially as described.

2. The rigidly-connected crank-arms I I′, through which an independent movement is imparted to the cut-off valve, connected with and operated by the movement of the single eccentric which operates the main valve, substantially as and for the purpose described.

3. The rock-shaft and its arms I I′, connected with the valve eccentric-rod, and also connected, through link L and the rock-shaft m and its arms p, with the sliding sleeve or collar on the governor-shaft, for giving an independent movement to the cut-off valve, substantially as described.

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Witnesses:
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