D. O'B. LADD.

Valve-Gear.

No. 207,607. Patented Sept. 3, 1878.

Fig. 1

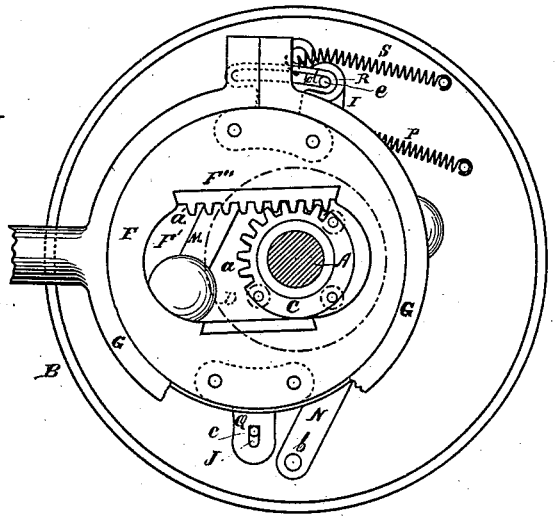


Fig. 2

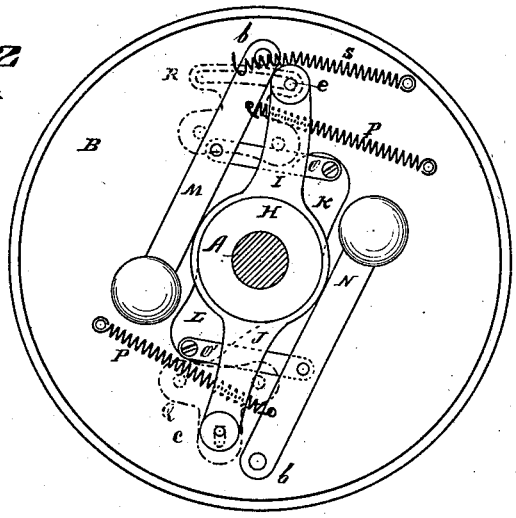
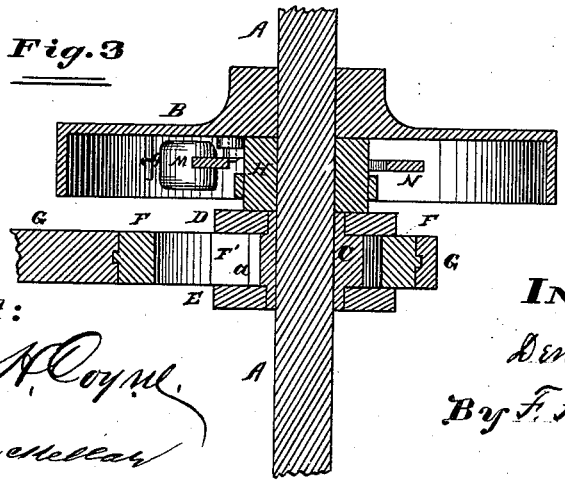


Fig. 3



Attest:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

DENNIS O'B. LADD, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE FARNSWORTH, OF SAME PLACE.

IMPROVEMENT IN VALVE-GEARS.

Specification forming part of Letters Patent No. **207,607**, dated September 3, 1878; application filed December 21, 1877.

To all whom it may concern:

Be it known that I, DENNIS O'B. LADD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Governors and Cut-Offs for Steam-Engines, of which improvements the following is a specification, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a side elevation of the eccentric and of the parts governing its action; Fig. 2, a like representation of the parts lying between the eccentric and the rotary disk; and Fig. 3 is a horizontal central section of the cut-off mechanism.

Like letters of reference indicate like parts.

My invention relates to that class of governors and cut-off mechanism whereby the movement of the valve is controlled by means of weighted levers contained in a disk on the engine-shaft.

My object is to render the mechanism quickly sensitive to variations of load and of steam-pressure, so as to maintain uniformity of speed at all times; to make the parts simple in their construction and operation, and so that they may be applied with facility to either new or old engines, and to economize in the use of fuel. These objects I accomplish chiefly by means of a pinion on the shaft and an engaging-rack in the eccentric-disk, all of which will be hereinafter particularly described and set forth.

In the drawing, A represents the engine-shaft. B is a disk, rigidly mounted on the shaft A. C is a hub or pinion, rigidly attached to the engine-shaft. *a* are cogs on a part of the periphery of the pinion C. D is a fixed collar on the pinion C, and E is a removable collar thereon. F is the eccentric-disk, and G is the eccentric strap or ring. The eccentric F has in it the elongated central opening F′, on one side of which are the cogs *a′*, constituting the rack F″, the cogs of which are adapted to engage the cogs *a*. The eccentric-disk is arranged between the collars D and E, and, excepting as its movement is restricted by the engagement of the cogs *a* and *a′*, and by its connection with the sleeve, hereinafter referred to, may be regarded as freely mounted on the pinion C.

H is a sleeve on the shaft A; and I, J, K, and L are arms projecting from the sleeve H, and lying in parallel pairs. M and N are weighted levers, pivoted to the disk B at *b b*, as shown. These levers extend in opposite directions, and the arm M is connected to the arm K by means of the link O, and the arm N to the arm L by means of the link O′, these links being pivoted to the arms to which they are connected.

P P are springs to draw the free and weighted ends of the arms or levers M and N in toward the shaft A, or to produce a centripetal movement of the weights, when the centrifugal force produced by the rotation of the shaft is diminished, or tends to become lessened either on account of low steam-pressure or of an increased load.

Q is a lug rigidly attached to the eccentric-disk F. *c* is a pin projecting from the arm J into a radial slot in the lug Q. R is a stop rigidly fastened to the disk F, and having therein the curved slot *d*. *e* is a pin extending from the arm I into the slot *d*. S is a spring to aid in returning the parts to their respective places during the centripetal movement of the weighted levers.

It will be perceived that when the shaft A is rotated during the action of the engine the weighted ends of the levers M and N will move outward as soon as the centrifugal force is sufficient to overcome the force of the springs P P and S. This outward movement of the weighted levers turns the sleeve H on the shaft A, and hence the arm J is carried around in the same direction, and this latter arm, being connected to the eccentric-disk B by means of the pin *c* and slotted lug Q, turns the eccentric on the hub or pinion C. While the eccentric is being thus turned the engagement of the teeth or cogs *a* and *a′* with each other causes the eccentric to also move in such a direction that its center approaches the center of the shaft A, and the position of the major part or belly of the eccentric is not only thus changed, but the eccentricity is diminished and the throw of the valve altered. When

the centrifugal force is overcome by the force of the springs the weighted ends of the levers M and N will move centripetally, and the movements already described will be reversed.

It will be perceived, therefore, that the steam will be cut off earlier or later in the stroke of the piston, as may be required, to maintain uniformity of speed under all variations of load and steam-pressure.

The movement of the eccentric-disk F may be limited by the length of the slot *d;* but it is not essential that this slot should be employed for that purpose, and it is obvious that other means may be used to control the distance moved by any of the parts described. The spring S, when employed as shown, takes up any lost motion that might otherwise result from the engagement of the teeth or cogs *a* and *a'*.

It is not essential that the sleeve H should have four arms; neither need the weighted levers be connected to the sleeve precisely as shown.

It will also be perceived that the throw may be varied from full throw to none, it being understood that the eccentric is rotated with the shaft besides being moved automatically in the manner described during its rotation. It may also be applied to any engine with facility, and is simple in construction and operation. Also, by utilizing all, or nearly all, the steam without unnecessary waste, a great saving of fuel is effected.

It may be observed that, if the rack F'' be made in the arc of a circle, having the pin *c* as a center, the pin need not work in a slot, but in a closely-fitting hole. It is not my intention to be restricted by mere form.

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

1. A governor and cut-off wherein an eccentric is adapted for adjustment automatically on its shaft by means of a pinion on the latter and a rack in the eccentric, in connection with springs and weighted levers, substantially as and for the purposes specified.

2. A governor and cut-off wherein the eccentric is adapted for adjustment automatically on its shaft by means of a pinion on the latter and a rack in the eccentric, in connection with a sleeve mounted on the same shaft and controlled by weighted levers and springs, substantially as and for the purposes specified.

3. The combination of the shaft A, disk B, pinion C, racked eccentric F, sleeve H, two or more levers, M N, connected to the said sleeve, and springs for producing centripetal movement of the said levers, substantially as and for the purposes specified.

DENNIS O'B. LADD.

Witnesses:
JAMES H. COYNE,
S. S. SCHOFF.