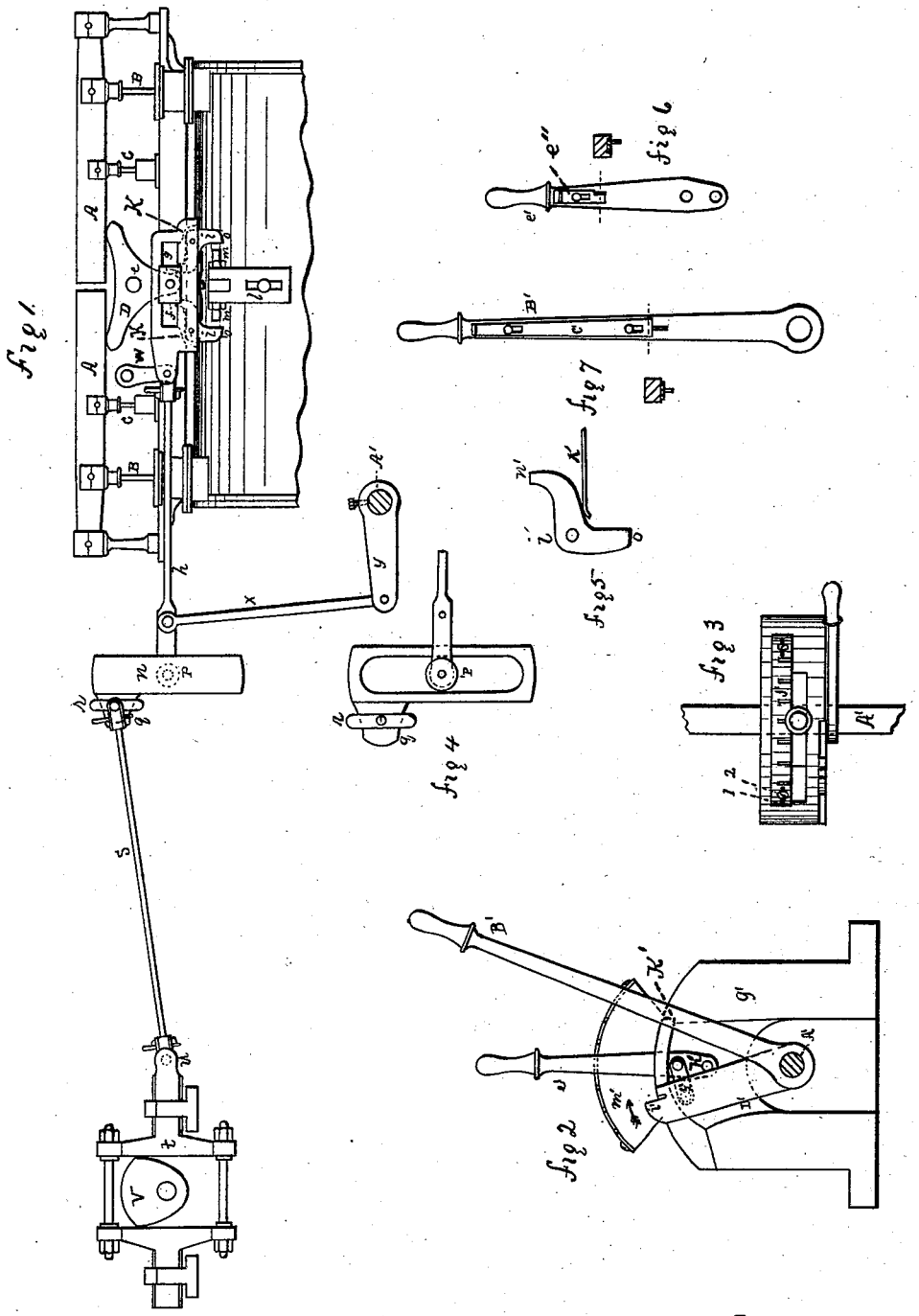
E. SPRAGUE.

Valve-Gear for Engines.

No. 210,059. Patented Nov. 19, 1878.



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IMPROVEMENT IN VALVE-GEARS FOR ENGINES.

Specification forming part of Letters Patent No. **210,059**, dated November 19, 1878; application filed August 17, 1878.

To all whom it may concern:

Be it known that I, EDWIN SPRAGUE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Cut-Off and Reversing Device for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to an improvement in cut-off and reversing device for steam-engines; and consists in a tripping device, connected to the rock-shaft, which operates the valve-levers connected with the cylinder of the engine, and, in combination with said tripping device, a peculiarly-constructed link, in combination with cam-rods, cam, cam-yoke, connecting-links, and shifting-levers, the whole being combined and operating so as to cut off the supply of steam at any desired point during the travel of the piston, and reverse the motion of two engines and operate their cut-off mechanism.

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

In the accompanying drawings, which form part of my specification, Figure 1 is a side elevation of the cut-off and reversing mechanism for a single engine. Fig. 2 is a sectional view, representing the arrangement of the reversing and cut-off levers. Fig. 3 is a top view of the same. Fig. 4 is a section of the link used in connection with the cam-rod and tripping device connected with the rock-shaft. Fig. 5 is a detailed view of one of the trippers. Fig. 6 is a side view of the shifting-lever used in connection with an adjustable holder. Fig. 7 is a side view of the shifting-lever used in connection with a shaft for connecting the cut-off and shifting device of two engines.

In the drawings, A represents the levers for operating the valves B of the steam-ports, C being an ordinary cushioning-chamber for the levers. D is a rocking plate, below the pivot-point *e* of which is placed a pivoted slide-block, *f*, which moves in a guide, *g*, which is attached to the connecting-rod *h*. Tappets *i* are pivoted to the guide *g*, and held in position by the springs K. (Shown by dotted lines.)

Below the guide *g*, and between the tappets *i*, is an adjustable piece or block, *l*, having the adjustable screws *m*, which are for determining the point at which the tappets *i* shall release their hold on the pivoted slide-block *f*, thereby releasing the positive travel of the rocking plate D, which will allow the levers A to drop at any desired point in accordance to the position of the connecting-rod *h* in the link *n* and the distance between the outer ends of the adjustable screws *m* and the arms *o* of the tappets *i*.

The link *n* is pivoted in the center, and is recessed for the purpose of receiving anti-friction wheels *p*, pivoted on the end of the connecting-rod *h*, as shown in Fig. 4.

To one side of the link *n*, at its upper end, is a side projection, *q*, in which is placed an adjustable piece, *r*, to which is pivoted a connecting-rod, *s*. The position in which this adjustable piece is placed relatively to the pivotal point of the link *n* regulates the extent of the vibrations of the link attached to the cam-yoke *t* at *u*. In the cam-yoke is a cam, *v*.

To the connecting-rod *h* is attached a pivoted arm, *w*, for holding it and the guide *g* in the proper position. To the rod *h* is also attached a rod, *x*, which is attached at its lower end to an arm, *y*, on the shaft A′, used for connecting together the reversing and cut-off gear of two engines, but one of which, however, is here shown.

On the shaft A′ is secured a shifting-lever, B′, provided with a holding-latch, C′. On the shaft A′ is pivoted a holder, D′, which is connected to a shifting-lever, *e′*, by means of a link, *f′*.

The lever *e′* is pivoted to a stand, *g′*, at *h′*, and is furnished with an adjustable holding-latch, *e*. The stand *g′* is furnished with a plate, J′, rendered adjustable, as by means of slots 1 and set-screws 2, and which is provided with a series of notches for holding the lever *e′* and adjustable holder D′ in the desired position for holding the shifting-lever B′ in its proper position for cutting off the steam at any desired point in the travel of the piston. The stand *g′* is provided with a notch, K′, (shown in dotted lines,) and when the latch C′

of the shifting-lever B′ is in the notch K′ (shown in dotted lines) the motion of the engine will be reversed; and when the holder D′ is in the position represented in Fig. 2, and the latch C′ of the shifting-lever B′ is placed in the notch *l′*, the engines will be working forward at full stroke; and by moving the holder D′, through the medium of the lever *e′*, back in the direction indicated by the arrow *m′*, and placing its latch in the proper notch of the plate J′, the steam will be cut off at the desired point of the travel of the piston. The steam may be cut off at any desired point of the travel of the piston, either in the forward or backward travel of it, by suitably moving the levers B′ and *e′*, and holding them in a fixed position by the means hereinbefore stated—viz., through the medium of the latches and notches.

The arms *o* of the tappets *i* should be sufficiently heavy to hold up the arms *n′* in gear with the pivoted slide *f*, in case the springs K should break or otherwise become inoperative.

When the cut-off device hereinbefore described is used in a non-reversing engine, the connecting-rod *h* is connected direct with the cam-yoke *t*, in which case the link *n*, connecting-rod S, shaft A′, levers B′ and *e′*, holder D′, and stand *g′* are dispensed with, and the cut-off regulated through the medium of the screws *m* in the adjustable piece or block *l*, which piece may be raised or lowered, at the will of the operator, for the purpose of removing the screws *m* from between the tappets *i*, or bringing them between said tappets, as may be desired. When the piece *l* is lowered so that the screws *m* are removed from between the tappets *i*, the engine will be working full stroke; but when the piece *l* is placed between the tappets *i* the tripping-screws *m* can be adjusted to cut-off the steam at any desired point of travel of the piston. The motion of the engine is reversed by the shifting of the rod in the usual manner.

From the foregoing description and by reference to the accompanying drawings the skilled mechanic will readily understand my invention.

Having thus described my improvement, what I claim as of my invention is—

1. The rocking plate D, provided with a pivoted slide block, *f*, moving in a guide, *g*, furnished with tappets *i*, in combination with the adjustable block having tripping-screws *m* and connecting-rod *h*, substantially as herein described, and for the purpose set forth.

2. In combination with the connecting-rod *h*, the link *n*, connecting-rod S, with the cam-yoke *t*, and guide *g*, and slide block *f*, tappets *i*, and adjustable block having tripping-screws *m*, substantially as herein described, and for the purpose set forth.

3. The recessed link *n*, for the reception of anti-friction wheels *p* on the end of the connecting-rod *h*, substantially as herein described, and for the purpose set forth.

4. The link *n*, provided with side projections *q* and adjustable piece *r*, in combination with the connecting-rod S, cam-yoke *t*, and cam *v*, substantially as herein described, and for the purpose set forth.

5. Pivoted on the shaft A′, a holder, D′, in combination with the lever *e′*, lever B′, stand *g′*, and notched plate J′, substantially as herein described, and for the purpose set forth.

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Witnesses:
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