

S. W. ROBINSON.

Improvement in Regulating Cut-Off Valve-Gears.

No. 114,861.

Patented May 16, 1871.

Fig 1.

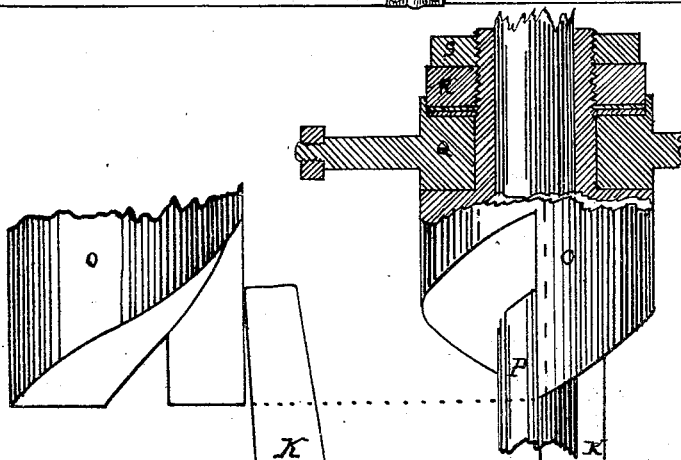
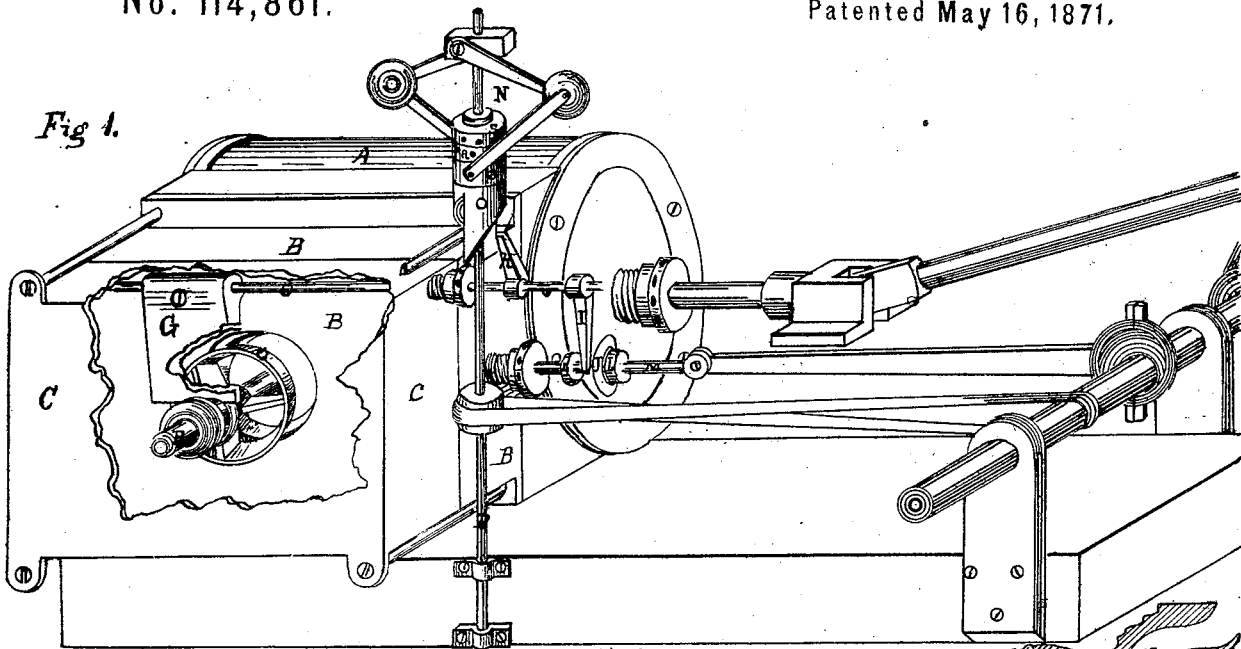


Fig 2.

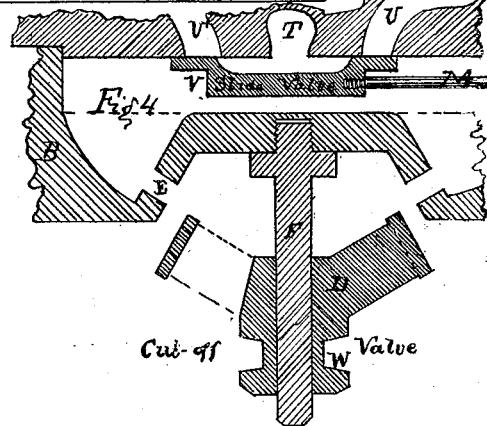
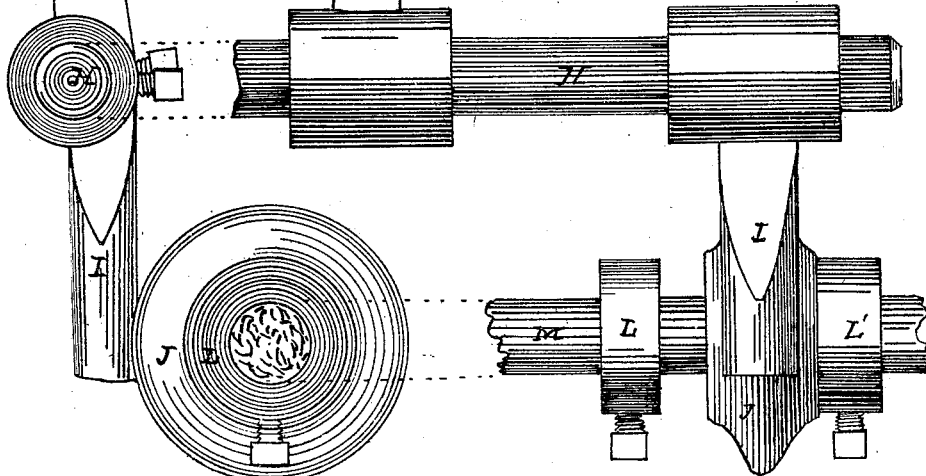


Fig 3.



Witnesses
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STILLMAN W. ROBINSON, OF CHAMPAIGN, ILLINOIS.

Letters Patent No. 114,861, dated May 16, 1871; antedated May 12, 1871.

IMPROVEMENT IN REGULATING CUT-OFF VALVE-GEARS.

The Schedule referred to in these Letters Patent and making part of the same.

I, STILLMAN W. ROBINSON, of Champaign, county of Champaign and State of Illinois, have invented certain Improvements in "Variable" or "Regulating Cut-off" Engines, of which the following is a specification.

Nature and Object of the Invention.

My invention consists, chiefly, in the combination with the ordinary so-called distribution-valve or valves of common engines, and a cut-off valve interposed between the same and the source of the steam, of an automatic cut-off gear, including attachments to the governor and the gear of the distribution-valve, the whole being so arranged and operated that the necessary amount of steam for maintaining uniform speed during each stroke is admitted into the cylinder under full pressure at the beginning of the stroke, when it is quickly cut-off and expanded to full stroke; the object of the same being mainly to secure for the most common kinds of engines an efficient automatic or self-regulating cut-off attachment.

Drawing.

Figure 1 is a perspective view of an engine having this "regulating cut-off" attachment.

Figure 2 is an enlarged side elevation of a part of the governor of the cut-off valve-rod and two arms attached to it, and of the main valve-rod with its trip and two tappets.

Figure 3 is a front elevation of the same.

Figure 4 is a horizontal section through the center of the cut-off valve and main valve, showing the relative position and action of both.

General Description.

In the drawing—

A is the steam-cylinder;

B, the steam-chest;

V, the slide-valve;

U and U', the steam-ports;

T, the exhaust-port; and

M the valve-rod, operating the valve V from an eccentric on the main shaft in the usual way.

These parts belong to the common and well-known slide-valve engine. My invention applies more especially to the following:

D is the cut-off valve, having its seat in the partition between the ordinary steam-chest B and steam-chamber C.

This valve is in the form of a hollow truncated cone, with a hollow center piece sliding upon the spindle F.

F is in the axis of the cone, and forms a guide for the valve to slide upon in opening and shutting.

E is an annular opening through the conical seat of the valve, which communicates between the chamber

C and chest B, and which the valve entirely closes when on its seat.

Three or four ribs pass across the opening E, serving to keep in place the center part, which bears the spindle F.

In practice this valve-seat may be stationary, as represented, or it may be placed on the back of the main valve, made hollow, with steam-passages through it, and ride back and forth with it, and still be operated by a broader arm, G, and other gear the same.

More or less coning is given to the valve at pleasure, when made to render it more or less nearly balanced, causing a greater or lesser strain upon the operating gear, and tending in a greater or lesser measure to make the valve close itself.

The cut-off valve is opened and closed by means of its valve-rod or rock-shaft H and arm G, which locks into a groove in the stem of the cut-off valve. This rod has also attached to it the arms I and K.

I is acted upon by the trip or annular cam J, which rotates the rod H in one direction and opens the valve.

This trip is fitted to the main valve-rod so as to slide freely a short distance between the two tappet-collars L and L'.

By giving to J some breadth on the periphery, dispensing with K, and adopting the governor and governor-valve, a determinate or fixed cut-off results, which may be made to cut off the steam at one-half, one-fourth, or at any other desired part of the stroke for which the suitable trip J is at hand.

Indeed, by using a trip, J, with spiral or helicoidal ends, and suitable mechanism for rotating it about the rod M, an independent cut-off results, which would be well adapted for locomotives for regulating at will the speed of the train.

K serves simply to hold the cut-off valve open the proper length of time by its upper end resting upon a point of O. As soon as the point moves from beneath K by the rotation of O the valve closes.

These points are flat, or determined by planes which coincide with the axis of O on one edge, and helicoidal or screw-shaped on the other. K rises upon O at the flat edge and returns on the spiral edge; the latter should be somewhat sloping for K to ride gradually down upon to close the valve quietly.

O is connected to the governor, as shown in figs. 1 and 3, so as to be raised or lowered by it.

The speed of the governor should be determined by the number of points of O. With two points its speed is the same as the engine; with one point it is double, &c.; and it may be run by gearing from the engine-shaft; but I have adopted running it by a belt, which may be done and O have the desired speed, as follows:

O passes through Q and has screwed upon its upper extremity the nut R and check-nut S. With suit-

able packing between Q and R, as shown in fig. 3, and tightening down the nut properly, moderate friction is produced between O and Q. The governor is then speeded to run a little faster than O so that the points of the latter are sure to run fast enough; and if it tends to run too fast the arm K, when the cut-off is closed, strikes against the flat edge of one of the points of O and retains it while Q slips around a short distance.

Operation of the Engine.

The slide-valve and valve-rod are reciprocated by an eccentric, placed nearly at right angles to the crank on the main shaft. The trip or annular cam J will, therefore, pass back and forth under the arm I, forcing it off at nearly the middle point of the movement of J, or when the eccentric is at the middle of its throw, and, consequently, open the cut-off valve nearly at the beginning of each stroke of the engine. At this instant the main valve is at or near its middle point of motion and no steam can enter either port. This position of the valves is represented at fig. 4, and the corresponding position of the arms I and K, the trip J, &c., shown in figs. 2 and 3; but as the main valve is traveling most rapidly at its middle point of motion one port soon is opened, and steam enters the cylinder at the beginning of the stroke of the piston. J also would very soon pass I, fig. 3, and let the cut-off valve close, were it not for the action of the arm K and points of O; but as the governor is speeded a little faster than the engine, one of the points of O will strike K and cause O to stop and turn in Q until the exact half-throw of the valve is accomplished, or until the trip J, acting upon I, throws K out from before

the point of O, as shown in figs. 2 and 3. At this instant O commences to revolve, and when J passes I K fall back upon O, which continues to rotate until the point passes out from under K, when it falls in between this and the next point and closes the cut-off valve. The next point arrives at K a little before the stroke is completed, and stops O until K is again raised by the action of J and I, as before. The point of cut-off is regulated by the governor by virtue of the inclined or helicoidal edge of the points of O, which, being raised or lowered as required, as they rotate allow K to fall and the cut-off valve D to close sooner or later, as regards the engine stroke. The time of cut-off is, therefore, determined by the height of O; the height of O by the speed of the governor; the speed of the governor by the speed of the engine; and as the speed of the governor is such that only one point of O passes K during a stroke of the engine the cut-off may occur at any point during the whole stroke, as required by the amount of work being done by the engine.

Claim.

What I claim, and desire to secure as my invention, is—

The combination of the valves, as described, with their operating gear, the trip J, arms I K, and points O O, the latter being operated by the governor, all arranged as shown and set forth.

STILLMAN W. ROBINSON.

Witnesses:

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R. E. MOORE.