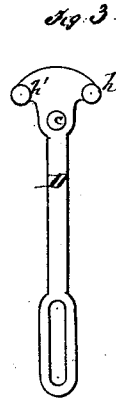
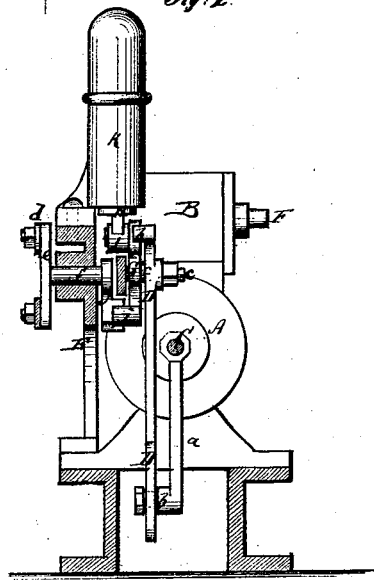


Direct Acting Engine.

Patented, Sept. 20, 1870.



Witnesses:
Chas. Nida
S S Mabie

PER

Inventor:
J. C. King
Witness:
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN C. KING, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, GEORGE M. WOODWARD, AND GEORGE A. BLOOD, OF SAME PLACE.

IMPROVEMENT IN VALVE-GEAR FOR STEAM PUMPS, ENGINES, &c.

Specification forming part of Letters Patent No. **107,504**, dated September 20, 1870.

To all whom it may concern:

Be it known that I, JOHN C. KING, of the city of New York, in the county and State of New York, have invented a new and Improved Valve-Gear for Steam Pumps, Engines, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

Figure 1 represents a side view, partly in section, of my improved valve-gear for pumps. Fig. 2 is a vertical transverse section of the same. Fig. 3 is a detail side view of the lever for transmitting the motion from the piston-rod. Fig. 4 is a detail side view of the lever for transmitting the motion to the valve mechanism. Fig. 5 is a detail side view of the crank which receives the motion from the lever shown in Fig. 4.

Similar letters of reference indicate corresponding parts.

The object of this invention is to construct a link-motion for operating the valves of steam pumps and engines, which will adjust the same so rapidly that the water or steam will be suddenly reversed, so that the dead-center will be entirely overcome.

The invention consists in the arrangement of a spring-slide, acting upon a roller on a swinging lever in such manner as to rapidly throw the said lever to the side. The lower end of the slide is sharp, or pointed in such manner that it will not stand on the edge of the roller, but will, by vertical pressure, throw the same rapidly aside.

The invention consists also in the new arrangement of levers, as hereinafter more fully described.

A in the drawing represents a steam-cylinder, B the steam-chest, and C the piston-rod, of a steam-engine of suitable construction. On the piston-rod is secured a projecting arm, *a*, which, by means of a pin, *b*, imparts oscillating motion to a slotted lever, D. The lever D is, by a pin, *c*, pivoted to a stationary frame, E, that projects from the bed of the engine. The pin *c* passes through the upper part of the lever D, as shown. The lower part

of the lever D is slotted, to receive motion from the arm *a*, as aforesaid.

The valve F in the steam-chest is, by a rod, *d*, connected with a crank, *e*, that projects from a pin, *f*, which is hung in the frame E, in line with the pin *c*. The inner end of the pin *f* carries a crank, *g*, which is fully shown in Figs. 2 and 5.

Between the lever D and crank *g* is mounted, upon the pin *c*, a lever, G, which is shaped like an inverted letter T, as shown in Fig. 4. The upper end of the lever D is enlarged, and carries two projecting pins, *h h'*, which act alternately against opposite sides of the upper shank of the lever G. The lower part of the lever G carries two projecting pins, *i i'*, which embrace the sides of the crank *g*. On the upper end of the lever G is hung a roller, *j*, which turns readily. Above the lever G is arranged in a case or guide, K, projecting from the frame E, a vertical slide or bar, H, which is, to a certain extent, thrown down by a spring, *l*, and whose lower end is made tapering or pointed, to form a narrow edge. A head, *m*, formed at the upper end of the slide H, determines how far the same is forced down by the spring.

The operation is as follows: The lever D, receiving oscillating motion by means of the reciprocating piston-rod, strikes with its pins *h h'* alternately against opposite sides of the lever G, and serves thereby to swing the same on the pin *c*. As the roller *j* arrives under the slide H it gradually elevates the same and compresses the spring *l*. When the slide is directly above the axis of the roller *j* it will press upon the same, and will, as it passes the uppermost part of the same, rapidly move down, throwing the roller and lever G suddenly to one side. This motion of the lever G produces an equally rapid movement of the crank *g* and valve. The slide could not stand on the roller during the motion of the engine, as the least motion carrying the roller beyond the center will cause the slide to quickly move down. A dead-center is thus, as far as practice proves, absolutely impossible, and rapid adjustment of the valve insured. A cushion, *n*, made of rubber or other elastic material, is put under the head *m* of the slide to deaden the sound during the descent of the same.

The crank-pin *f* may, by a rod, *o*, be also connected with the valve *I* of a pump, *J*, as shown in Fig. 1. The invention is, in fact, applicable to all kinds of slide or rock valve.

The pins *h h'* and *i i'* may, if desired, be arranged on the devices receiving instead of those imparting motion.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the slide *H* and roller *j* with a pivoted lever, so that said lever will be swung to the side, and thereby operate on a valve-gear, and rapidly reverse the position of a valve, substantially as herein shown and described.

2. The lever *D*, connected with an arm, *a*, of the piston-rod, and arranged to impart oscillating motion to the lever *G* by means of pins *h h'*, substantially as herein shown and described.

3. The lever *G*, provided with the roller *j*, and combined with the lever *D*, slide *H*, and crank *g*, to operate substantially as herein shown and described.

JOHN C. KING.

Witnesses:

GEO. W. MABEE,
ALEX. F. ROBERTS.