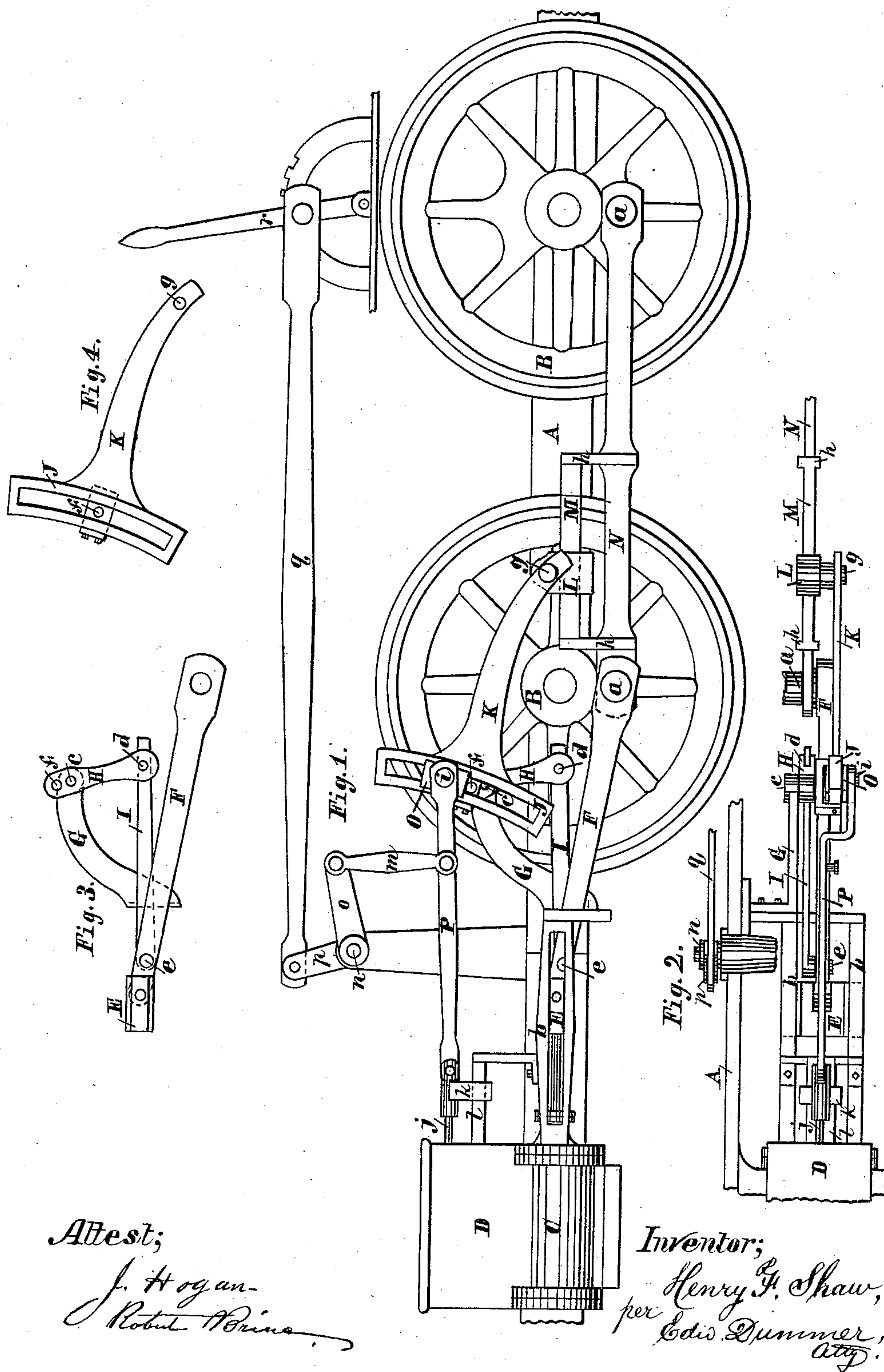


(No Model.)

H. F. SHAW.
VALVE GEAR.

No. 332,842.

Patented Dec. 22, 1885.



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UNITED STATES PATENT OFFICE.

HENRY F. SHAW, OF BOSTON, MASSACHUSETTS.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 332,842, dated December 22, 1885.

Application filed October 10, 1885. Serial No. 179,563. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. SHAW, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Valve-Gear for Locomotives, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to a valve-gear especially adapted for locomotives; and its object is to impart such motion to the ordinary slide-valve during each stroke of the piston that the appropriate inlet-port will be opened quickly at and near the commencement of the stroke of the piston, that the valve shall move the distance of its lap while the piston is making the middle portion of its stroke, and also that the exhaust-port will be held open for a very large portion of the time of the stroke of the piston. I accomplish this object by means of, and my invention consists in, mechanism, substantially as hereinafter described, in which the link is connected with the ordinary parallel rod to be rocked thereby, and also connected with the cross-head, so as to be thereby also swung bodily.

In the drawings, Figure 1 is an elevation of as much of one side of a locomotive provided with my improved valve-gear as serves to illustrate my invention, Fig. 2 is a plan of some of the parts shown in Fig. 1. Figs. 3 and 4 are side views of certain parts of the valve-gear mechanism.

The longitudinal rail A of the frame, driving-wheels B B, having crank-pins *a a*, cylinder C, valve-chest D, cross-head E, sliding on guides *b b*, and connecting-rod F, are those of any ordinary locomotive. To a stand, G, fixed to the frame of the locomotive, I pivot a lever, H, at *c*, so that while the lower end of the lever swings through a distance equal to the travel of the cross-head the upper end moves only the required quite short distance. A connecting-rod, I, is pivoted at one end to the lower end of the lever H at *d* and at the other end to the connecting-rod F at *e*. This end of the rod I might be pivoted, and preferably so, directly to the cross-head E. The link J is pivoted at its center to the upper end of the lever H at *f*. To the link J is fixed an arm, K, which is pivoted at its outer end to a block,

L, at *g*. This block slides on a guide, M, which is fixed, as by means of suitable uprights or arms, *h h*, to and parallel with the parallel rod N, pivoted on the crank-pins *a a* in the usual manner. On the link J slides the usual block, O, to which is pivoted, at *i*, a rod, P, pivoted at the other end to the valve-rod *j*, which may be guided by any well-known means, as by a block, *k*, sliding on a way, *l*.

The sliding piece to which the outer end of the arm K is pivoted may take other specific form than the block L, and may be located directly on the parallel rod, the object being to have the outer end of the arm located in such position as to have the distance of motion required, and to have it derive its motion from the vertical motion of the parallel rod, and not from the movement of the parallel rod in a horizontal direction. The block O may be moved up and down on the link to cause the valve to slide the distance required, or to reverse the engine, in the ordinary way and by well-known means, as the rod *m*, shaft *n*, having arms *o p*, rod *q*, and lever *r*. The shaft *n* may extend across the locomotive and be connected with valve mechanism, similar to that described, at the other side of the locomotive, so that the movement of both valves of the locomotive may be governed by means of the one hand-lever *r*.

The operation and effect thereof of my improved valve-gear may be briefly stated as follows: The lever H will be swung, and hence by it the valve will be moved, during each stroke of the piston; but this movement is designed to be only through the distance equal to the lap, or the lap and lead, of the valve. The arm K will be swung during each stroke of the piston, but mainly and much more rapidly at and near each end of the stroke—that is, when the crank-pins *a a* are crossing a horizontal line; hence the valve, if the block O be above or below the center of the link J, will open the appropriate inlet-port at and very near the commencement of a stroke. The exhaust-port for the appropriate end of the cylinder will be kept well open for a great portion of the stroke of the piston, especially so since as a result of the two motions there is an actual rest of the valve during a certain part of the stroke of the piston.

In short, by means of my invention I am able to get greater pressure of the steam on the piston at the commencement of its stroke, to more effectually cut off the steam at any
5 desired point, and hence obtain better results by expansion, and to keep the exhaust open longer, and thus have less compression of steam to act as back-pressure than can be accomplished by the ordinary eccentric and link, or
10 by any locomotive valve-gear of which I have knowledge. By deriving the rocking motion of the link from the motion of the parallel rod, or, in case but one driving-wheel is used at one side of the engine, from a rod or bar
15 connected thereto, to have movements similar to that of a parallel rod, the resulting movements of the valve are alike at both ends of the stroke.

I claim as my invention—

- 20 1. In a locomotive, and in combination with a parallel rod, a pivoted link, J, provided with an arm. K, pivoted to a block adapted to slide

on said parallel rod, whereby the rocking motion of said link is derived from the movement of the parallel rod, substantially as specified. 25

2. In a locomotive, a link pivoted to a lever which is pivoted to a part of or stand on the frame of the locomotive, and also to a rod which connects the lever with the cross-head, whereby said link is swung bodily by means of the cross-head, substantially as set forth. 30

3. The combination of a link, J, and a cross-head, together with suitable intervening lever and connecting-rod, with a parallel rod, together with suitable intervening arm and sliding block, whereby said link may have a swinging motion derived from the cross-head, and a rocking motion derived from the parallel rod, substantially as and for the purposes set forth. 35

HENRY F. SHAW.

Witnesses:

WILLIAM H. SOLOMON,
EDW. DUMMER.