

J. TESSEYMAN & E. I. HOWARD.

Valve-Gears for Direct-Acting Steam-Engines.

No. 139,439.

Patented May 27, 1873.

Fig. 1.

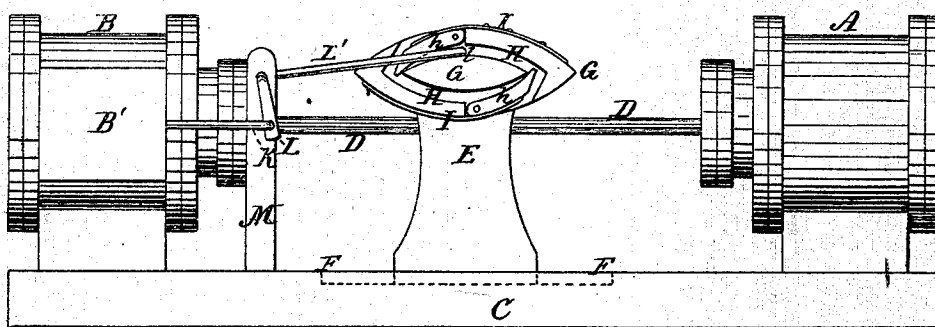


Fig. 2.

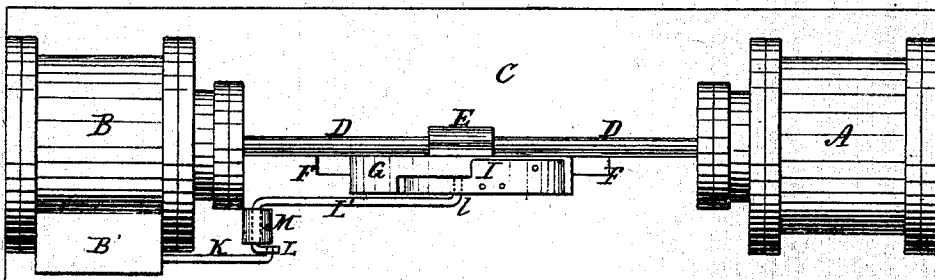


Fig. 3.

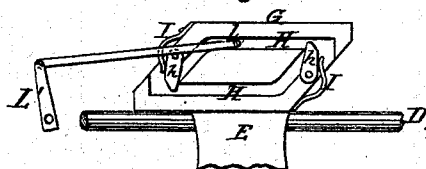
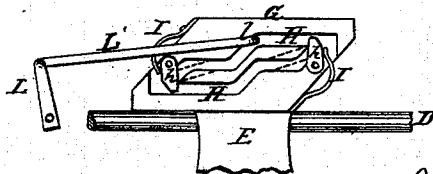


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN TESSEYMAN AND EDMUND I. HOWARD, OF DAYTON, OHIO.

IMPROVEMENT IN VALVE-GEARS FOR DIRECT-ACTING STEAM-ENGINES.

Specification forming part of Letters Patent No. **139,439**, dated May 27, 1873; application filed January 4, 1873.

To all whom it may concern:

Be it known that we, JOHN TESSEYMAN and E. I. HOWARD, of Dayton, in the county of Montgomery and in the State of Ohio, have invented certain new and useful Improvements in Valve-Gear for Direct-Acting Steam-Engines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a side elevation of a pumping-engine containing our improvements. Fig. 2 is a plan view of the upper side of the same; and Figs. 3 and 4 are side elevations of modifications of the construction of the reciprocating head used for operating the valve.

Letters of like name and kind refer to like parts in each of the figures.

The design of our invention is to increase the efficiency, economy, and durability of direct-acting engines, to which end it consists, principally, in the employment of a reciprocating cross-head provided within one of its vertical sides with two substantially horizontal grooves which are connected at their ends, and diverge vertically at their centers to a distance equal to the throw of the valve, and, through suitable mechanism, impart motion to said valve, substantially as and for the purpose hereinafter specified. It consists, further, in the employment of a spring cut-off at each end of the intersecting grooves for the purpose of changing the course of the wrist-pin, or other device that travels therein, substantially as is hereinafter shown. It consists, finally, in the device as a whole, when constructed to operate substantially as and for the purpose hereinafter set forth.

Although applicable to all classes of direct-acting engines, for convenience, its use upon a pumping-engine will be described.

In the annexed drawing, A represents the water and B the steam-cylinders secured upon opposite ends of a base-plate, C, and provided with a common piston-rod, D, which is connected at its ends to or with the piston and plunger, all in the usual manner. Secured to or upon the piston-rod D, at its longitudinal center, is a cross-head, E, which, preferably, extends above and below said rod and has its

lower end contained within a corresponding groove, F, that is formed within the bed-plate C, and which serves as a guide for said head. Upon one side of the head E is a plate, G, within the outer vertical face of which are cut two grooves, H, that are formed upon circular lines and at their ends intersect so as to have in plan view a double-convex form. Upon the upper side at one end and the lower side at the opposite end of the plate G the outer sides *h* of the grooves H are made separate from said plate and are pivoted near the longitudinal center of the latter so as to permit their outer ends to be moved inward and close the corresponding portions of said groove, as shown. A spring, I, secured at one end to or upon the edge of the plate, and at its other end bearing upon the free end of each pivoted cut-off *h*, presses the latter inward against the inner side of its groove. The steam-chest B' is, preferably, placed upon the side of its cylinder, which corresponds to the position of the plate G, and the valve-stem K, extending horizontally forward, is pivoted to or upon a vertical arm, L, of a rock-shaft which rests within a standard, M, that extends upward from the bed-plate C. The inner arm L' of the rock-shaft extends horizontally forward to a point midway between the cylinders A and B, and at its end is provided with a wrist-pin, *l*, that extends laterally inward and fits into the grooves H. As thus arranged, the reciprocating movement of the cross-head E will cause the wrist-pin *l* to follow alternately the course of the upper and lower grooves H, the springs I operating through the pivoted cut-offs *h*, to press said pin from one groove into the other as it reaches the ends of the same, by which means the vertical motion thus imparted to said pin and the end of the arm L' and communicated through the arm L and valve-rod K to the valve, will cause the latter to change the course of steam to and from the ends of the cylinder B, in the usual manner. As constructed, the grooves will give to the valve substantially the same motion as would be obtained by use of an ordinary eccentric, and enable the steam to be used expansively, so as to cause the piston to have a low rate of speed at either end of its stroke and a high rate at the central portion thereof, instead, as is usually the case, of having the

speed of the piston continue to or near the limit of motion and then suddenly checked and said piston thrown backward with a shock. Although the form of groove shown is, preferably, employed, it will be seen that the same may be varied so as to give any desired motion to the valve. As illustrations of such modifications, Fig. 3 shows grooves arranged so as to cause a full head of steam to be carried to nearly the end of the stroke, when the valve will be suddenly changed and steam thrown upon the opposite side of the piston, the motion produced being similar to that found in most pumping-engines. Fig. 4 shows such an arrangement of grooves as to cause the supply of steam to be shut off at one-half stroke, from whence to near the termination of said stroke the steam is used expansively, after which the valve is changed either quickly, as seen by the full lines, or more slowly, as indicated by the dotted lines.

The especial advantages obtained by this improvement are, first, any desired motion may be given to the valve, which motion instead of being constant in either direction, may be variable to any degree and in any manner; second, the valve-gearing is more simple in construction, costs less, and requires less skill to operate than those commonly used.

Having thus fully set forth the nature and merits of our invention, what we claim as new is—

1. In a direct-acting engine, a reciprocating cross-head provided with two longitudinal grooves, intersecting at their ends and diverging at their centers, and through suitable mechanism connected with and imparting motion to the steam-valve, substantially as and for the purpose specified.

2. In combination with the grooves H within the plate G, the pivoted cut-offs h and springs I, substantially as and for the purpose shown.

3. The valve-gearing described, as a whole, consisting of the reciprocating cross-head B, provided with the groove H, the rock-shaft L and Z, and the valve-rod K, when said parts are constructed and combined, substantially as and for the purpose set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 21st day of December, 1872.

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EDMUND I. HOWARD.

Witnesses:

C. D. IDDINGS,

THOMAS CLEGG.