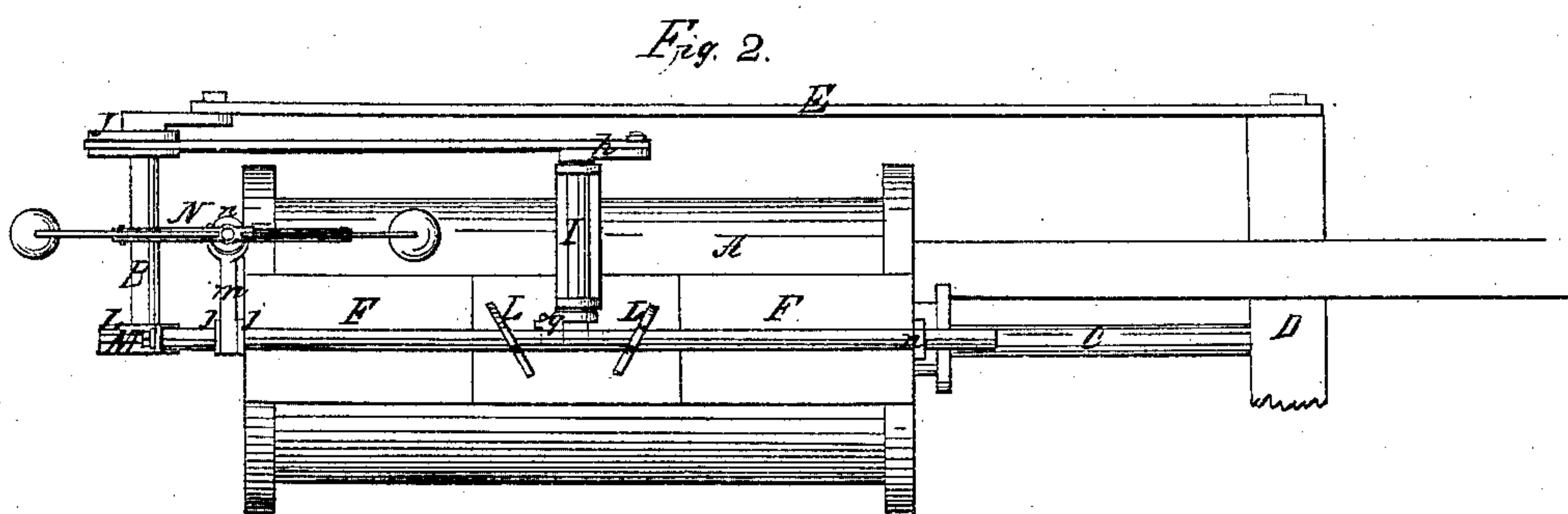
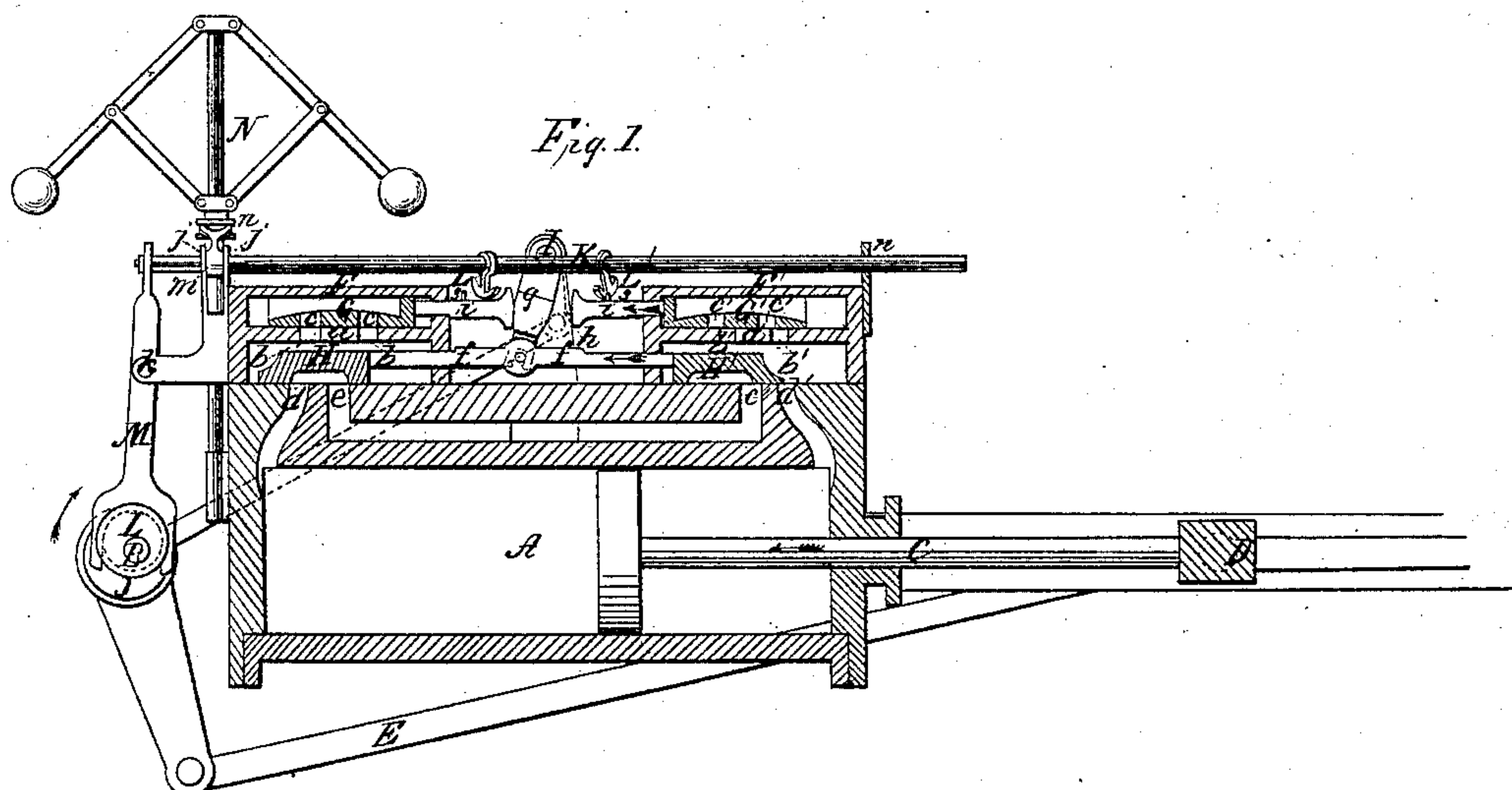


*A. H. Rider,*

*Steam-Engine Valve-Gear.*

*N<sup>o</sup> 34,013.*

*Patented Dec. 24, 1861.*



*Witnesses:*

*W. Bonnell  
G. L. Reed*

*Inventor:*

*A. H. Rider.  
Jas. Munroe & Co.  
Attorneys.*

# UNITED STATES PATENT OFFICE.

ALEXANDER K. RIDER, OF HYDEVILLE, VERMONT.

## IMPROVEMENT IN CUT-OFF GEAR FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 34,013, dated December 24, 1861.

*To all whom it may concern:*

Be it known that I, ALEXANDER K. RIDER, of Hydeville, in the county of Rutland and State of Vermont, have invented a new and useful Improvement in the Cut-off Gear for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 exhibits a longitudinal central section of the cylinder valve-chests and valves of a steam-engine and a side view of the cut-off gear. Fig. 2 is a plan view of the whole.

Similar letters of reference indicate corresponding parts in both figures.

This invention relates to that description of cut-off which consists of sliding valves operating at the backs of and independently of the main valves; and it consists in controlling the closing movements of such cut-off valves by means of two obliquely-arranged sectors or segments carried by a rod or shaft, which drives a longitudinal reciprocating motion from the crank-shaft of the engine and an oscillating motion on its axis from the governor or other device employed to regulate the engine, and so makes the said sectors serve to effect the variation in the point of cutting off steam from the engine-cylinder throughout the whole or nearly the whole length of stroke of the piston.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The engine may have its cylinder A, crank-shaft B, and crank-connections C D E arranged either as represented in Fig. 1 or in any other suitable manner. The cylinder is furnished with two valve-chests F F', each of which has an inner and outer compartment separated by a partition *a*, which constitutes the seat for one of the two cut-off valves G G'. The steam from the boiler is received from the outer compartments of the chests. The seats *a a* are each made with two ports *b b* or *b' b'*, and the valves G G' each with two similar ports *c c* or *c' c'*, so that the full opening of the ports may be effected by a short movement. The two main valves H H'—a separate one for each end of the cylinder—work in the

inner compartments of the valve-chests next the cylinder, and are of well-known kind, as will be at once seen by reference to Fig. 1, and work in connection with a common arrangement of steam-ports *d d'* and exhaust-ports *e e'*. The said main valves are connected together by a rod *f*, working through stuffing-boxes in the chests F F', and are operated by the connection of the said rod with the arm *g* of a rock-shaft I, which derives an oscillating movement through the connection of its arm *h* with an eccentric J on the crank-shaft B, and the movement thus given to these valves is such as to cause the opening of the steam-port at either end of the cylinder for the reception of steam to commence as the piston arrives at that end of the cylinder and the opening of the steam-port at the opposite end to its respective exhaust-port at the same time.

The cut-off valves G G' are provided with stems *i i'*, which pass through stuffing-boxes in the inner ends of the valve-chests F F', and the arm *g* of the rock-shaft I works between the heads of these stems and acts upon them in such manner as to produce the opening of the two valves G G' alternately to admit steam to the lower compartments of their respective valve-chests, commencing the opening of each one as its respective main valve is bringing its respective ports *d e* or *d' e'* into communication. The closing movement of these cut-off valves may be effected by means of springs or weights. The said valves are arrested when closed by coming in contact with the inner ends of their respective valve-chests.

K is the longitudinally reciprocating and oscillating shaft, and L L' the oblique sectors carried by the said shaft and constituting part of the variable cut-off gear for controlling the closing of the cut-off valves. The said shaft is arranged parallel with the axis of the cylinder in suitable fixed bearings *j j* and *n*, and derives its longitudinal reciprocating motion from an eccentric L on the crank-shaft through a lever M, which works on a fixed fulcrum *k*, such movement being nearly coincident with the movement of the piston-rod, but very short. The sectors L L' are fast upon the shaft, one opposite each of the



cut-off-valve stems and are facing each other, and their obliquity is in opposite directions, but of similar degree; and in each of the stems *i i* there is secured a stud 3, arranged on the outer side of its respective sector. The said shaft K is connected with the sleeve *n* of the governor N by means of an arm *m*, which is fitted to the shaft with a feather and groove in such a manner as to be incapable of turning upon the shaft, but capable of moving longitudinally upon it, and the said arm is so confined by being fitted between the bearings *j j* that it is incapable of moving with the shaft in a direction lengthwise of the latter, but remains opposite the governor.

In the operation of the engine the opening movement of each of the valves G G', produced by the action of the arm *g* upon the head of its stem, is followed by a longitudinal movement of the shaft K in the same direction. As the arm *g* returns after having opened one of the valves G G' the valve is prevented from at once making more than a very inconsiderable portion of its closing movement by its respective pin 3 coming in contact with its respective sector L or L', which does not allow it to close till the shaft K moves in the reverse direction, when it can only close as fast as the sector permits the movement of the stud 3. The closing movement is completed at an earlier or later period of the stroke of the piston, according to the position to which the sectors L L' are brought by the movement of the shaft K about its axis. When the parts of the two sectors which are farther apart are brought opposite to the valve-stems *i i*, the cut-off valves are kept

open through a greater portion of the stroke, and when the parts of the two sectors which are nearer together are opposite the said stems the cut-off valves are closed sooner after the commencement of the stroke, and hence the connection of the governor with the said shaft by the arm *m* should be such that when there is any tendency to increased speed it will turn the shaft in a direction to present to the valve-stems portions of the two sectors which are nearer to each other. Any other device for turning the said shaft upon its axis—as, for instance, a hand-lever—may be substituted for the governor as a means of varying the cutting-off operation and regulating the engine. The cut-off valves may also be operated independently of the rock-shaft I by attaching the valve-stems to the sectors by means of spiral grooves or projections, so as to have a common motion with the oscillating shaft L L, the valves, however, approaching or receding from each other as the sectors are oscillated by the action of the governor.

What I claim as my invention, and desire to secure by Letters Patent, is—

The employment, for controlling the closing movements of the cut-off valves, of two obliquely-arranged sectors or segments L L' on a shaft or rod K, which has a longitudinal reciprocating movement and an oscillating movement upon its axis, derived substantially as herein described.

ALEXR. K. RIDER.

Witnesses:

JOHN JONES,

ROWLAND WALTER.