

(No Model.)

R. HARDIE.
CUT-OFF VALVE GEAR.

No. 247,189.

Patented Sept. 20, 1881.

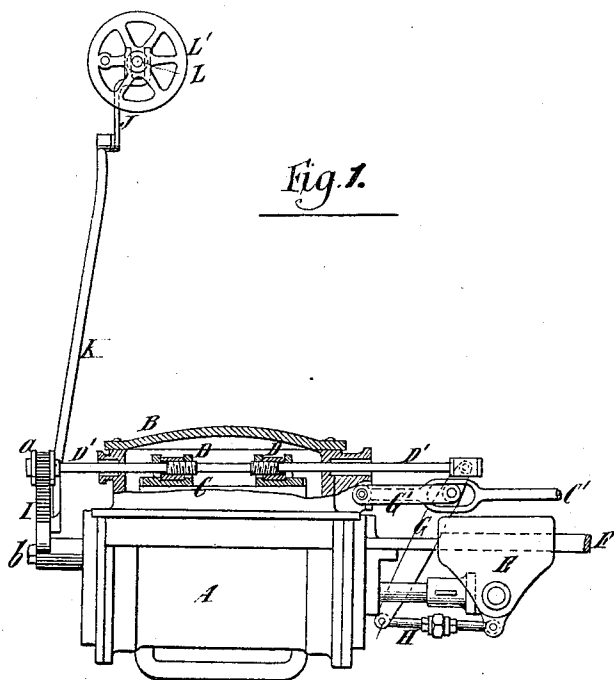


Fig. 1.

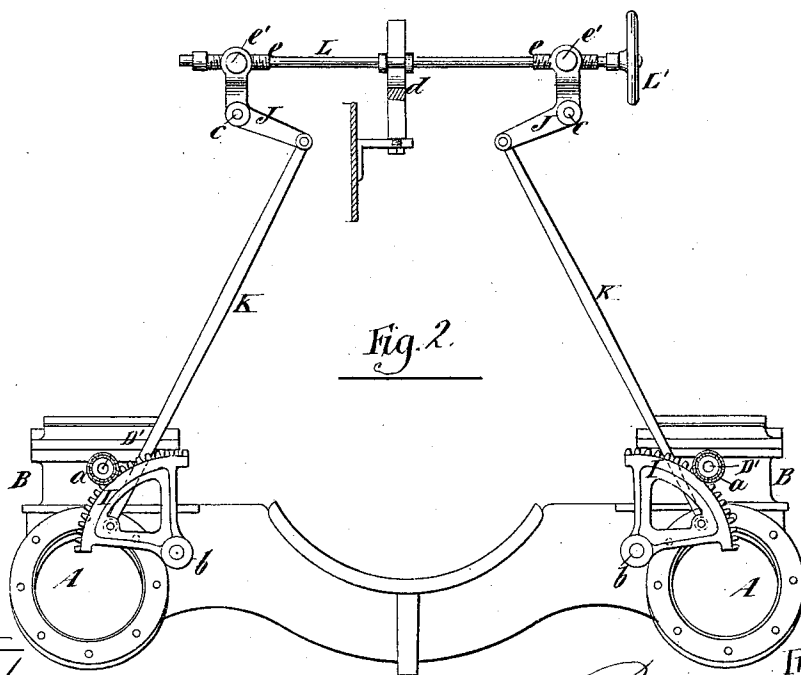


Fig. 2.

Witnesses:-

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CUT-OFF-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 247,189, dated September 20, 1881.

Application filed January 26, 1881. (No model.)

To all whom it may concern:

Be it known that I, ROBERT HARDIE, a resident of the city of Hoboken, in the county of Hudson, in the State of New Jersey, have invented certain new and useful Improvements in Cut-Off-Valve Gears for Engines, of which the following is a specification.

My invention, though applicable to engines generally, is particularly intended for locomotives; and the object is to provide a simple and desirable means for working cut-off slide-valves in lieu of the eccentric-rod and rock-shaft ordinarily employed, and also to provide a convenient means for simultaneously turning the cut-off-valve stems of two cylinders, to cause the valves to cut off sooner or later in the stroke.

The invention consists in the combination, in an engine, with a main slide-valve, cut-off slide-valves mounted thereon, and a cross-head, of a lever connected upon one side of its fulcrum with the cut-off-valve stem and a rod connected with said lever upon the other side of its fulcrum, and also connected with said cross-head. The reciprocating movement of the cross-head serves to vibrate the lever, and said lever then reciprocates the cut-off slide-valves, accomplishing this result in a simple and very desirable manner. I make the rod which connects the cross-head with said lever adjustable in its length, and thereby afford provision for setting the cut-off valves.

The invention also consists in the combination, with two engine cylinders, arranged side by side, as in a locomotive, and each provided with cut-off slide-valves, of a novel combination of mechanism for simultaneously turning the cut-off-valve stems of both engines, and thereby shifting or adjusting the two cut-off valves of each engine nearer to or farther from each other, by reason of the right and left hand screw-threads upon each cut-off-valve stem.

In the accompanying drawings, Figure 1 represents a side view, partly in section, of an engine-cylinder and other parts embodying my invention; and Fig. 2 represents an end view of two cylinders and other parts.

Similar letters of reference designate corresponding parts in both the figures.

A A designate two engine-cylinders, arranged side by side, and which may be presumed to be the two cylinders of a locomotive; and B designates the valve-chests thereof.

C designates the main slide-valve, and C' the stem thereof, which may be reciprocated by an eccentric, or in any other suitable manner.

Upon the back of the main slide-valve C are mounted two cut-off slide-valves, D, which are actuated by a cut-off-valve stem, D', in the usual way, the said stem having upon it right and left hand screw-threads, which engage with nuts fitted in the back of the cut-off valves D. By turning the valve-stem D' the two cut-off valves D are moved nearer together or farther apart, and the point of cut-off correspondingly changed.

I will now describe the mechanism employed for reciprocating the cut-off-valve stem D'.

E designates the cross-head of the engine, which is adapted to reciprocate upon a guide or guides, F, in the usual way.

G designates a lever, and G' designates a link or links pivoted to any part of the cylinder A, and forming a fulcrum for said lever. At its upper end, upon one side of its fulcrum, the lever G is connected with the cut-off-valve stem or rod D', and upon the other side of its fulcrum it is connected by a rod, H, with the cross-head E. The rod H is preferably composed of two portions connected by a right and left hand screw-threaded nut, so that it may be lengthened or shortened; but the said rod may be otherwise constructed to render it adjustable in length.

It is obvious that by lengthening or shortening the rod H the cut-off valves may be shifted relatively to the main valve and properly set.

I will now describe the mechanism whereby the cut-off valves D of both cylinders may be adjusted toward and from each other to vary the point of cut-off.

As clearly shown in Fig. 1, the cut-off-valve stems D' project through the back end of the valve-chests B, and are provided outside said chests with pinions *a*.

I designates toothed sectors, which are pivoted at *b* to any suitable supports—as, for in-

stance, to lugs upon the cylinders or cylinder-heads—and which engage with the pinions *a* upon the cut-off-valve stems *D'*.

J designates levers, here shown as elbow or bell-crank levers, arranged above the cylinders and pivoted or fulcrumed at *c* to any suitable supports, upon which they may swing or oscillate. One arm of each lever *J* is connected by a rod, *K*, with one of the sectors *I*; and it will readily be seen that by oscillating the levers *J* the sectors *I* will be actuated and the cut-off-valve stems *D'* turned to adjust the cut-off valves of both cylinders nearer together or farther apart.

L designates a shaft, arranged transversely to the cylinders *A* in a slotted bearing, *d*, which provides for its vertical movement, and provided with a hand-wheel, *L'*, whereby it may be turned in either direction. Upon the shaft *L* are right and left hand screw-threads *e*, which engage with nuts carried by the bell-crank levers *J* and oscillate said levers. In the present instance one arm of each bell-crank lever *J* is bifurcated, so as to receive the shaft *L*, and the said shaft passes through pins *e'*, which are inserted through the bifurcated portions of said levers and form nuts for the screw-threads upon said shaft.

From the above description it will be readily seen that by turning the shaft *L* the point of cut-off of both cylinders may be varied as may be desired; and although my arrangement of mechanism for adjusting the cut-off valves is useful in any situation where two engines are arranged side by side and coupled together, it is particularly desirable for locomotives having the cab arranged over the cylinders, in which case the shaft *L* would extend across the cab, within easy reach of the engineer.

It will be observed that by this arrangement of mechanism the cut-off-valve stems *D'* will be turned in reverse directions, and it will

therefore be apparent that one valve-stem should have a right-hand thread upon its front portion and a left-hand thread upon its back portion, while the other should have a left-hand thread upon its front portion and a right-hand thread upon its back portion.

I do not claim, broadly, the employment of toothed sectors and pinions outside of the valve-chest for adjusting the cut-off valves of engines; but

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

1. The combination, in an engine, with a main slide-valve, cut-off valves mounted thereon, and with the cross-head of the engine, of a lever connected upon one side of its fulcrum with the cut-off-valve stem and a rod connected to said lever upon the other side of its fulcrum, and also connected to said cross-head, substantially as and for the purpose specified.

2. The combination of the main valve *C*, the cut-off valves *D*, the cut-off-valve stem *D'*, the lever *G*, the cross-head *E*, and the rod *H*, connecting said lever with said cross-head, and adjustable in its length, substantially as specified.

3. The combination, with two engine-cylinders, arranged side by side, and each provided with cut-off slide-valves having right and left hand screw-threads on their stems, of pinions fixed to said cut-off-valve stems, toothed sectors engaging with said pinions, two levers, rods connecting one arm of said levers with said sectors, and a screw-threaded shaft engaging with the other arm of said levers and serving to oscillate said levers, and thereby turn both said cut-off-valve stems simultaneously, substantially as specified.

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