Scott & Eckart,

Steam-Engine Valve-Gear.

No. 66,046. Patented June 25, 1867.

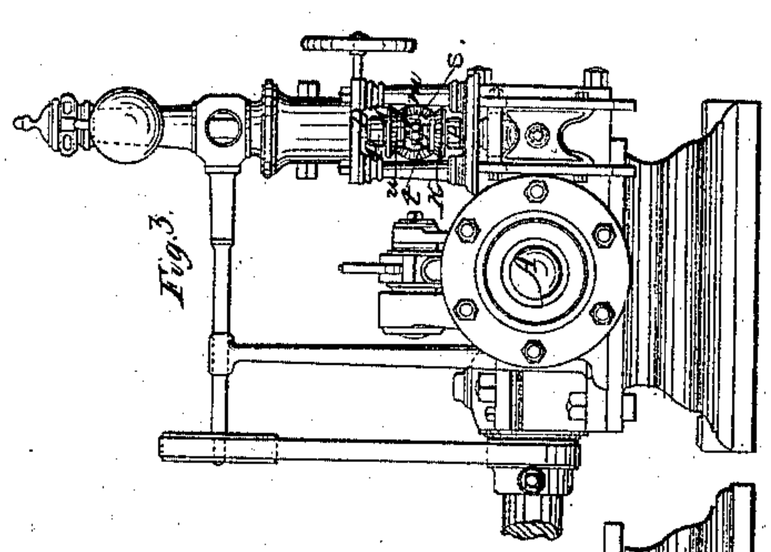
Fig. 3.

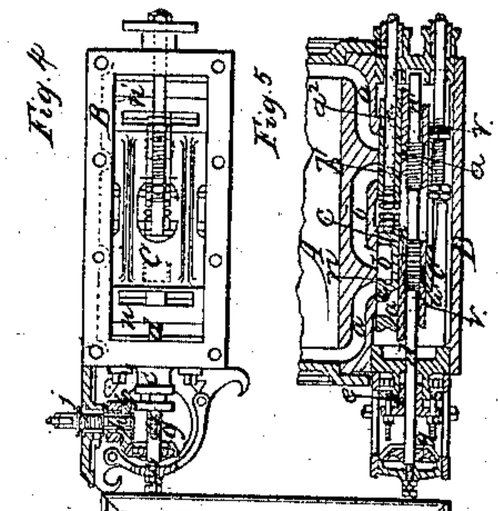
Fig. 4

Fig. 5

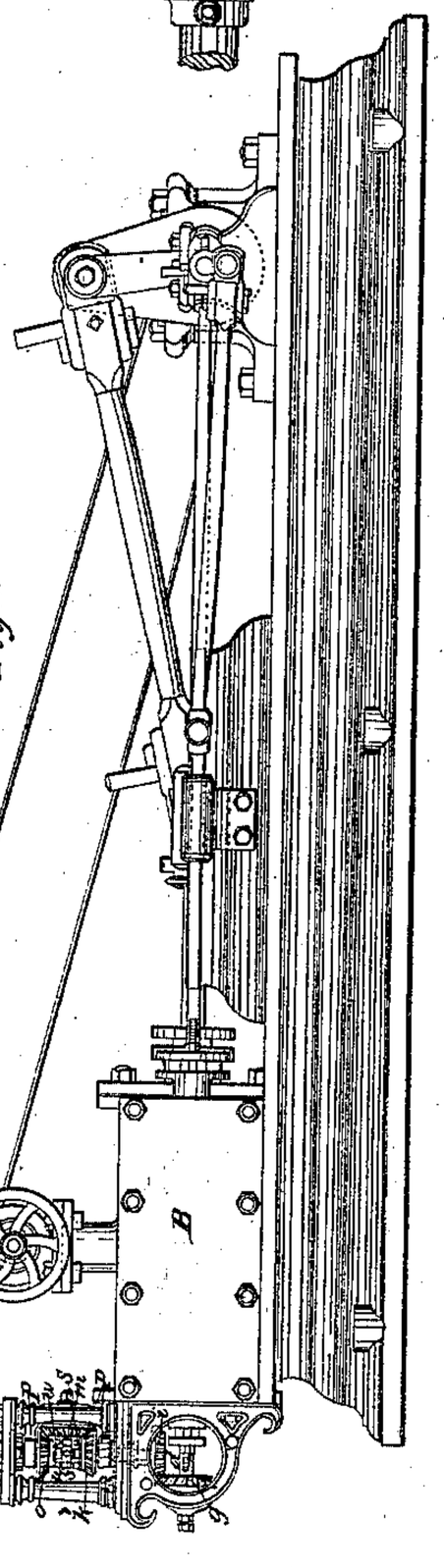
Fig. 1.

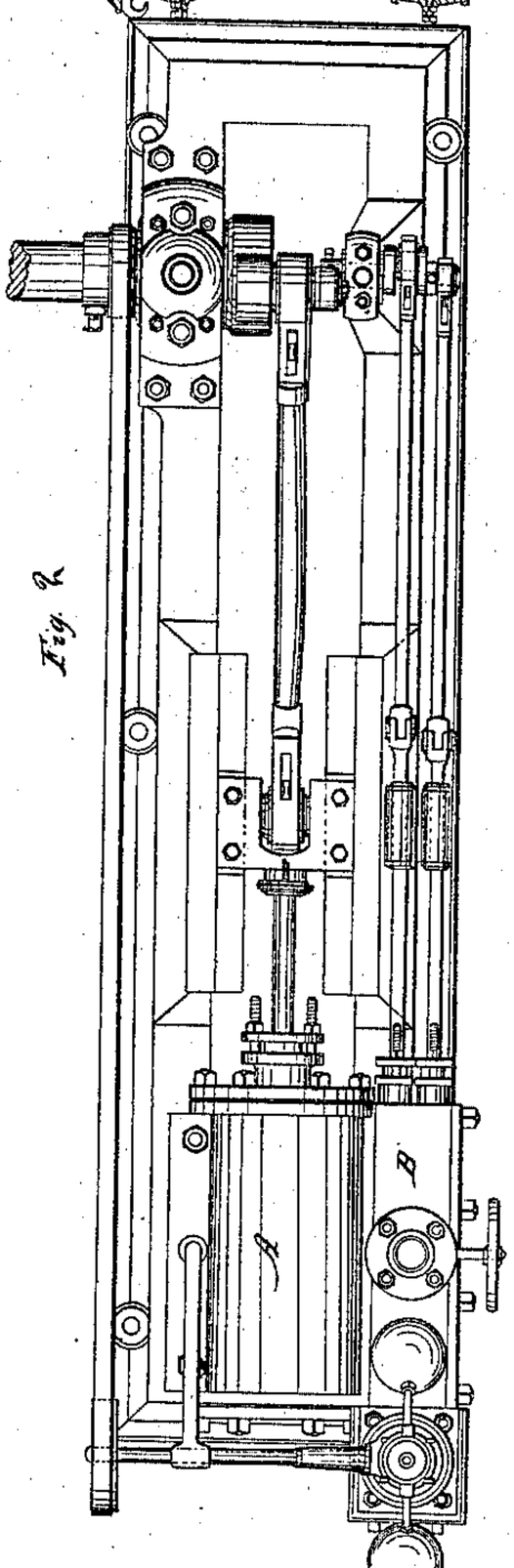
Fig. 2

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IRVING M. SCOTT AND WILLIAM ROBERTS ECKART, OF SAN FRANCISCO, CALIFORNIA.

Letters Patent No. 66,046, *dated June* 25, 1867.

IMPROVEMENT IN CUT-OFF VALVES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, IRVING M. SCOTT and WILLIAM R. ECKART, of San Francisco city, San Francisco county, State of California, have invented certain new and useful improvements in "Steam Engines;" and we do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use our said invention without further invention or experiment.

The nature of our invention is to provide an improved "self-adjusting cut-off" for stationary engines, so designed and constructed as to admit of a slide-valve being used for admitting steam to and from the cylinder of a steam engine. This end is accomplished by constructing an engine in the ordinary manner with a main valve, to admit the steam to and discharge it from the cylinder. Upon the back of this valve are two cut-off plates, having one opening in each. Through these plates, and parallel with the valve-face, passes a rod, having cut upon it one right and one left-hand screw working in corresponding nuts, which are fast to the cut-off plates or movable partitions. This rod, if turned in one direction, moves the plates nearer together, and when turned in the opposite direction, separates them. This screw receives its motion from the governor. On the back of the cut-off plates works the cut-off valve. This valve has a constant travel or throw. The motion of this valve is opposite or nearly opposite to that of the piston of the engine. The cutting off of the steam takes place by the cut-off valve coming in contact and passing over the outer edge of the cut-off plates. If the cut-off plates are moved close together, steam will be cut off sooner; if separated it will be cut off later. The position of the cut-off plates is entirely regulated by the engine.

To more fully explain our invention, reference is had to the accompanying drawing and letters marked thereon, in which—

Figure 1 is a side elevation, with our invention attached.

Figure 2, a plan.

Figure 3, an end view.

Figure 4, side view of steam-chest, with cover off.

Figure 5 is a transverse section of steam-chest, cut-off plates, valves, and part of steam-cylinder.

Similar letters of indicate like parts in each of the figures.

A is the steam-cylinder of the engine, with the steam-chest B. *a a* are the induction ports, and *b* is the exhaust port. *c* is the main valve, which is moved by a rod from the shaft in any suitable manner. This valve has passing through it two steam ports, a^2 a^2, and has in it two exhaust ports, *b'* and *b'*. On the back of the main valve are two cut-off plates, or movable partitions, *n n'*, each of which has an opening, *v*, through which to admit steam. Passing through these cut-off plates is a rod, *d*. Upon this rod is cut a right and left-hand screw, working in the nuts *d'* and *d'*, which are fast to the cut-off plates *n* and *n'*. If this rod is turned in one direction, the plates *n* and *n'* are brought closer together; if turned in the opposite direction they will be separated. The cut-off valve C is placed on the back of these two plates, and is moved by the engine-shaft in an opposite direction, or nearly so, to that of the piston of the engine. The rod *d*, which operates the plates *n* and *n'*, passes through a stuffing-box, *e*, at the end of the steam-chest, and has fast on its outer end a gear-wheel, *g*. In connection with this wheel works the wheel *i*, having a hub upon it, which serves to keep it in position. Through the centre of the wheel *i*, and its hub, is cut a feather-way. In the hub is the end of a spindle or shaft, *h*, fig. 4, having a feather in its lower end, which works in the feather-way in the wheel *i*. On the upper end of the spindle *h* is fast a wheel, *k*. Between the wheels *i* and *k*, cut upon the spindle *h*, is a screw, J, working in a nut or screw, *j*, cut or fast in the plate. At right angles to the wheel *k* is a dummy or change-wheel, *m*, whose teeth engage in *k* and *o*. *o* is a wheel having a hub on its upper side, which serves to keep it in position. On its under side are fast the projecting pins or lugs *u u*, similar to the lugs *r r*, fast on the wheel *k*. The three wheels *k*, *m*, and *o* are held in position by means of the yoke *p*, whose end embraces the hub on the upper face or back of the wheel *o*; its middle carries the wheel *m*, and its lower end rests loosely upon the spindle *h*, just under the wheel *k*. Passing through the wheel *o* loosely, and its hub, is the governor-spindle D, having fast upon it, between the wheels *k* and *o*, a clutch, *s s*. The governor-spindle D is moved vertically up or down,

depending upon the speed of the engine, at the same time having a rotary motion. When steam is allowed to enter the steam-chest, after everything is arranged, the cut-off plates *n* and *n'* will have been so widely separated that the cut-off valve C will not cut off the steam from the main valve until the stroke of the piston is nearly or quite completed, the main valve allowing all the steam it receives through the openings *v v* in the cut-off plates to pass into the cylinder. As the engine attains a greater speed the governor-balls separate, causing the clutch *s s* to engage in the lugs *t t*, on the wheel *k*, communicating a rotary motion (in the direction that the governor-spindle D is revolving) to the wheel *k*, spindle *h*, and wheel *i*; the wheel *i* always being in contact with the wheel *g*, fast on the rod *d*, which rod, through the motion it receives, brings the plates *n* and *n'* closer together, thereby allowing the cut-off valve C to cut off the communication to the ports a^2 a^2 through the passage *v v*, in the cut-off plates *n* and *n'* sooner. When the engine has attained the speed for which it was designed, the clutch *s s* travels midway between the points of the lugs *u u* and *t t*, allowing the wheels *o* and *k* to remain at rest. If the speed of the engine is decreased below its regular speed, the governor causes the clutch *s s* to engage in the pins *u u*, upon the wheel *o*, causing that wheel to engage or communicate, through the intervention of the wheel *m*, a rotary motion to the wheel *k*, spindle *h*, and wheel *i*, in an opposite direction to that in which the governor-spindle is revolving, causing the rod *d* to revolve in an opposite direction to its former motion, thereby separating the plates *n* and *n'*, allowing the steam to follow further in the stroke. To prevent the plates *n* and *n'* from being drawn too near together, or spread too far apart, and also to regulate the action of the governor upon the pins *u u* and *t t*, as well as to allow the governor-rod D to communicate to the rod *d*, as before described, exactly or nearly the same number of revolutions that the governor-rod D is making, the screw J upon the spindle *h* is used, when the governor brings the clutch *s s* in contact with the lugs on the wheel *k* and yoke *p*, the yoke carrying with it the wheels *m* and *o*. If the balls of the governor should take the extreme position allowed them, shown in the greatest outward position in figs. 1, 2, 3, the screw J will have lowered the wheel *k* until the clutch *s s* can no longer engage with the lugs *t t*, the cut-off plates *n n'* will have been moved close enough together to have cut off all the steam, or nearly all, and cannot be moved any nearer by the governor. If the governor-balls should lower, the clutch *s s* will engage with the lugs *u u*, which will move the screw J in the opposite direction, which will raise the yoke *p* and wheels *k m o*, and at the same time spreading the plates apart, and admitting more steam, until the governor-balls have lowered as far as possible, when the lugs *u u* will have been moved by the screw J out of contact with the clutch *s s*; then the cut-off plates will have been moved apart to their extreme position, as shown in figs. 4 and 5, admitting full, or nearly full, steam to the engine, through the ports *v v*, a^2 a^2, and *a a*. If the wheels *k*, *m*, and *o* were prevented from moving vertically up and down, when the clutch *s s* engaged with the lugs *t t*, the governor would keep moving the cut-off plates nearer together, and cutting off steam shorter, until the engine had reduced its speed enough to allow the weight of the ball to overcome the friction between the clutch *s s* and lugs *t t*, which would be very great if the rod *d* communicated a quick motion to the cut-off plates *n n'*. By using the screw J to raise or lower the wheels *k*, *m*, and *o*, if the clutch *s s* engages with the lugs *t t* or *u u*, the friction is overcome, and the lugs *t t* or *u u* are moved out of contact with the clutch *s s*, by means of said screw, thereby allowing the governor to work easier, and to control the motion of the cut-off plates *n n'* quicker.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The movable plates or partitions *n n'*, arranged between and in contact with the main valve *c* and cut-off valve C, substantially as described.

2. The screw J and spindle *h*, together with the wheels *k m o* and the yoke *p*, arrangement for disengaging the plates *n n'* from the action of the governor, substantially as described.

In witness whereof we have hereunto set our hands and seals.

IRVING M. SCOTT, [L. S.]
WM. ROBERTS ECKART. [L. S.]

Witnesses:
C. W. M. SMITH,
GEO. H. STRONG.