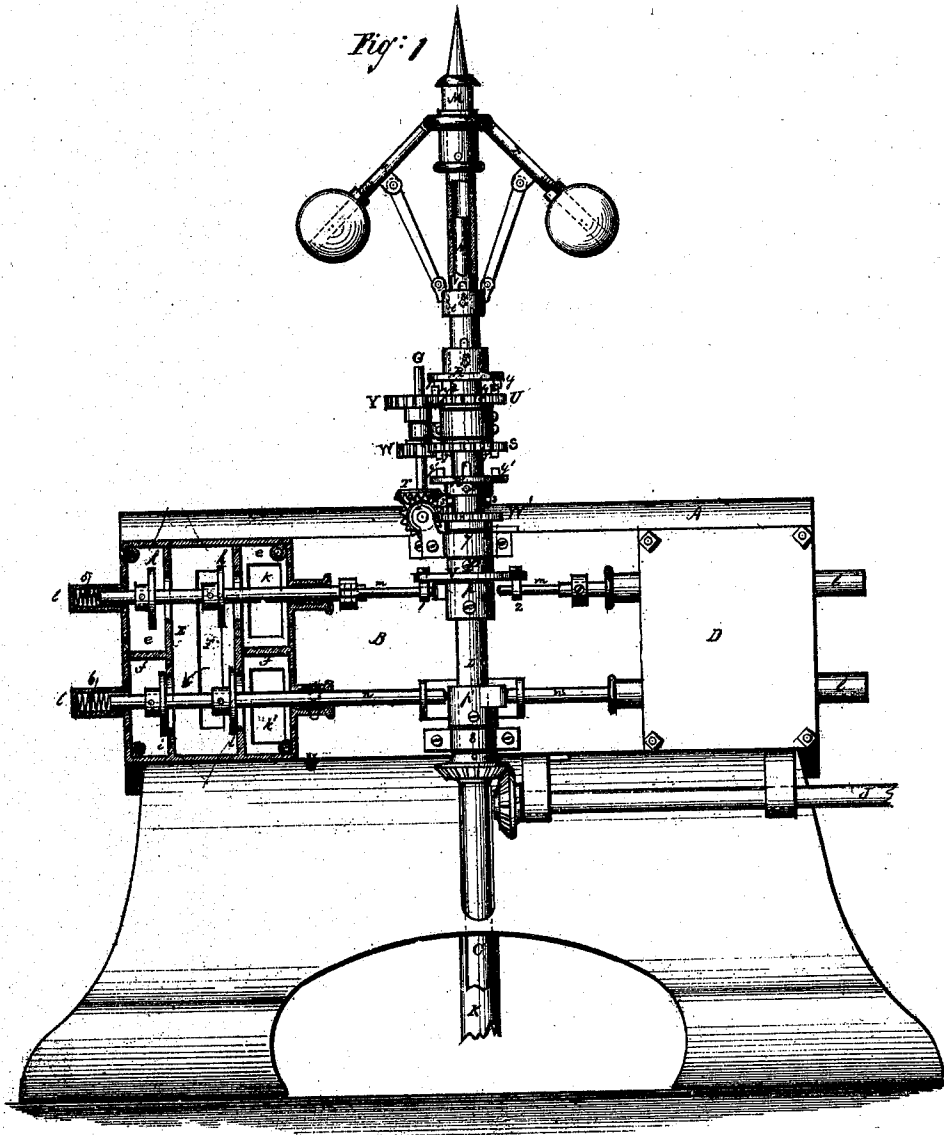


J. P. Merriam, 2. Sheets, Sheet. 1.

Cut Off Valve.

No. 106,185.

Patented Aug. 9, 1870.



Witnesses:

A. S. Mattenberg
J. M. P. (m)

Inventor:

J. P. Merriam
P. G. M. (m)

J. P. Merriam,

Cut Off Valve.

No 106,185.

Patented Aug. 9, 1870.

Fig: 2

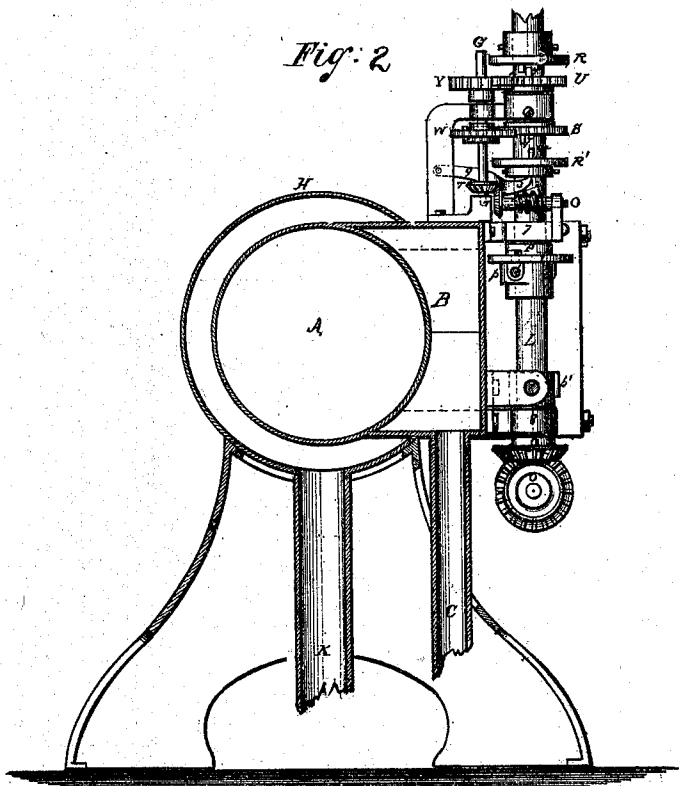
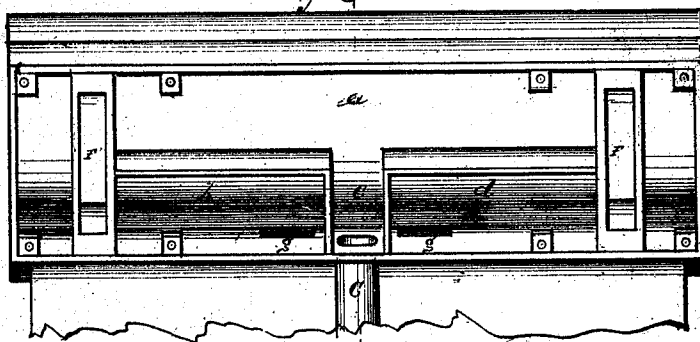


Fig: 3



Witnesses:

H. L. Waterberg

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Inventor:

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United States Patent Office.

JOSEPH P. MERRIAM, OF SANDUSKY, OHIO.

Letters Patent No. 106,185, dated August 9, 1870.

IMPROVEMENT IN STEAM-ENGINE.

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

To all whom it may concern:

Be it known that I, JOSEPH P. MERRIAM, of Sandusky, in the county of Erie and State of Ohio, have invented a new and improved Steam-Engine; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon making a part of this specification.

This invention consists, principally, in the peculiar construction and arrangement of a variable cut-off, combined with the valves, so that the latter will be operated by the governor in an exceedingly sensitive manner, and at the same time give to the cylinder the greatest amount of steam when the work on the engine most requires it, and to instantly reduce the volume of steam when the load on the engine is lightened. This desirable feature in the construction of steam-engines has long been sought for, but up to this time imperfectly arrived at.

Still another object of my invention is to construct the steam and valve-chests in such manner as will admit of easy access to the valves, &c., without materially disarranging the cut-off or its several parts.

In the accompanying drawings—

Figure 1 represents a side elevation of my engine; Figure 2, a transverse section; and

Figure 3, a perspective view of the same, showing the top of the steam-chest removed.

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

A is a steam-cylinder, which may be of any desired size, cast onto which is a part, B, forming a chamber which is divided into four separate parts or channels, *a*, *b*, *c*, and *d*.

The steam from the boiler entering into the steam-chamber B through the steam-pipe C passes through the channels *c* and *a*, (see fig. 3,) and thence into the valve-chests D D' and valve-chamber *e*, through the ports *k*.

The steam-valves *h k* then being opened, as herein-after described, the steam passes into the pocket E, and from thence into the cylinder through the induction-port F.

The steam, having performed its work by forcing the piston to the end of its strokes, is allowed to escape through the port F into the pocket E, and to the valves *i i* into the valve-chambers *f*, and into the channels *h* and *d*, thence through the ports *g g*, around and between the cylinder and the jacket H, and through the exhaust-pipe K into the open air, or directly into the open air, as may be desired.

The steam-valves *h k* and exhaust-valves *i i* are operated by gearing on the crank-shaft, which imparts a rotary motion to the shaft J, which in turn revolves

the spindle L by means of the bevel-gear wheels *o o*; the spindle L thus being made to revolve carries with it the cams *p p'*, the lower one of which, *p'*, coming in contact alternately with the outer ends of the supplementary valve-stems *n n*, opens the exhaust-valves *i i* at the required time, and the upper cam *p*, coming in contact alternately with the supplementary valve-stems *m m*, forces open the steam-valves *h k* when admitting steam to the cylinder A.

These cams are secured to the spindle L by keys or otherwise, and at its upper end is attached the governor M, provided with the weighted arms *r r*, which, when revolving rapidly, are thrown upward by centrifugal force, and, when revolving less rapidly, drop to their former position by their own gravity, as in governors as ordinarily constructed.

Through the spindle L passes the secondary spindle N; this secondary spindle is connected to the arms of the governor M by the pin *s*, which passes through the collar *t* and slot *v*.

Slipped onto the spindle L, and connected to the secondary spindle N by the pins *s²* and *s³*, are the clutch-plates R and R', which are provided with clutch-pins *y y'*.

Now, it will be obvious that when the speed of the engine is accelerated the arms of the governor will be raised, and carry upward with them the secondary spindle N and clutch-plates R and R', and thus bring the clutch-pins *y y'* in contact with the clutch-pins *y²* of the gear-wheel S, the teeth of which mesh into a second and smaller gear-wheel, S', (not shown in the accompanying drawings.) This second gear-wheel in turn engages with a third gear-wheel, W, thus revolving the shaft G and bevels T T, which in turn impart a rotary motion to the worm O; this worm then working into the teeth of the gear-wheel W', (which last-mentioned gear-wheel is fixed to the collar or sleeve P, which it revolves,) and the motion thus imparted to the collar revolves the plate V.

Attached to the under side of the plate V are fixed the guide-studs 1 and 2, through which the ends of the supplementary valve-stems *m m* pass, and it will be clearly seen that as the plate V is revolved the guide-studs 1 and 2 are carried more or less out of a direct line with said supplementary valve-stems *m m*, and thus as the guides are moved the projecting ends of the supplementary valve-stems are withdrawn more or less from the guide-studs 1 and 2, and in this way present less surface to be acted on by the cam *p*, and, consequently, the throw of the valves *h k* is lessened, and less steam is admitted to the cylinder, or the supply, in other words, is partly "cut off."

When the engine is running at reduced speed, the arms *r r* of the governor will droop, and shove down-

ward with them the supplementary spindle N, and with it the clutch-plate R, which, being thus brought down, causes the clutch-pins $y y^1$ (fixed to the under side of said plate) to engage with the clutch-pin y^2 of the gear-wheel U, and thereby causes said gear-wheel to revolve, which in turn communicates motion to the gear-wheel Y, and in this way revolving the shaft G, bevel-wheels T T, and worm O, sleeve P with plate V thereto attached, and guide-studs 1 and 2, precisely as hereinbefore described, but in a reverse direction, and thus the guide-studs 1 and 2 are brought more in a direct line with the supplementary valve-stems $m m$, allowing them to protrude in such manner as will offer greater surface to the action of the cam p , and in this way increase the throw of the valves $h h'$, or open them wider for the admission of steam, and maintain the former speed of the engine.

To prevent the possibility of turning the plate V so far as will entirely withdraw the ends of the supplementary valve-stems $m m$ from the guide-studs 1 and 2, a small inclined plane, x , is attached to the upper surface of the wheel W', which, coming in contact with the forks 3 3 of the lever 9, will trip the clutch-plates R R', so that none of the aforementioned clutch-pins will engage, and the engine will then run full stroke until the speed is such as to again throw out the arms of the governor, when the steam is again cut off and its supply regulated as hereinbefore described.

One decided advantage of my valves over valves as ordinarily constructed for stationary steam-engines is that they are balance poppet-valves, and, therefore, it requires but very little power to move them, and

again, by reason of their construction, the steam is admitted to the cylinder without being "wire-drawn," thus getting into the cylinder promptly the full pressure from the boiler.

The outer ends of the valve-stems are received into the dash-pots ll , and are therein cushioned against the spiral springs 5 6, which, by their elasticity close the valves after they have been opened by the action of the cams $p p'$, or instead of springs, steam may be used for that purpose.

The spindle L is attached to the outer side of the steam-chamber B by the collars 7 and 8, through which it freely revolves.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. A variable cut-off, composed of the clutch-plates R R', gear-wheels S S', W W', U, and Y, bevel-wheels $o o$, T T, and worm O, oscillating guide-plate V, with the guide-studs thereon, cams $p p'$, tripping-lever 9, supplementary valve-stems $m m'$, $n n'$, in combination with the governor M, all arranged and constructed as hereinbefore described.

2. The arrangement of the steam-passages or channels $a b c d$, ports $g g$ and F F in the chamber B, the pockets E E, valve-chambers $e e$, $f f$, and ports K' K', the jacket H, and exhaust-pipe K, all as and for the purpose set forth.

J. P. MERRIAM.

Witnesses:

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G. M. PLYMPTON.