J. C. DEAN.
Valve-Gear.

No. 221,537. Patented Nov. 11, 1879.

Fig. 3

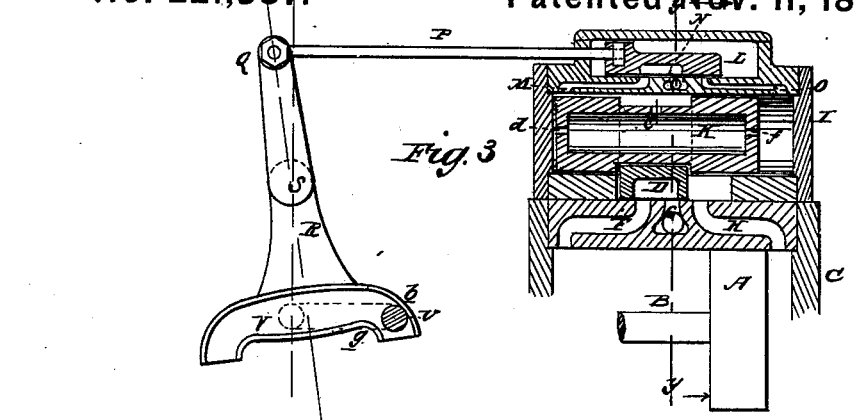


Fig. 4.

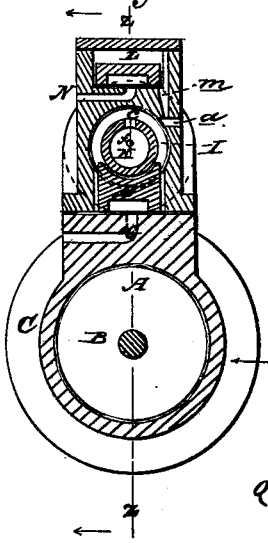


Fig. 2.

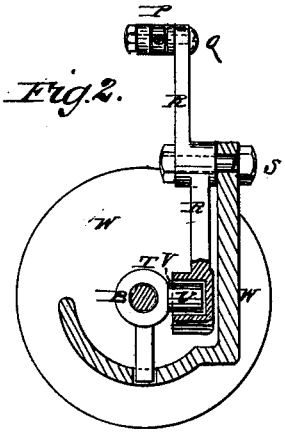
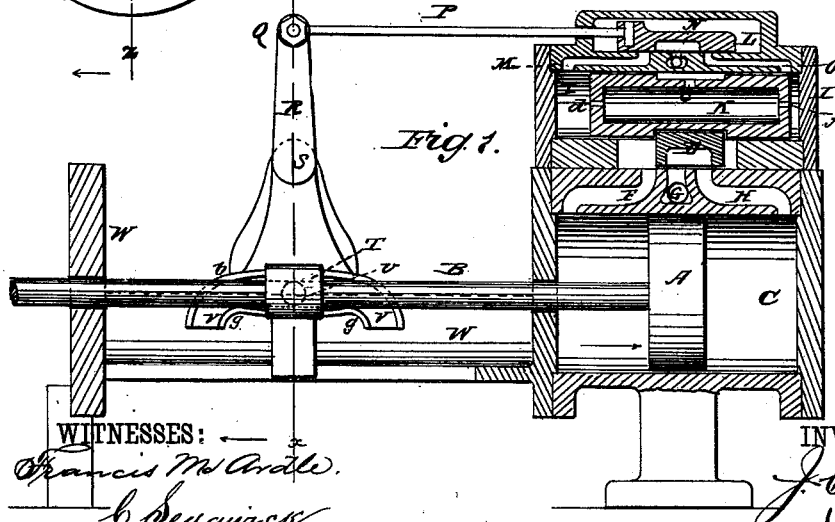


Fig. 1.



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UNITED STATES PATENT OFFICE.

JOHN C. DEAN, OF INDIANAPOLIS, INDIANA.

IMPROVEMENT IN VALVE-GEARS.

Specification forming part of Letters Patent No. **221,537**, dated November 11, 1879; application filed September 19, 1879.

To all whom it may concern:

Be it known that I, JOHN C. DEAN, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and Improved Valve-Gear, of which the following is a specification.

Figure 1 is a longitudinal sectional elevation of the device, showing the auxiliary valve and the main piston centered on line *z z*, Fig. 4. Fig. 2 is a sectional elevation on line *x x*, Fig. 1. Fig. 3 is a sectional elevation, showing the auxiliary valve and main piston when near the end of a stroke. Fig. 4 is a transverse sectional elevation on line *y y*, Fig. 3.

Similar letters of reference indicate corresponding parts.

The object of this invention is to provide an improved valve-gear for the more easy and economical working of steam-pumps.

The invention consists of an arrangement in the steam-chest of a direct-acting steam-pump of an auxiliary piston and valve that are so operated as to regulate the admission and exhaust of steam to and from the main steam-cylinder, and prevent loss of steam when the pump is in operation.

A represents a piston, and B a piston-rod, working in a steam-cylinder, C. D is a plain slide-valve, which works over the three ports F, G, and H of the cylinder C. I is the steam-chest, the ends of which are bored cylindrically to receive the piston K, which moves the valve D. L is an auxiliary exhaust-valve, that works over the ports M N O of the steam-chest I, above the hollow piston K. The stem P of the valve L has an eye on its outer end for receiving the pin Q, which projects from the upper extremity of the cam-lever R, pivoted on the stud S, projecting from the pawl W.

T is a dog fastened to the piston-rod B, and moving with it, and having a pin, U, that moves in the groove V of the cam-lever R. *a* is the steam-ingress port into the steam-chest I.

Referring to Fig. 1, suppose the steam to be passing into the steam-cylinder C through the port F, the piston A will then move from left to right in the direction indicated by the arrow, carrying with it the dog T and pin U, causing the latter to pass along the groove V of the cam-lever R. As the piston A approaches the end of the stroke, the pin U will come in contact with the upper flange, *b*, of the cam-lever R, and will throw the cam-lever R into the tilted position shown in Fig. 3.

M O are the ports leading to the cylindrical ends of the steam-chest I. The piston K is hollow, and is provided with a small hole, *c*, for the admission of steam thereto.

a f are small holes in either end of the piston K, to permit the steam entering at *c* to pass into the cylindrical part of the steam-chest I, in which said piston K works, in order to produce an equal pressure on each end of said piston K.

When the valve L is thrown in the position shown in Fig. 3—that is, so as to throw the ports *m* and *n* into communication and to close the port *o*, which results from the tilting of lever R, as before stated—the steam at the left-hand end of the piston K can escape through ports M N, and M being of a much larger area than the hole *d* in the end of piston K, the steam escaping from the left-hand end of the steam-chest I through the said port M destroys the equilibrium of the said piston K, and allows the steam at the right-hand end of the piston K to move it from right to left, carrying with it the valve D, as clearly represented in Fig. 3, and this movement of the valve D permits the steam in the steam-chest I to enter the port H on the right of the piston A, and at the same time permits the escape of the exhaust-steam through the port F, thus causing the piston A to reverse its motion and travel from right to left.

When the piston A begins to move from right to left the pin U will come in contact with the lower flanges, *g*, of the cam-lever R, and in moving this pin U will take the direction shown by the dotted lines shown in Fig. 3, and cause the cam-lever R to swing to the position shown in Fig. 1. This movement causes the valve L to be thrown into the position shown in Fig. 1, thus closing the ports M O. The valve L continues in this position until moved by the cam-lever R by means of the pin U as the piston A reaches the opposite end of its stroke, when the motion of the valve L is reversed in precisely the same manner as before described.

Steam is admitted to the chamber of the valve L through the passage *m* for the purpose of

holding the valve to its seat. The piston K could be operated by a valve like D, the ports M O being used for both admitting and exhausting steam, the said valve, of course, being long enough to cover both the ports when it is on a center, as shown in Fig. 3.

Instead of the cam-lever R having a groove on it, as shown, it might have a rib on it, over which a fork could be fitted, the fork taking the place of the pin U. Such an arrangement would, of course, produce the same results as the present arrangement.

I am aware that it is not new to operate the piston of an engine-cylinder by a tappet and a rocking arm, the latter connected with the valve of an auxiliary cylinder, so as to admit and exhaust steam by the movement of the piston of the principal cylinder, and thus actuate the piston of the auxiliary cylinder; but

What I claim as new is—

The combination, with cylinder A, having piston, ports, main valve, and auxiliary valve, substantially as shown and described, of the piston-rod B, having dog with pin U, the cam-lever R, having flanges *g*, groove V, and pin Q, and the rod P, having eye at outer end, all constructed and arranged as and for the purpose specified.

JOHN C. DEAN.

Witnesses:

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