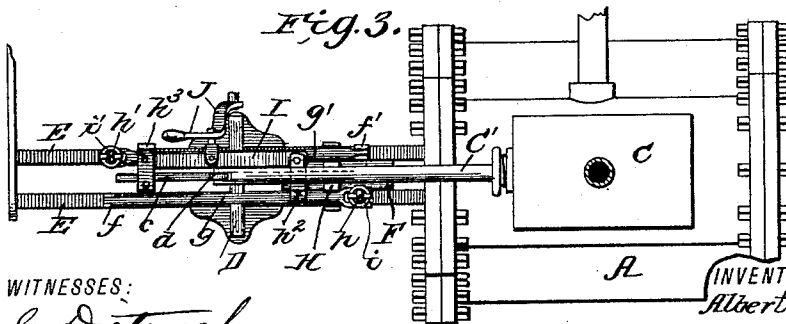
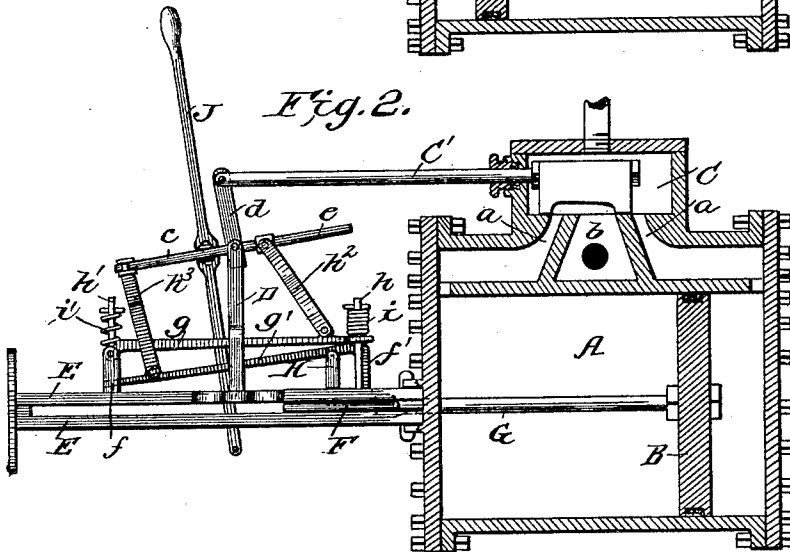
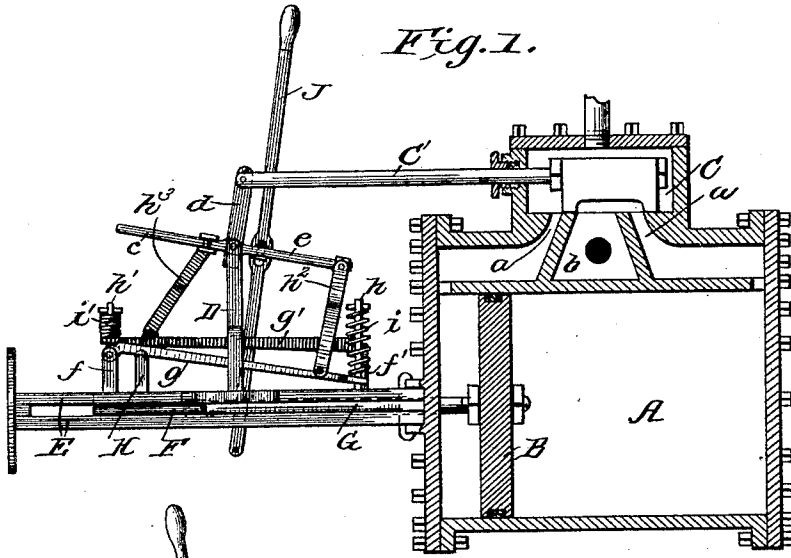


(No Model.)

A. M. SYKES.
VALVE GEAR.

No. 454,411.

Patented June 16, 1891.



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ALBERT M. SYKES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO CHARLES C. WEBBER, OF WILMINGTON, DELAWARE.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 454,411, dated June 16, 1891.

Application filed January 22, 1891. Serial No. 378,725. (No model.)

To all whom it may concern:

Be it known that I, ALBERT M. SYKES, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Valve-Gears, of which the following is a specification.

The object of my invention is to provide a new and simple form of valve-gear to take the place of the ordinary link-motion in locomotives and stationary engines for the purpose of reversing the stroke; and it consists in the peculiar construction and arrangement of parts, which I will now proceed to fully describe with reference to the drawings, in which—

Figure 1 is a side view of the valve-gear, shown in one position in connection with the piston and slide-valve. Fig. 2 is a similar view showing another position, and Fig. 3 is a plan view of the valve-gear.

A represents an ordinary steam-cylinder, B its piston, and C its slide-valve, the latter playing over and alternately connecting one of the induction-ports *a a* with the exhaust-port *b* in the usual way. The slide-valve is provided with a rod *C'*, which is jointed and reciprocated by the upright arm *d* of the double-elbow lever *c d e*. This double-elbow lever is fulcrumed to the upper end of stationary fulcrum frame or standard *D*, which is mounted upon the guide-bars *E E*, in which slides the cross-head *F*, attached to the piston-rod *G*. Upon each of the guide-bars *E* is mounted a short standard *f* and *f'*, to which are respectively jointed the ends of cam-arms *g g'*, the pivot or axis of the arms being reversed or at opposite ends from each other. The outer ends of these cam-arms are guided upon stems *h h'* and are forced downwardly by spiral springs *i i'*. Near the spring *i* one of the cam-arms is connected to one arm *e* of the double-elbow lever by a link *h*, and the other cam-arm is similarly connected by another link *h'* to the other arm *c* of the double-elbow lever. Attached to the cross-head and sliding under and lifting the cam-arms is a lift-plate *H*, which when the cross-head reciprocates lifts one or the other of the cam-arms and transmits through one or the other of the links an oscillating motion to the double-

crank lever for shifting the slide-valve in the normal operation of the engine.

In the operation of the engine the slide-valve is worked by only one of the cam-arms and links, the others being thrown out of use and being brought into play only when the engine is to be reversed. Thus, as shown in Fig. 1, the front cam-arm *g* is inclined downwardly at its spring end, so as to be acted upon by the lift-plate on the cross-head, while the other cam-arm is held in a horizontal position and is not lifted by the plate. In this position of the valve-gear, therefore, when the cross-head and piston moves to the right it lifts the cam-arm *g* and through the link *h* throws the arm *d* of the elbow-lever to the left to shift the valve, and when the cross-head moves to the left the spring *i* forces the cam-arm *g* and link *h* down and throws the elbow-lever to the right, moving the valve back again to its former position. Now it is obvious that as the cam-arms are pivoted at opposite ends they will act reversely upon the valve when lifted by the lift-plate, and I will now describe the means whereby the first-mentioned cam-arm is thrown out of action and the rear one brought into action to reverse the stroke of the valve and piston. The links *h h'* are not connected directly to their respective arms *c* and *e* of the elbow-lever, but are connected (see Fig. 3) to the opposite ends of a horizontal shifting bar *I*, whose ends embrace the arms *c e* of the elbow-lever. This shifting bar *I* is thrown to the right or left by means of a hand-lever *J*, which is fulcrumed at its lower end to some stationary part, and is slotted and provided with a sliding box, where it connects with the rectilinearly-sliding bar *I*, so as to compensate for the difference between the curved movement of the lever and the straight movement of the shifting bar *I*. Now when the lever *J* is thrown to the right, the upper ends of the two links *h h'* are thrown to the right. The effect of this is to throw the upper end of link *h* away from the center of the elbow-lever and throw the end of its cam-arm *g* down into the inclined or operative position, while the link *h'* lifts its cam-arm *g'* into a horizontal position, in which it is not acted upon by the lift-plate on the

cross-head. To reverse the engine, the lever J is thrown to the left, as in Fig. 2. This causes the link *h* to lift cam-arm *g* to a horizontal position, in which it is unacted upon, while the other link *h'* throws its cam-arm *g'* down into inclined position, in which it receives the motion of the plate on the cross-head, and as this cam-arm is reversed in its inclination from that of *g* it will be seen that it imparts a reversed throw to the valve.

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

1. A valve-gear consisting of a cross-head carrying an actuating-plate, a pair of reversely-arranged cam-arms pivoted at one end and maintained alternately in a position to be acted upon by said plate, and means for transmitting the motion of the cam-arms to the valve, substantially as shown and described.
2. A valve-gear consisting of a cross-head

carrying an actuating-plate, a pair of cam-arms and springs, each arm being arranged to be brought alternately into or out of engagement with the said plate, a double-elbow lever connected to the slide-valve, and links connecting the double-elbow lever to the cam-arms, substantially as shown and described.

3. A valve-gear consisting of a cross-head bearing an actuating-plate, a pair of cam-arms pivoted at opposite ends and provided with springs for forcing them downwardly, a double-elbow lever connected to the valve, a shifting bar sliding on the double-elbow lever and connected to the cam-arms by means of links, and a hand-lever connected to the shifting bar, substantially as shown and described.

ALBERT M. SYKES.

Witnesses:

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