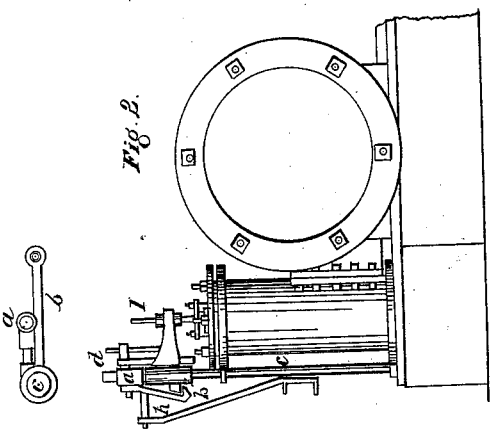
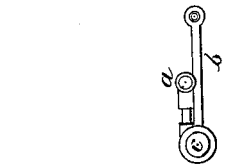
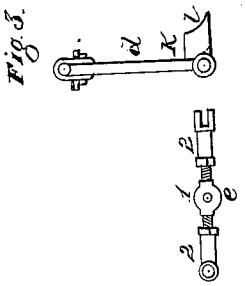
# S. Barber,

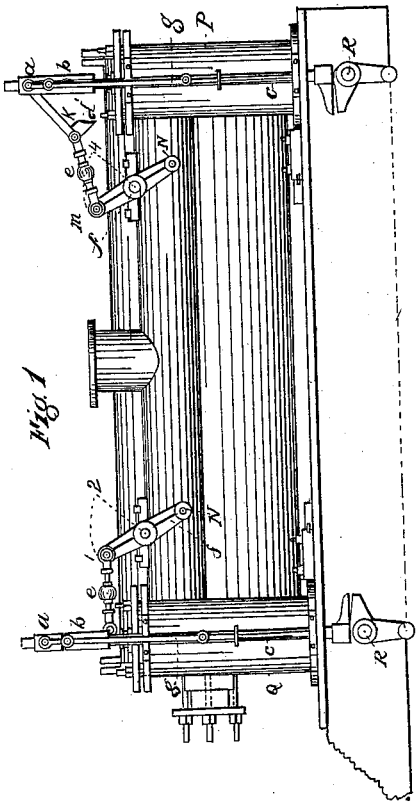
## Steam-Engine Valve-Gear.

No. 5,129. Patented May 22, 1847.





# UNITED STATES PATENT OFFICE.

SPRAGUE BARBER, OF NEW YORK, N. Y., ASSIGNOR TO JAMES A. STEVENS, OF HOBOKEN, NEW JERSEY.

## OPERATING CUT-OFF VALVES.

Specification of Letters Patent No. 5,129, dated May 22, 1847.

*To all whom it may concern:*

Be it known that I, SPRAGUE BARBER, of the city and county of New York, late of Westerly Rhode Island, a citizen of the United States, have invented a new and useful Improvement on Steam-Engines, called a "Cut-Off," of which the following is a full and exact description.

The object of this invention is to construct a less expensive and more perfect apparatus for closing the steam valves at different portions of the stroke of the piston and thereby cutting off the steam from the boiler and allowing it to act expansively in the cylinder. This I mean to accomplish by means of what I call a drop slide placed in the position represented in the drawing; this drop slide elevates the valve to its required height with the original lifting rod by means of its shoulder and then the shoulder being withdrawn by an attachment to some suitable portion of the machinery allows the valve to drop with any degree of velocity that may be found necessary on the curve of the drop slide. This will be more clearly explained by a reference to the drawing.

In the drawings, Figure I represents an elevation or front view of the cylinder and steam chests of a horizontal engine with rock shafts, lifting rods and lifters together with my apparatus for cutting off the steam attached to each steam chest. Fig. II represents an end view of the same. Fig. III represents detached portions of the cut off apparatus.

The letter *a* represents a lifter keyed fast to the ordinary lifting rod *c*, but not attached to the valve stem. The letter *b* represents an additional lifter not keyed to the lifting rod but at liberty to slide on the lifting rod *c* and attached to the valve stem I.

*d* represents the drop slide made with a shoulder *k* and a curve *l* as represented in Figs. I and III. This drop slide by means of the adjusting connection *e* is made at the proper intervals to connect and to disconnect the lifters *a* and *b*.

*e* represents the adjusting connection formed of three pieces, the end pieces having one a right-handed screw and the other a left handed screw and the center piece having two female screws one right handed and the other left handed. By means of these screws the adjusting connection can be lengthened or shortened at pleasure. This adjusting connection serves to connect the drop slide to the end *m* of the rocker shaft *f* the end *n* of the rocker shaft *f* can be connected to the walking beam at a suitable place or can be connected to a separate excentric wheel on the main shaft or to any part of the engine having a motion parallel to the motion of the piston rod and having a sufficient throw to move the arm *m* of the rocker shaft *f* on the steam chest Q from 1 to 2 or on the steam chest P from 3 to 4 while the piston is moving from the top of the cylinder to the bottom.

*g* represents the hand gear which serves to force the catch *h* under the lifter *b*, and by that means to connect the lifters *a* and *b*. The catch *h* is forced under the lifter *b* by disconnecting the hand gear *g* from the catch *o;* this allows the engine to work whole stroke and must always be done when working by hand.

The operation of this cut-off is as follows: The piston being supposed to be at the upper end of the cylinder, or at the end to which the steam chest Q is attached, the rocker shaft R would by the ordinary motion raise the lifting rod *c* and the lifter *a* which is firmly keyed to it. Now the drop slide having been moved by the adjusting connection and rocker shaft *f* to the position as shown at the steam chest Q, the shoulder K connects the lifters *a* and *b* together so that when the lifter *a* is raised by the rocker shaft, it raises the lifter *b* and the valve I with it, admitting the steam on the upper or Q side of the piston. Now as the piston moves from Q to P the arm attached to the rocker shaft *f* moves in the direction as marked from 1 to 2 withdrawing the shoulder K of the drop slide *d* from under the lifter *b* and thereby disconnecting *a* and *b* and allowing the lifter *b* to fall gradually and gently along the curve *l* of the drop slide until both the shoulder and curve of the drop slide is entirely withdrawn from under the lifter *b* by which time the valve attached to *b* rests in its seat and the entrance of the steam from the boiler to the cylinder through the steam chest Q is cut off. The time at which the shoulder K is withdrawn from under the lifter *b* and (at which time the lifter *b* commences to fall along the curve *l* and at the same time com-

mences to close the valve) can be regulated by the adjusting connection *e*; by shortening *e* when it is desirable to cut off shorter and by lengthening *e* when it is desirable to cut off longer.

The degree of curvature allowed to the curve *l* must be made to suit the velocity at which it is desirable that the valve should fall; the curve being made steep, when it is desirable that the valve should fall rapidly. This curve may be a section or portion of a circle or any other curvature that the fall of the lifter or cut off may require. The drawing represents the cut-off apparatus attached to a horizontal engine but it can, without altering the arrangement of the drop slide, sliding lifter, adjustable connection and rock shaft, be attached to an upright on to an inclined engine.

It will be obvious from the foregoing that the beveled, inclined, or curved face of the drop slide for gradually arresting the downward motion of the valve as it drops is the essential feature of my invention by which the slamming of the valve is avoided, and that this feature of my invention may be applied to any kind of catch or slide which lifts and liberates the valve, and therefore I do not wish to limit myself to the precise manner herein described of applying this principle, but to vary the same so long as I retain the principle or mode of operation herein described whereby the slamming of the valve is avoided.

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

1. The method herein described of connecting the lifter of the valve with, and disconnecting it from the lifter of the lifting rod by means of the drop slide in combination with the lifting rod and lifter attached to the valve, the drop slide being operated during the lifting of the valve, substantially as described.

2. And I also claim the method of arresting the downward motion of the valve by the inclined or curved face of the slide that holds and liberates the valve, whether it be the slide herein described, or any thing analogous or equivalent thereto, as described.

SPRAGUE BARBER.

Witnesses:
A. G. MONTMOMERY,
THOS. LEE.