

United States Patent Office.

WILLIAM B. CROSS, OF SACRAMENTO, CALIFORNIA.

Letters Patent No. 111,180, dated January 24, 1871.

IMPROVEMENT IN VARIABLE CUT-OFFS FOR STEAM-ENGINES.

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, WILLIAM B. CROSS, of Sacramento, in the county of Sacramento and State of California, have invented a new and improved Variable Cut-off for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to improvements in variable cut-off apparatus for steam-engines, and consists in a combination, with a vibrating lever connected with the valve-stem, so as to open the valve when moved in one direction, of an adjustable inclined sliding block, arranged between the lever and point of the valve-stem, to which motion is communicated by the said lever, and connected with an eccentric, or any other moving part, so as to be caused to slide on the lever and let the valve close sooner than it would if moved back with the lever, said block being arranged so that it may be shifted while in motion to vary the point of cutting off.

The invention also comprises an arrangement of operating and adjusting devices for the said block, the said apparatus being adapted for working two valves alternately, one at each end of the engine.

Figure 1 is a side elevation, partly sectioned, of my improved valve-gear applied to two valves, which may be supposed to be arranged one at each end of the cylinder;

Figure 2 is a section on the line $x x$; and

Figure 3 is a section on the line $y y$.

Similar letters of reference indicate corresponding parts.

A A represent two valve-chests, one at each end of the steam-pipe B.

C represents the valve-stems, which, in this instance, are arranged vertically.

They have each a long slot or mortise in the upper end, through which a lever, D, passes, said levers being pivoted to any suitable support at E, and having their free ends extending toward, but terminating short of, each other over a rock-shaft, F, carrying the toes G, and worked by the eccentric or other moving part, to which it is connected by the rod H, the said toes alternately raising each lever to open the valves.

The valve-stems have cross-heads, I, working on the guide-rods K, and on which cross-heads the coiled springs L work to close the valves.

The mortises in the upper ends of the valve-stems are considerably longer than the width of the levers, to admit of independent movement of the said stems, also to admit of the reception of the sliding block M

between the upper sides of the levers and the walls at the upper ends of the mortises.

These blocks are fitted to the upper sides of the said levers so as to slide back and forth on them, and they have the inclined planes N upon their upper sides.

They are connected by the rods O to the F-headed lever P, pivoted at Q to an arm, R, rising up from, and turning freely on, the rock-shaft F, which arm is connected by a rod, R', with an eccentric or other properly-moving part of the engine.

The free end of lever P is connected by a rod, S, to a bar, T, by hooking into a hole in it, of which there are a number, for shifting the rod from one to the other for varying the lever P up or down, to shift the arms U of the head forward or backward to change the slides on the levers.

For reducing the friction as much as possible, a friction-roller, V, is placed in the slot of each valve-stem, above the sliding block M, for the latter to work under.

The arm R is caused to move forward and backward in such relation to the movements of the rock-shaft and toes G that, previous to the rising of lever D, the slide M will be drawn forward under the roller, so that the rising of the said lever will raise the valve, and previous to the downward movement of the lever the slide will be moved back, the inclined plane N passing from under the roller and letting the valve be suddenly closed by the springs. This closing movement is made sooner or later, according to the position of the F-lever and the slides M on the levers D, as will be clearly understood by inspection of the drawing.

It is not necessary that the levers D pass through slots in the valve-stem, as they may work along side of the stems, and the friction-rollers may be supported on studs projecting from the said stems.

Having thus described my invention,

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

1. The lever for working the valve-stem, combined as described with the sliding block having the inclined plane, as and for the purpose specified.

2. The combination, with the sliding block M, of the rod O, lever P, adjustable rod or hook S, and arm R, all substantially as specified.

3. The combination, with the rock-shaft, toes, and levers D, of the arm R, lever P, adjusting-rod or hook S, rod O, slide M, and valve-stem C, all substantially as specified.

Witnesses: WILLIAM B. CROSS.

HENRY C. JOHNSON,
JOSEPH CROGHAN.