

G. B. MASSEY.
Variable Cut-Offs.

No. 150,336.

Patented April 28, 1874.

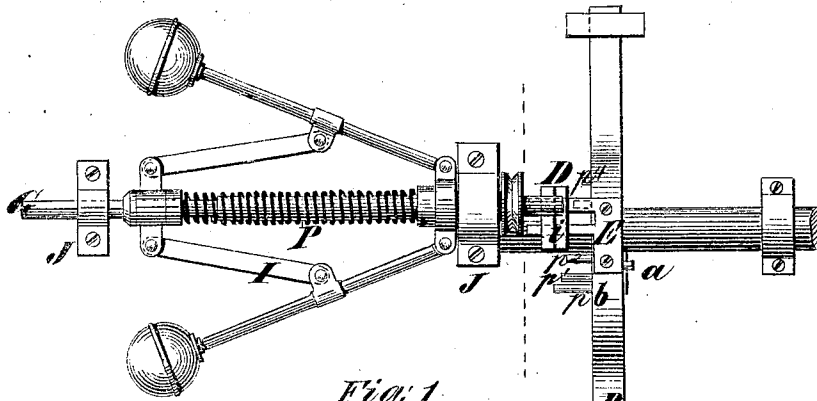


Fig. 1

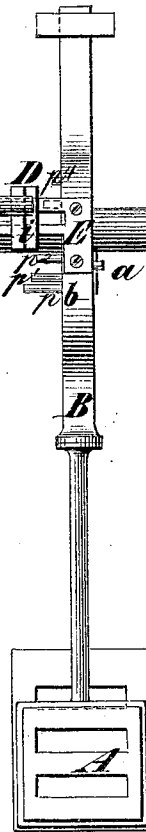


Fig. 2

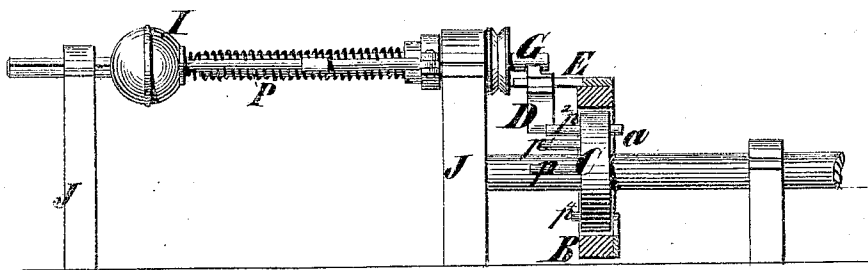
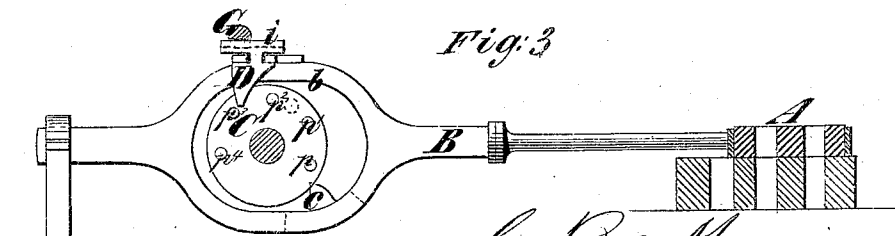


Fig. 3



Witnesses:
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN VARIABLE CUT-OFFS.

Specification forming part of Letters Patent No. **150,336**, dated April 28, 1874; application filed July 19, 1873.

To all whom it may concern:

Be it known that I, GIDEON B. MASSEY, of the city, county, and State of New York, have invented an Improved Variable Cut - Off, of which the following is a specification:

The object of this invention is to obtain a cut-off gear which will be variable under the control of a governor, and through which the cut-off valve will not only be opened, but also closed, by a positive action derived from the shaft of the engine, without aid from the force of gravity, resilience of springs, or pressure of steam. The invention consists in a novel and simple system of pins or offset-surfaces of different length and projection, carried by a rotating shaft, and a variable toe attached to the valve, whereby the positive invariable opening, and the positive but variable closing, movements are effected. It also consists in the combination of a slotted arm, arranged on the yoke of the valve-rod, a toe made to slide in the same toward and from the valve-rod, and a longitudinally-moving rod, which constitutes the controlling agent of the governor, and is transversely grooved near its outer end, to fit a rib on the head of the aforesaid toe, whereby the governor is made to control the shifting of the toe, and, consequently, made to regulate the cutting off the induction of steam to the engine-cylinder.

In the accompanying drawing, Figure 1 is a plan view of my improved cut-off, showing the valve of the engine to which it is applied. Fig. 2 is a section of the same, taken transversely through the yoke of the valve-rod, and representing a side view of the governor of the device; and Fig. 3 is a sectional view of the cut-off, taken close to the valve-rod.

Similar letters of reference indicate corresponding parts in the several figures.

A represents the cut-off valve of a steam-engine. B indicates the rod by which it is operated. Motion is imparted to this rod by pins or wrists on a disk, C, fitting within a yoke, *b*, provided on the rod for its reception. The rod is impelled forward in a direction to open the valve by a wrist, *a*, arranged alone on one side of the disk or wheel C. In the revolution of the wheel this pin strikes a projecting piece, *c*, situate on the adjacent side of the yoke of the valve-rod, and so pushes the rod along. This

movement is ever the same throughout all the variations of the cut-off.

The backward movement of the rod, effecting the closing of the valve and cutting off of the steam, is produced by separate means. On the other side of the disk C there is arranged a series of wrists or pins, $p\ p^1\ p^2\ p^3\ p^4$, which decrease in length, from the first to last of the series, in regular gradation. A sliding toe, D, is arranged on the valve-rod yoke in such position that it can be thrown out into contact with one or another of these pins, and according to which is thus rendered the operative one, so will the cutting off of the steam take place sooner or later in the stroke of the engine. In the drawing this toe is represented as being arranged in a slotted arm, E, situate on the middle portion of the upper side of the valve-rod yoke. It is thus enabled to slide toward and from the valve-rod, to come into contact with one of the wrists $p\ p^1$, &c., as just described. The toe D has a head, which fits above the slotted plate, and shoulders, that fit below it. On its head there is a long rib, *i*, which fits into a transverse groove in the rod G of the governor I, that shifts its position on the arm E. This rod G has no rotary motion whatsoever, but simply a longitudinal movement. The said rod fits within the spindle P of the governor I, and the sliding collar of the governor is connected with it in such manner as to permit the free rotation of the governor, the turning of the said rod being prevented by a pin located in one of the governor's bearings J J, so as to project into a groove provided in the rod. The spindle P of the governor extends through the bearing next the valve-rod, and, at the outer end, is furnished with a pulley, S, to receive the belt by which motion is imparted to it. There may be a nut arranged on the governor-spindle beyond the spring, to afford a means of compressing it more or less, in order to set the governor to regulate the running of the engine at a greater or less speed.

The operation of this cut-off is as follows: As the wheel C revolves, the wrist *a* comes in contact with the projection *c* on the yoke of the valve-rod, and pushes the valve forward, so as to open it. The backward cutting - off movement of the valve is effected by one or

other of the pins or wrists p p^1 p^2 , &c., coming in contact with the sliding toe D carried by the eccentric rod. As soon as the slightest tendency to variation in the speed of the engine occurs, and the arms of the governor, in their gyrations, are more or less distended, so the toe is moved farther out or in, and is thrown into contact with a shorter or longer wrist. The distension of the balls brings the toe into contact with one of the shorter wrists, and the steam is cut off sooner in the stroke of the engine. As soon as the speed decreases, the tongue is drawn by the governor inward, so that it only gears with the longer pins at the end of the series, and cuts off the steam only near the end of the stroke.

Instead of the wrists p p^1 , &c., a disk or wheel having its face or periphery correspondingly graduated may be employed.

In applying the invention to a reciprocating engine with a single cut-off valve independent of the main valves, the disk C must make two revolutions for every one of the main shaft of the engine. In engines which use the same valves for induction and cut-off—one valve at each end of the cylinder—the cut-off gear must be duplicate. In applying the invention to a

rotary engine, a single set of cut-off gear only will be necessary; but the disk C must revolve as many times for each revolution of the main shaft as there are pistons to the engine.

The governor may be dispensed with, if desirable, and the tongue will then be adjusted, by a screw or other means, to cut off at such point as may be desired.

A great advantage of this cut-off gear is, that the cut-off valve is always left full open, no matter in what position the engine stops.

What I claim as my invention is—

1. The combination of the fixed projection C and movable toe D, attached to the valve-yoke on opposite sides of the valve-operating shaft, and the opening wrist or pin a , and series of closing wrists or offsets p p^1 p^2 p^3 p^4 , of different length or projection, carried by the said shaft, substantially as herein described.

2. The combination of the slotted plate E, the sliding toe D, and the governor-rod G, essentially as and for the purpose herein specified.

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Witnesses:

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