(No Model.)

H. LECHTENBERG.

VALVE GEAR.

No. 382,168. Patented May 1, 1888.

Fig. 1.

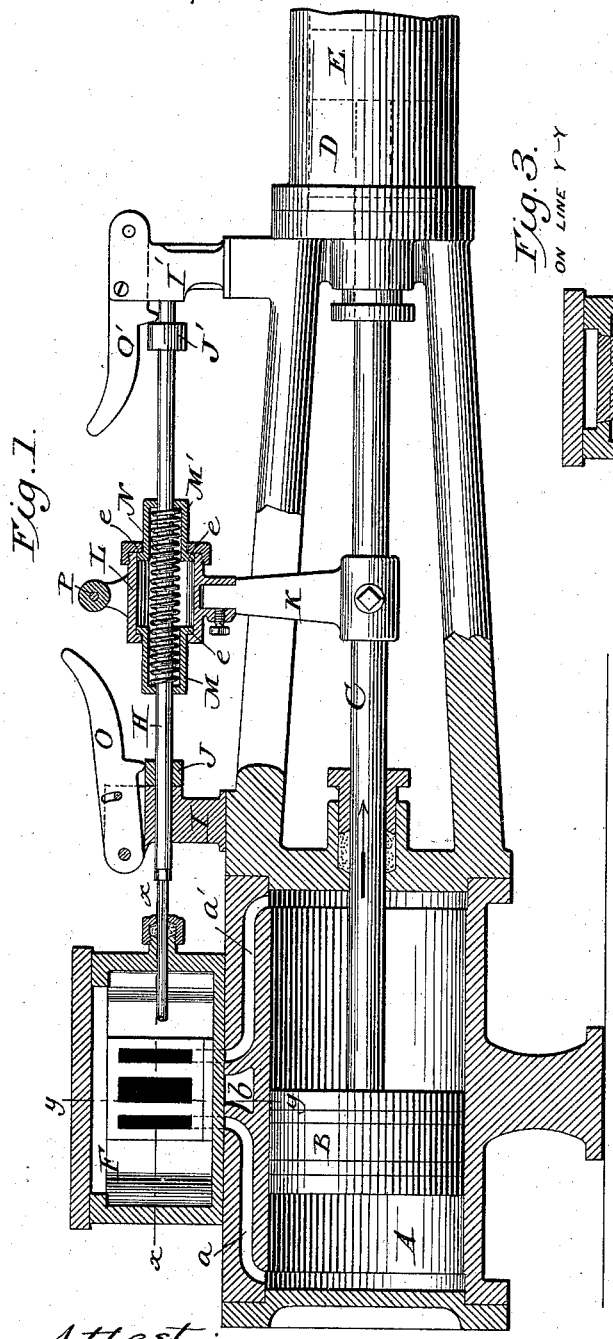


Fig. 3.
ON LINE Y-Y

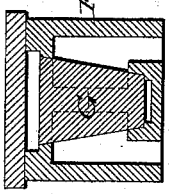
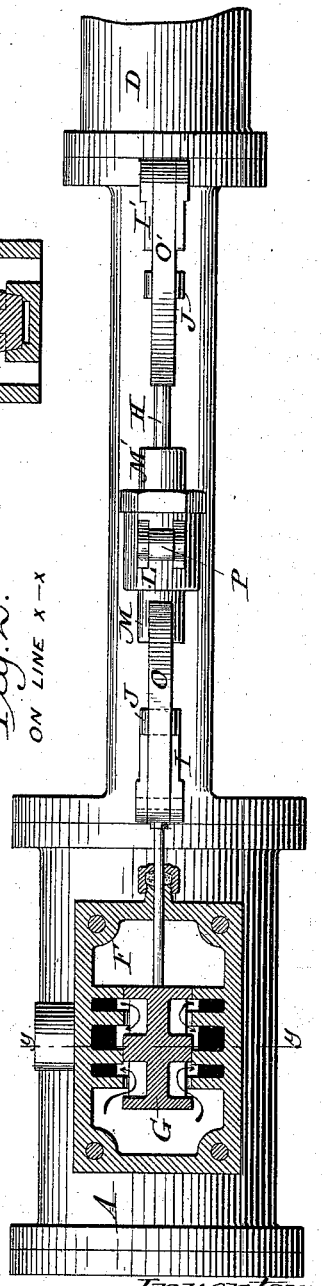


Fig. 2.
ON LINE X-X



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UNITED STATES PATENT OFFICE.

HENRY LECHTENBERG, OF QUINCY, ILLINOIS.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 382,168, dated May 1, 1888.

Application filed November 17, 1887. Serial No. 255,416. (No model.)

To all whom it may concern:

Be it known that I, HENRY LECHTENBERG, of Quincy, in the county of Adams and State of Illinois, have invented certain Improvements in Valve-Gear, of which the following is a specification.

My invention relates to a mechanism for imparting a reciprocating movement to the valves of steam-pumps, steam-engines, &c., in which the valve motion is obtained from the main piston-rod; and it consists in combining with the piston-rod and the valve-operating rod or spindle an intermediate spring, which, being compressed by the piston-rod, acts to throw the valve first in one direction and then in the other, and tappets or locking devices by which the spring is prevented from moving the valve except at the proper times.

In the drawings I have represented my improvement as applied to that familiar class of pumps in which a piston-rod is provided at one end with an actuating steam-piston and at the opposite end with the pump-piston.

Figure 1 represents a longitudinal vertical section through the steam cylinder and the entire valve mechanism, one end of the pump-piston being also shown in side elevation. Fig. 2 is a top plan view of the valve and valve-chest, being shown in horizontal section on the line *x x*. Fig. 3 is a cross-section through the valve-chest on the line *y y* of the preceding figures.

Referring to the drawings, A represents a steam-cylinder containing a reciprocating piston, B, attached rigidly to the piston-rod C, which is extended, as usual, through and beyond the end of the cylinder and into a second cylinder, D, where it is attached to the usual pump-piston, E. The steam-cylinder is provided with eduction and induction ports *a* and *a'*, leading from opposite ends to points near the middle, and also provided with an eduction-port, *b*, leading to the exterior, these ports being similar in general arrangement to those in ordinary slide-valve engines.

F is the steam-chest located on the top of the cylinder and containing the reciprocating valve G, which is of the "balanced" type and of V form in cross-section. The valve is provided on opposite sides with duplicate ports constructed as shown, so that as it is moved to and fro it delivers the steam into and out of the opposite ends of the cylinder alternately, in a manner which will be understood by any person skilled in the art.

H represents the valve-spindle projecting through and beyond the chest and sustained in suitable guides, I, that it may move freely in an endwise direction. Near its opposite end the valve-spindle H is provided with two fixed collars, J, which, encountering the guides I and I' alternately, limit the reciprocation of the valve.

To the piston-rod C is secured rigidly an arm, K, carrying at its upper end a sleeve, L, which encircles the valve-spindle H. In opposite ends of this sleeve are mounted two smaller sleeves, M and M', and within the sleeves around the valve-spindle H is mounted a strong spiral spring, N, which, bearing against the sleeves M and M', tends to push them outward in opposite directions. Each of the smaller sleeves is provided at its inner end with a flange, *e*, by which its outward movement is limited, although it is permitted to move freely inward on the application of sufficient force to effect the compression of the spring.

To the guides I and I' are pivoted two dogs or tappets, O and O', which are adapted to act alternately behind the respective collars J and J', in order to lock the valve spindle against motion first in one direction and then in the other. The reciprocating arm K carries on its upper end a roller, P, or equivalent projection, adapted to act on the two dogs alternately and effect their disengagement from the collars of the valve-stem.

The operation is as follows: Assuming that the pistons and piston-rod are moving toward the right, as indicated by the arrow in Fig. 1, the dog O' will stand in engagement with the collar J, holding the valve to the left, as shown in Fig. 1. As the piston rod approaches the completion of its movement to the right, carrying the sleeves and the spring with it, the sleeve M' encounters the collar J', which arrests the movement of the sleeve M'. As, however, the other parts continue their advance, the spring is subjected to a strong compression, so that, acting through the sleeve M' on the collar J', it acts to move the valve-

spindle and valve to the right. While the spring is thus acting, and at or near the end of the piston-stroke, the roller P′ encounters the dog or tappet O′ and lifts the same out of engagement with the collar J′, whereupon the spring acts to move the valve-spindle and valve quickly to the right, thereby reversing the course of the steam into the cylinder. When this action occurs, the dog O drops into engagement behind the collar J and holds the valve-spindle to the right. The piston and its connections now move to the left. The sleeve M encounters the collar J and the spring is compressed, so that it tends to move the valve to the left. At the proper time the roller P disengages the dog O, whereupon the spring pushes the valve to the left, the parts again assuming the position represented in Fig. 1, with the dog O′ engaged behind the collar J′.

It will be perceived that under my construction the piston-rod acts upon the spring in such manner that the latter tends to move the valve first to the right and then to the left, and that the dogs or tappets operate to hold the valve until the spring is properly compressed, and then to release it, so that its movement may be suddenly effected by the spring.

It is manifest that the details of construction may be modified in various respects, the essence of my invention residing in the combination of a valve-operating spring compressed through the action of the piston-rod with dogs which prevent the valve from moving during the compression of the spring until the proper time arrives.

While I prefer to inclose the spring by means of the sleeves in the manner shown, it is obvious that any equivalent device which will permit the spring to be compressed by the arm K against the collars J and J′ alternately, may be employed without passing beyond the limits of my invention.

Having thus described my invention, what I claim is—

1. In a valve-gear, the reciprocating valve-rod H, having the end collars, J J′, in combination with the two independent pivoted dogs O O′, alternately engaging the respective collars to hold the valve-rod momentarily at rest, the reciprocating piston-rod, the arm K, fixed rigidly to said rod and acting upon the dogs alternately to effect their disengagement from the collars, the spiral spring loosely encircling the valve-rod, and the two sleeves M M′, seated against opposite ends of the spring and connected with the arm K to yield each toward the other, as described, whereby the arm on the piston-rod is caused to directly effect the compression of the spring first in one direction and then in the other against the collars of the valve rod, and also to directly trip the dogs, that the spring may move the rod at the proper time.

2. In combination with the piston-rod C, the arm K, fixed rigidly thereto and provided with the sleeve N and roller P, the spiral spring encircling the valve-spindle, the sleeves M and M′, seated against the ends of the spring, the valve-spindle provided with the two collars, and the locking dogs or tappets adapted to engage said collars alternately.

In testimony whereof I hereunto set my hand, this 22d day of October, 1887, in the presence of two attesting witnesses.

HENRY LECHTENBERG.

Witnesses:
HENRY STOETZEL,
JOE STEINKAMP.