

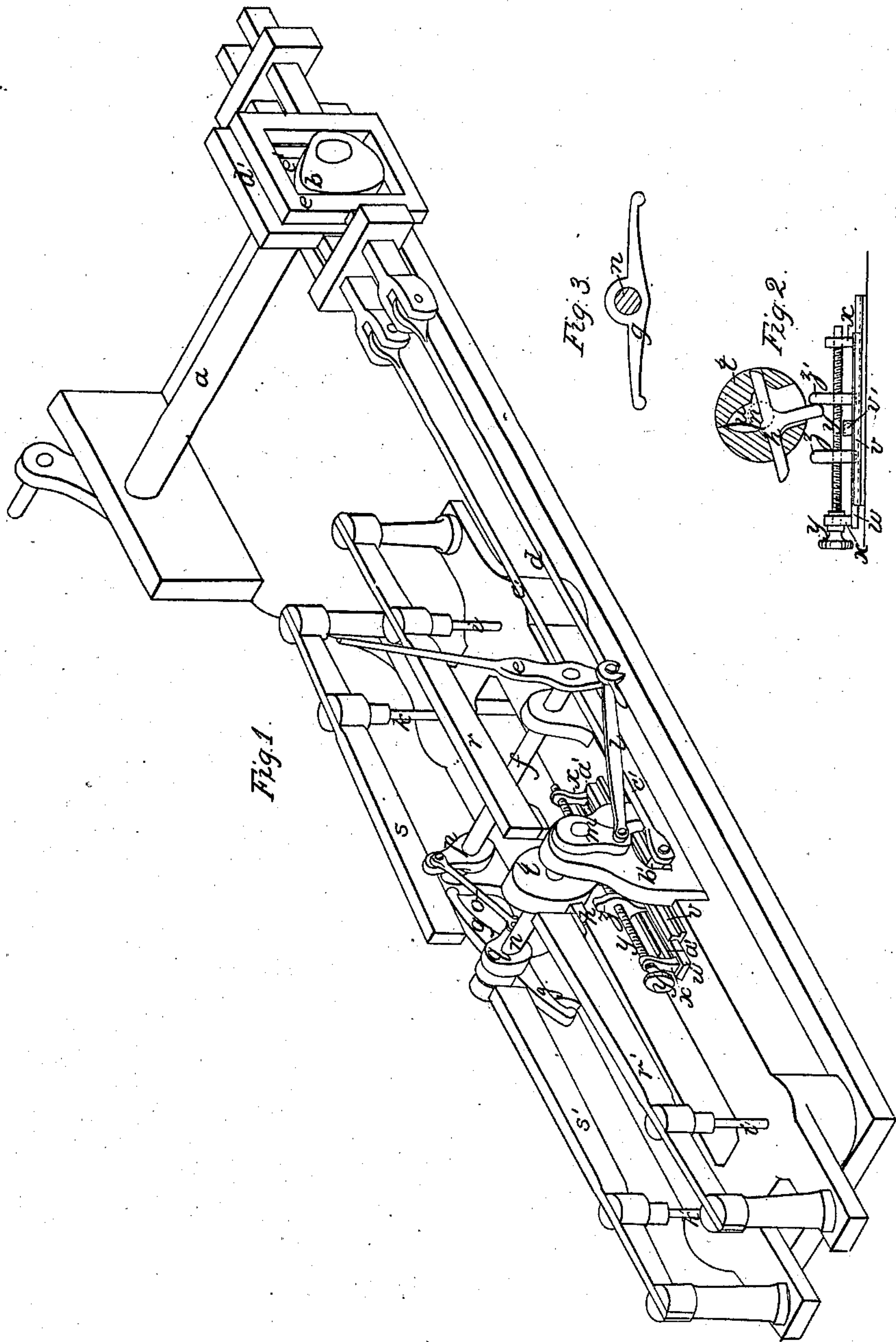
The specification to which this
is not in answer

Hartney & Morron,

Steam Cut-Off.

N^o 15,650.

Patented Sep 2, 1856.



UNITED STATES PATENT OFFICE.

ANDREW HARTUPEE AND JOHN MORROW, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS
TO J. P. HAIGH, A. HARTUPEE, AND J. MORROW.

ADJUSTABLE CUT-OFF FOR STEAM-ENGINES.

Specification of Letters Patent No. 15,650, dated September 2, 1856.

To all whom it may concern:

Be it known that we, ANDREW HARTUPEE and JOHN MORROW, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawing, forming part of this specification, in which—

Figure 1, is a perspective view of a portion of a horizontal engine, showing our improvement. Fig. 2, is a representation of an improved cut off attachment.

Our improvement consists in an improved adjustable cut off, to be applied to the valves for admitting steam into the engine; so arranged that the steam can be cut off at any portion of the stroke from $\frac{1}{4}$ stroke to full stroke, and yet capable of speedy adjustment and variation, at the will of the engineer, while the engine is in full operation.

In the drawings, Figure 1, *a* is the main shaft worked by the engine; *b* is a cam, working in a cam yoke *c*. To the cam yoke *c*, is attached the cam rod *d*, which communicates an intermittent motion to the starting bar *e*, attached to the shaft *f*, in the usual manner, for the purpose of communicating the proper movement to the lifters, *g* and *h*, for raising and dropping the levers of the puppet valves *i*, *i'*, *k*, *k'*. The lower extremity of the starting bar *e* is attached by a coupling rod *l* to the crank *m*, on the shaft *n*. The shaft *n* carries the lifters *g* and *h*. The lifter *g* moving on the shaft with a reverse motion to the shaft *n*, while the lifter *h*, is attached to and works with the shaft *n*. The cam rod *o* connects the crank *p* on the shaft *f*, with the crank *q*, attached to the lifters *g* in such a manner that the lifters *g* and *h* have a reverse motion as before stated, so that when one extremity of the lifter *g* is raised, the corresponding end of the lifter *h* is lowered. This is, so far, the ordinary arrangement to give the proper alternate motion to the valve levers *r r*, *s s*, of the puppet valves *i i'*, *k k'*, and therefore need not be more particularly described.

Now if the lifter *h*, which operates the levers of the valves *i*, *i'* to admit the steam into the cylinder were of the same shape and construction as the lifter *g*, which operates the levers of the exhaust valves *k*, *k'*,

the valve *i'*, to admit the steam into the forward end of the cylinder would be raised at the same moment that the valve *k* is opened to exhaust the steam from the rear end of the cylinder, and would remain up until the end of the full stroke, that is until the valve *i*, to admit the steam into the rear end of the cylinder, and the valve *k'* to exhaust the steam from the forward end of the cylinder, were raised; and of course there would be no cut off at all. Instead, then, of using such a lifter as *g* for the valves *i i'*, to admit the steam into the cylinder, we adopt an entirely different arrangement, which constitutes our improvement in that part of the steam engine and which we will proceed to describe.

Attached to the shaft *n*, in a line with the levers *r*, *r*, of the puppet valves *i*, *i'* which admit the steam into the cylinder, we place a circular box *t*, which is concentric with the shaft *n*. The shaft *n* is attached to each side of this box *t*, and does not pass through it, as that would interfere with the motion of the lifter *h*. This box *t*, has a T-shaped cavity, (see Fig. 2) in which the lifter *h* is placed, and which is large enough to give sufficient play to the lifter *h*. The lifter *h* is T shaped, (see Fig. 2,) the lower extremity protruding out of the circular box *t* a sufficient distance, and the extremities of the head of the T also projecting horizontally from the circumference of the circular box *t*, a little below its center. A spring *u*, attached to the box *t*, and having room to play has its extremity resting in a notch in the head of the T-shaped lifter *h*, midway from either end. When the lifter *h* is at rest, the spring *u* keeps it uniformly in the middle of the box *t*, with each extremity of the head appearing a short distance outside of the periphery of the box *t*. This spring also enables the lifter *h* to regain its position after the pressure exerted on its lower extremity to push it to one side or the other is removed.

There is attached to the frame of the engine, horizontally, immediately under the center of the shaft *n*, a guide or way *v*, in which a slide *w*, works freely back and forth. This slide, *w*, has at either end an upright, *x*, *x*, supporting a right and left screw shaft *y*. This screw shaft *y*, turns freely in the uprights, *x*, *x*, as journal boxes; the journals at either end of the screw, *y*,

being smooth, and not having the screw cut on them; so that the screw shaft, *y*, retains its relative position to the slide *w*. The threads of the screw shaft, *y*, run in one direction from one extremity of the shaft *y*, to the middle of it; and in the opposite direction from the middle to the other extremity; thus forming a right and left screw. Two stops *z*, *z'*, with a female screw through the center of each, fitting on the screw shaft *y*, are placed, one on either end of the center. The lower extremity of each stop *z*, *z'*, traverses a groove *a'*, in the slide, *w*, which causes the stops to pass back and forth on the screw shaft, *y*, as it is turned. The upper extremity of each stop *z*, *z'*, projects upward high enough to come in contact with the projecting extremity of the T-shaped lifter *h*. The effect of the right and left screw shaft *y*, on its traversing stops *z*, *z'*, is to cause the stops *z*, *z'*, to advance or recede a uniform distance on the shaft, to or from either end; as the screw shaft *y*, is turned in one way or the other an arm, *b'*, projects horizontally from the slide *w*, at right angles to it, and is attached to the extremity of the rod *c'*, which is connected with the cam yoke *d'*, around the cam *e'*, on the main shaft *a*, by which a reciprocating motion is communicated from the shaft, *a*, at each stroke of the engine, and corresponding therewith.

The operation of this arrangement of parts is as follows: So soon as the stroke of the engine commences, the crank, *m*, turns its shaft *n*, and simultaneously with the lifting by the lifter *g*, of the lever *s*, and exhaust valve *k*; the box *t*, being turned on its center on the shaft *n*, (in the opposite direction from the lifter *g*) tilts up the extremity of the lifter *h*, on which rests the point of the lever *r'*, of the adit valve *i'*, to admit the steam into the forward end of the cylinder. In this elevated position it would retain the lever *r'*, were it not that the slide, *w*, being drawn back, in its way *v*, by the action of the cam *e'*, and cam rod *c'*; before the stroke is terminated, the upper extremity of the stop *z*, attached to the screw shaft *y*, comes in contact with the projecting extremity of the T-shaped lifter *h*, and draws it back in its box *t*, until the point on which the lever *r'*, rested, is drawn into the box *t*, and no longer supporting the lever *r'*, the lever drops at once, cutting off the communication of the steam with the cylinder by closing the adit valve *i'*.

On the return stroke of the engine, the like process is repeated with the other adit valve *i*; for as soon as the lifter, *g*, raises the lever *s*, and exhaust valve *k'*, the opposite extremity of the T-shaped lifter *h*, on which the point of the lever *r* rests, being tilted up by the turning of the box *t*, on its shaft *n*, raises the lever *r*, and adit valve *i*, admitting steam into the rear end of the cylinder; but no sooner does the stop *z'* come in contact with the lower extremity of the T-shaped lifter *h*, than it is drawn back, and the lever *r*, having no support, drops, closing its valve *i*, the exhaust valves *k*, *k'*, meanwhile working full stroke. This closing of the adit valves *i*, *i'*, alternately, by means of the stops *z*, *z'* coming in contact with the lower extremity of the lifter *h*, may be caused to take place at any point of the stroke from $\frac{1}{4}$ stroke, by simply turning the screw *y*, so as to bring the stops *z*, *z'*, closer together, or moving them farther apart; the closer they are together the sooner will the steam be cut off on each stroke of the engine.

It is manifest that the point of the stroke at which the steam is to be cut off may be fixed with the greatest precision, and varied at pleasure by merely turning the screw *y*, so as to bring the stops *z*, *z'* closer together to cut off sooner, or moving them farther apart to work more steam. The advantages of this arrangement are so obvious that it is unnecessary to enlarge on them.

Our improvements are described as applied to horizontal engines, but by obvious arrangement and adaptation of parts, they may be equally well applied to engines working perpendicularly.

Having thus described our improvements in steam engines, what we claim as our invention and desire to secure by Letters Patent is,—

The combination of the T-shaped lifter, slide, screw and stops, or their equivalents; constructed and arranged as described; and operating as an adjustable cut off for steam engines; in the manner hereinbefore set forth.

In testimony whereof we have hereunto set our hands.

ANDREW HARTUPEE.
JOHN MORROW.

Witnesses:

WM. N. HOWARD,
AND. McMASTER.