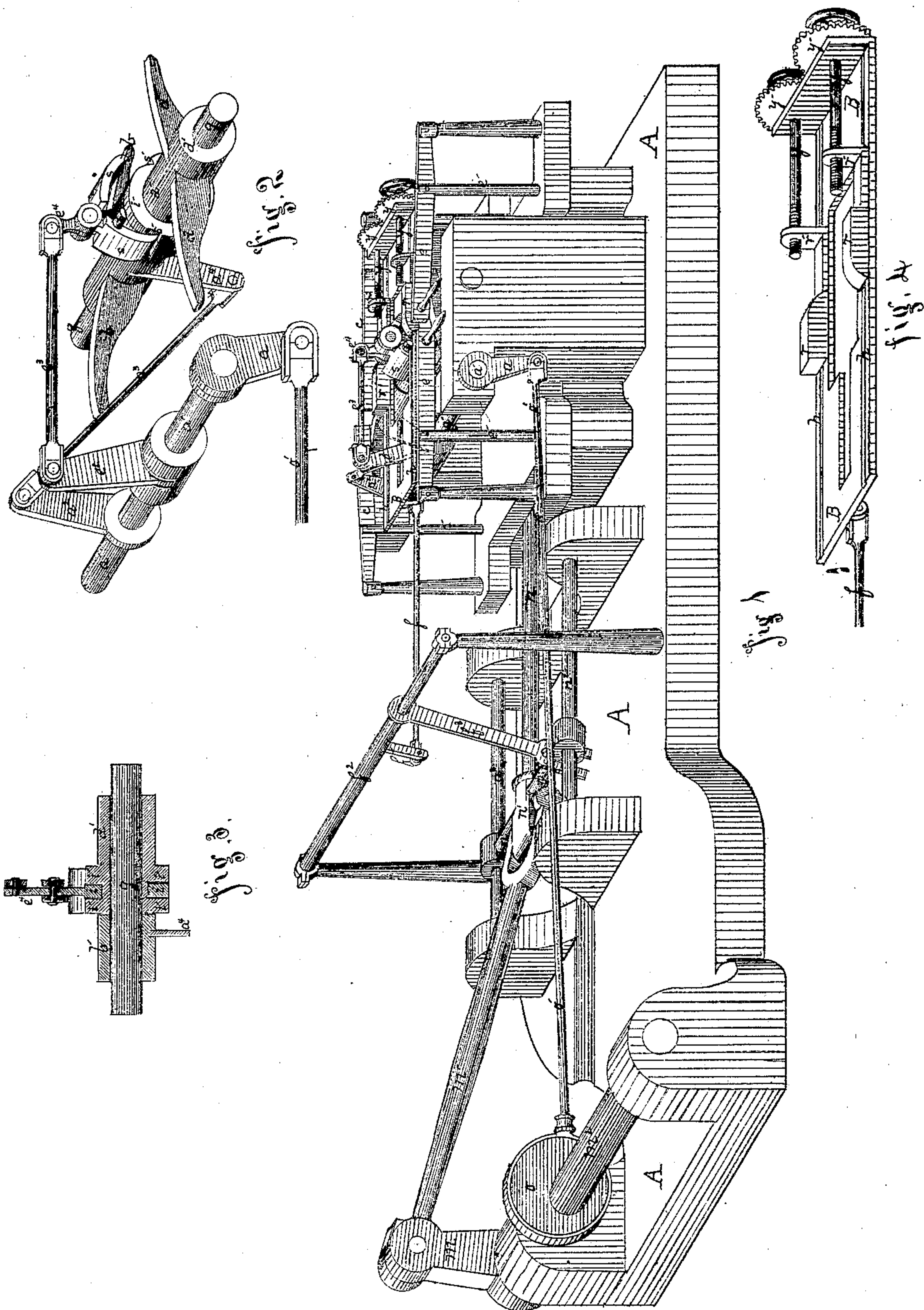


JAMES REES.

Improvement in Adjustable Cut-Offs for Steam-Engines.

No. 114,601.

Patented May 9, 1871.



Witnesses { R.C. Wrenthall  
James S. Hay, Inventor: James Rees  
by Batewell, Christy & Kerr, his Attys.



# United States Patent Office.

JAMES REES, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 114,601, dated May 9, 1871.

## IMPROVEMENT IN ADJUSTABLE 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, JAMES REES, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Adjustable Cut-off for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of the operative devices of my improvement, and

Figures 2, 3, and 4 are detached views, somewhat enlarged, of portions thereof, more fully illustrative of its construction and operation.

Like letters of reference indicate like parts in each.

My improvement relates to the construction of a variable and adjustable cut-off for steam-engines, as hereinafter described and claimed.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation.

On any suitable foundation, A, I arrange the main steam-cylinder of the usual construction, and furnish it with a piston.

From this point I employ the well-known construction of piston-rod *n*, T-head *n*<sup>1</sup>, working on parallel ways *n*<sup>2</sup>, the crank-shaft *m*, crank *m*<sup>1</sup>, main shaft *m*<sup>2</sup>, cam *o*, cam-rod *o*<sup>1</sup>, communicating with the crank *a*.

This crank is attached to the shaft *a*<sup>1</sup>, and the latter, by its crank *a*<sup>2</sup>, through a connecting-rod *a*<sup>3</sup> and crank *a*<sup>4</sup>, communicates motion to the exhaust valve-lifters *b b*, which are rigidly connected with the sleeve *b*<sup>1</sup>, which latter in turn works loosely on its shaft *g*.

The valve-lifters open and close alternately the exhaust poppet-valves through the medium of the valve-levers *c* and valve-stems *c*<sup>1</sup>, in the manner well-known in the art.

The steam-inlet valves are carried by the stems *e*<sup>1</sup>, and are opened and closed alternately by the lifters *d d*, through the medium of the levers *e e*.

The lifters *d d* are rigidly connected with a sleeve *d*<sup>1</sup>, which works loosely on the shaft *g*, or may be connected therewith.

These lifters receive their motion from a crank, *e*<sup>2</sup>, on the shaft *a*<sup>1</sup>, by means of a connecting-rod, *e*<sup>3</sup>, and crank-stem *e*<sup>4</sup>.

My improved construction commences at this point.

The crank-stem *e*<sup>4</sup> is rigidly connected with a ring, *i*, which plays in a groove formed in the outer face of the sleeve *d*<sup>1</sup>, as shown, (fig. 3,) the parts of the sleeve contiguous thereto, on one or both sides, being, by preference, enlarged somewhat, as at *i*<sup>1</sup>, and the faces of the parts *i i* being flush with each other.

A pair of pawls, *s*, is loosely hung to the crank-stem *e*<sup>4</sup>, one on each side, and at or about the points where the lower ends of these pawls strike the parts *i i*, there I make ratchet-teeth or shoulders *s*<sup>1</sup>, so that as the crank-stem *e*<sup>4</sup> vibrates back and forth the pawls *s*, engaging the shoulders *s*<sup>1</sup>, will, through the sleeve *d*<sup>1</sup>, cause the lifters *d* to operate with a rocking motion, as required.

I now propose at any desired point in the stroke of the main piston to throw the pawls *s* out of gear with the shoulders *s*<sup>1</sup>, so that the lifters *d*, as soon as the pawls are disengaged, shall, under the weight of the levers, return to a level, thus closing the steam-inlet valves and cutting off the supply of steam.

To do this I use a reciprocating frame, B, shown more fully in fig. 4. It receives its motion by means of the rod *f*, crank *f*<sup>1</sup>, rock-shaft *f*<sup>2</sup>, and crank *f*<sup>3</sup>, fig. 1, or by similar connections from any desired part of the main reciprocating devices.

On the side rails *h* of the reciprocating frame B I arrange a pair of adjustable sliding trippers, *r r*, their forward ends—that is, the end of each next the pawl *s* on that side—being made sloping, inclined, or wedge-shaped, as shown.

Projecting from the edge of each pawl *s*, so as to be directly in the path of the trippers, is a lug, *x*. Then, as the frame B moves either way, the inclined trippers *r* strike the lugs *x*, throw the pawls alternately out of gear with the ratchets *s*<sup>1</sup>, whereupon the weight of the valve-lever *e* on the lifter *d*, then up, causes the lifters *d* to come to a level and closes the valve. The steam is thus cut off at the latter end of the stroke.

In order to vary this cut-off point at pleasure, the trippers *r* may be slid along the rails *h* either way, and fixed in place by any known devices ordinarily used for such purposes, so that they shall engage the lugs *x* at an earlier or later point in the stroke, at pleasure.

As one device for effecting such adjustment I have shown the screws *y y*, the forward ends of which are connected with eye-pieces *r*<sup>1</sup> *r*<sup>1</sup>, which latter are connected each with its tripper *r*.

The screws gear into and work each other by means of gear-wheels *y*<sup>1</sup> *y*<sup>1</sup>, whereby, by the turning of either screw either way, the other is turned the same amount the opposite way, and the trippers *r* are moved an equal distance in opposite directions. The steam is thus cut off in each stroke at the same point in the stroke.

The lugs *x x* may be attached to the trippers *r* instead of the pawls *s*, it only being necessary in this respect that the trippers and pawls shall be relatively



so arranged that the former shall engage the latter and release them from contact with the shoulders *s'*.

The devices described are equally applicable to steam-boat engines, in which use it is often necessary to back on the engine; though for such purpose the usual extra crank for the reversing cam-rod and the hooked cam-rod crank-connection should be added.

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

1. A pair of pawls, *s*, loosely hung to the stem *e'*, the ends of such pawls alternately engaging shoulders *s'*, or other equivalent device of the sleeve *d'*, when combined with suitable tripping devices for disengaging the pawls before the end of stroke, substantially as and for the purposes set forth.

2. A pair of trippers, *r r*, adjustably arranged on a reciprocating frame, in combination with the pawls *s s*, and engaging lugs, substantially as and for the purposes set forth.

3. In combination with the trippers *r r*, the screws *y y* geared together, whereby by a single motion the trippers will be simultaneously adjusted by any desired length of movement, substantially as described.

In testimony whereof I, the said JAMES REES, have hereunto set my hand.

JAMES REES.

Witnesses:

G. H. CHRISTY,  
ANDREW HUMBERT.