2 Sheets--Sheet 1.

WILLIAM SELLERS.

Improvement in Oscillating-Engines.

No. 127,928. Patented June 11, 1872.

Fig. 1.

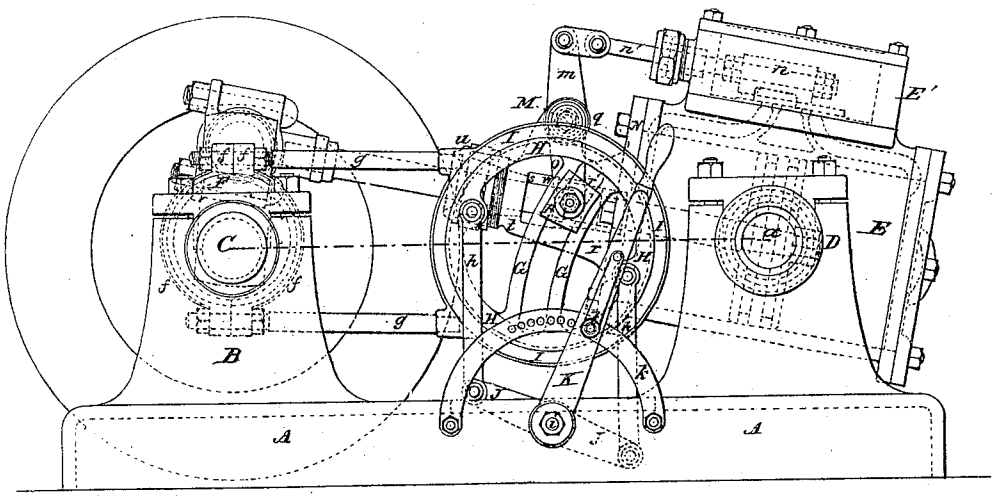


Fig. 4.

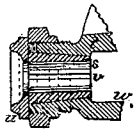
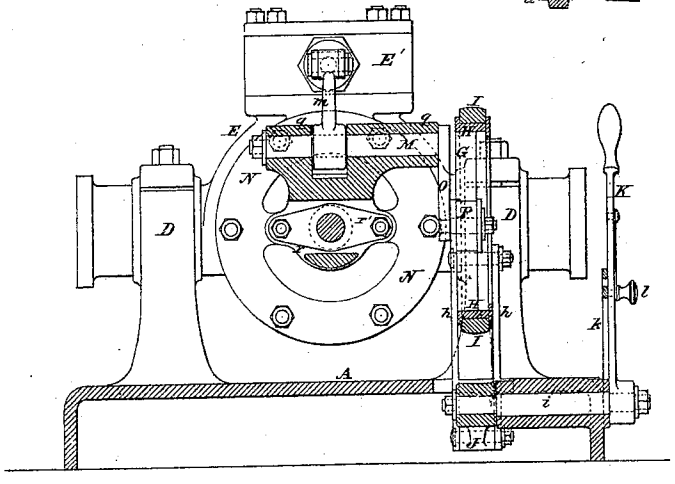


Fig. 5.

Fig. 3.



Witnesses:

T. C. Brecht.

Edwd. C. Davidson.

Inventor:

Wm Sellers
by his Atty
Wm. B. Bakewell

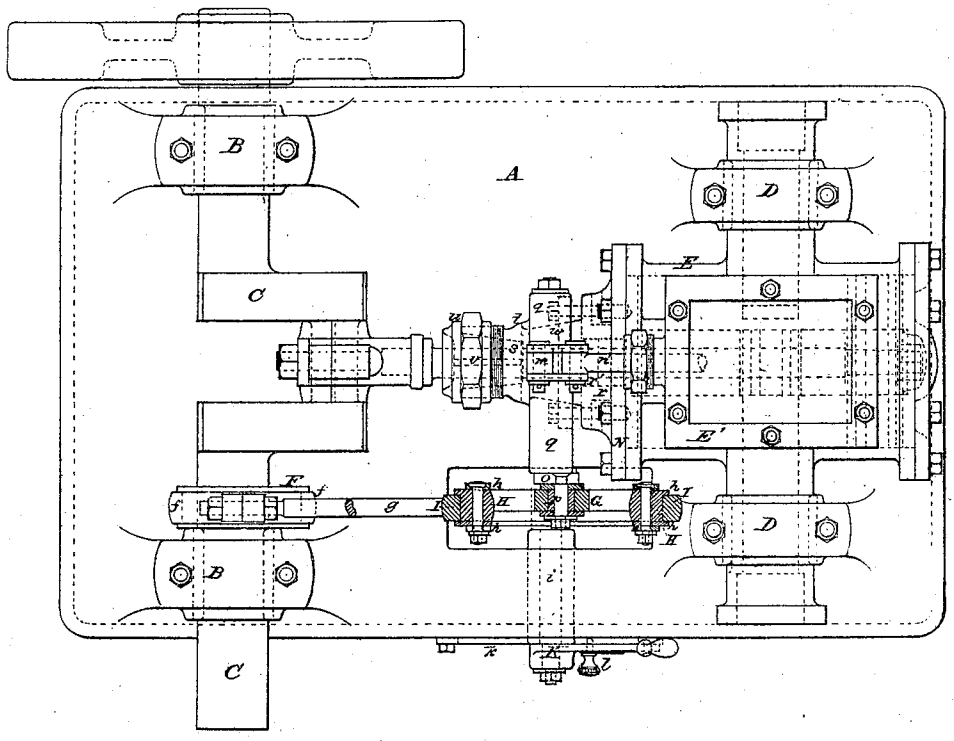
2 Sheets--Sheet 2.

WILLIAM SELLERS.

Improvement in Oscillating-Engines.

No. 127,928. Patented June 11, 1872.

Fig. 2.



Witnesses:

T. C. Brecht.

Edwd. C. Davidson,

Inventor:

Wm Sellers

by his Atty

Wm D. Baldwin

UNITED STATES PATENT OFFICE.

WILLIAM SELLERS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN OSCILLATING ENGINES.

Specification forming part of Letters Patent No. 127,928, dated June 11, 1872.

To all whom it may concern:

Be it known that I, WILLIAM SELLERS, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Oscillating Engines, of which improvements the following is a specification:

The objects of my invention are, first, to provide an improved means of operating the valve of an oscillating engine; and, second, to provide an improved means of guiding the piston-rod and diminishing the wear upon the stuffing-box and follower; to which ends my improvements consist, first, in imparting to the valve a motion capable of variation, for the purpose of cutting off the steam, as desired, and of reversal, for the purpose of reversing the movement of the engine through the joint action of an eccentric and of the oscillation of the cylinder, by means of a combination of devices hereinafter set forth; second, in an adjustable guide separate from and independent of the stuffing-box, which receives and transmits to the cylinder the pressure and strain on the piston-rod developed in rotating the crank, and affords means for compensating wear of the parts, as hereinafter set forth.

In the accompanying drawing, Figure 1 is a side elevation of an oscillating engine to which my improvements are applied; Fig. 2, a plan or top view, partly in section, of the same; Fig. 3, an end view, partly in section; and Figs. 4 and 5, detached views of the piston-rod guide.

My improvements are shown as applied to a horizontal oscillating engine mounted upon a bed-plate, A, provided with proper shaft-bearings B B and trunnion-bearings D D. These parts require no peculiarity of construction or arrangement in the use of my invention, which is equally adaptable to horizontal, vertical, or inclined engines. The valve *n*, which works in a steam-chest, E′, on the top of the cylinder E, is suitably secured to a valve-stem, *n′*, and is operated in the following manner: An eccentric, F, is secured upon the crank-shaft C in line with the crank, its throw being made equal to the amount of lap and lead desired for the valve, and has its strap *f f* connected, by the rods *g g*, to a strap, I, encircling a ring, H. A curved slotted link, G, is secured to or formed in a piece with the ring H and centrally therewith. The concavity of the link G is toward the center of oscillation of the cylinder, the radius of its curvature being the distance from its center to the center of the trunnion *a*. The ring H is pivoted, by link-connections *h h*, to the arms J J of a rock-shaft, *i*, mounted in bearings in the bed-plate A, and provided with a hand-lever, K, in such manner that the oscillation of the shaft *i* will impart a similar motion to the ring H and link G within the strap I, the links *h h* serving to so support and guide the ring H that it can only move in the direction due to the throw of the eccentric and forming a swing-frame on which the ring H moves without deviating sufficiently from a straight line to affect the operation of the parts. The ring H and link G are maintained at any point by means of a spring-bolt, *l*, upon the hand-lever *k*, which takes into any one of a series of holes in a quadrant, *k*, secured to the bed-plate. A rock-shaft, M, is mounted in bearings *q q* on the cylinder-head N, its upper arm *m* being connected to the valve-stem *n′*, and its lower arm *o* carrying a block or die, *p*, resting and laterally confined in the slot of the curved link H and receiving a longitudinal sliding motion therein from the oscillation of the cylinder.

From the foregoing description the separate functions and combined operation of the several parts of my improved valve-motion will be readily understood. The valve receives a determined and constant motion for giving a uniform amount of lead from the eccentric, and a variable and reversible motion for cutting off the steam at different portions of the stroke, and for reversing the movement of the engine from the oscillation of the cylinder. The eccentric F imparts a uniform amount of reciprocating motion to the ring H and link G in the direction of the line C *a*, and this irrespective of the position of the link G, whether the same is concentric with the center *a* of the trunnion or set more or less obliquely in either direction. In Fig. 1 the engine is shown in head motion and as the relative direction of obliquity of the link G with a vertical line determines the direction in which the engine will run it will be perceived that the movement of the hand-lever K to the opposite side of the center of the quadrant *k*, for the purpose of reversing, changes the direction of obliquity

of the link G and correspondingly moves the valve *n* over the ports. It is also evident that the range of motion of the valve, and consequently the degree of expansion of the steam, varies in proportion as the die *p* works nearer to or further from the center of the link G—a matter dependent upon the relative amount of obliquity of the link G as regulated by the hand-lever. The eccentric terminates its throw in either direction simultaneously with the stroke of the piston, and the "lead" remains uniform under all other varying conditions, since the motion of the eccentric alone governs the valve at the time that the block *p* passes through the axis of the ring H and link G, at which point the valve is independent of any change of position of the link, and would be in the center of its movement, covering both steam-ports equally, if it were not for the motion imparted to it by the eccentric F.

Various modifications in the construction and relative arrangement of the several parts of my improved valve-gear may be made without departing from the spirit of my invention, as, for example, the eccentric F may be made to give motion to a reciprocating block or slide on which the curved link may be arranged to vibrate on a fulcrum and be adjusted by a single-link connection; or, instead of using the hand-lever K and its connections for varying the position of the link and holding it at any point of obliquity, this may be effected by a self-acting regulating mechanism for varying the point of cutting off in accordance with the varying duties of the engine. My improvements are simple in construction and readily applicable to engines of ordinary pattern. As compared with the ordinary link-motion, the number of parts is reduced and equally effectual means of cutting off and reversing provided.

The improved piston-rod guide, which is the subject of another part of my invention, consists of a substantial outer metallic bearing, *t*, formed in a piece with the cylinder-head N, and surrounding but separate from the stuffing-box *r* and follower *r'*, to which access is afforded by transverse openings *w* in the bearing *t*. The bearing *t* is suitably bored out to receive a split conical bushing or sleeve, *s*, encircling the piston-rod and held in place by a screw-follower, *u*. By means of the screw-follower *u* the split bushing *s* can be contracted so as to reduce its inner diameter, and thus any play from wear of the piston-rod against its inner surface can be taken up, while the sleeve *s*, being conical, can be turned about its axis, so as to distribute the wear equally over its entire inner surface. It is important, after making an adjustment of the split-bushing, that a packing-piece of suitable thickness should be inserted in the longitudinal cut or slit *v*, to prevent any undue further contraction of the bushing *s* upon the piston-rod. The additional lateral support given to the piston-rod by my improved guide relieves the stuffing-box and packing from strain, preventing wear and leakage of the packing, and enabling this class of engines to be run at high velocities without injury to the parts, which would otherwise be injuriously affected by the rapid oscillations of the cylinder.

I am aware that the valve of an oscillating engine has been heretofore actuated by the combined movements of the cylinder and of an eccentric in a different manner and by different devices from those employed by me.

I do not broadly claim this method of operating a valve; but

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

1. The combination, in an oscillating engine, of a curved link or arc, concave toward the axis of oscillation of the cylinder and provided with means for varying and adjusting the direction and degree of its obliquity, an eccentric which operates said link, and a sliding-block or die which transmits motion to the valve, these parts being constructed to operate in combination, substantially as hereinbefore set forth.

2. The combination of the bearing for the piston-rod and the adjustable sleeve, substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name.

WM. SELLERS.

Witnesses:

J. SNOWDEN BELL,

EDWD. C. DAVIDSON.