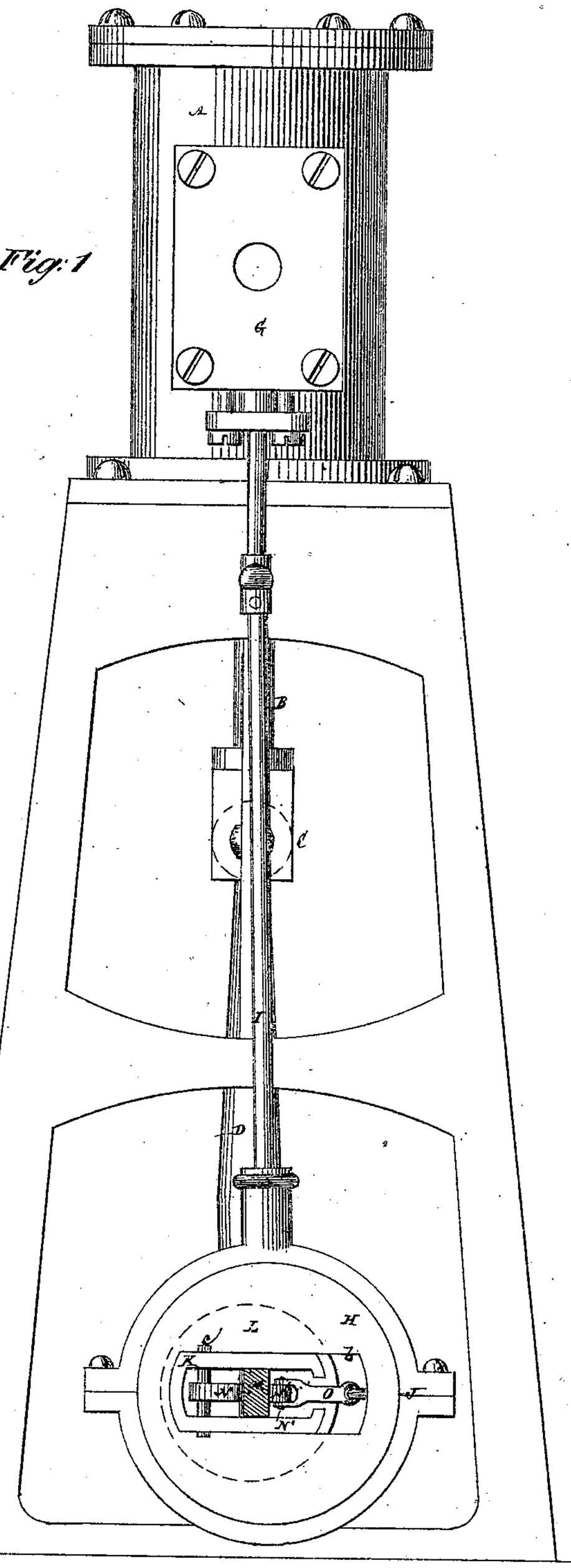
2 Sheets--Sheet 1.

R. McC. FRYER.

Cut-Offs and Reversing Valve-Gears for Steam-Engines.

No. 135,794. Patented Feb. 11, 1873.

Fig: 1



Witnesses:
Jno. C. Haynes
Benj. C. Sharp.

Robert McC. Fryer

2 Sheets--Sheet 2.

R. McC. FRYER.

Cut-Offs and Reversing Valve-Gears for Steam-Engines.

No. 135,794. Patented Feb. 11, 1873.

Fig: 2

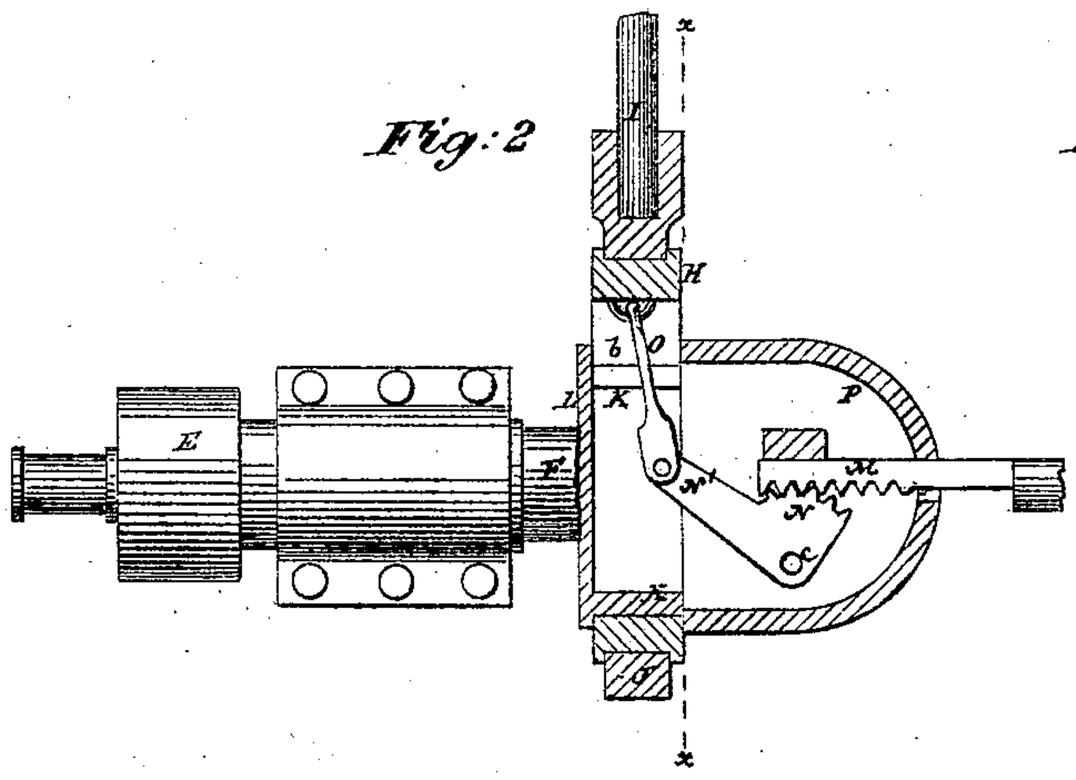


Fig: 3

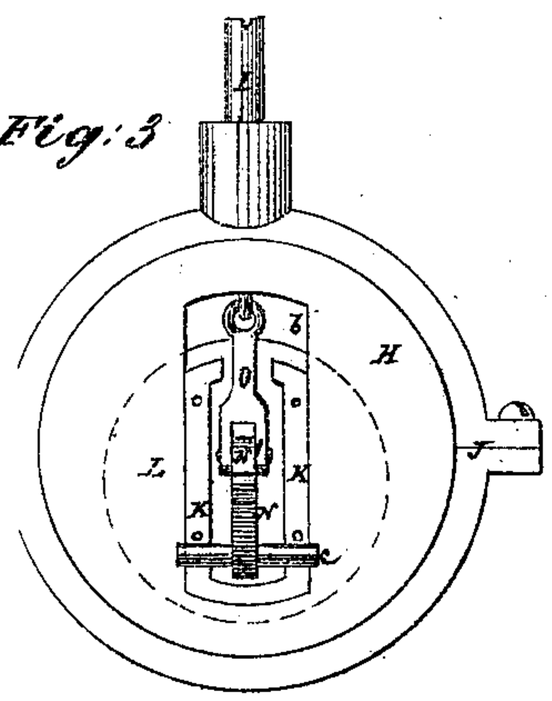


Fig: 5

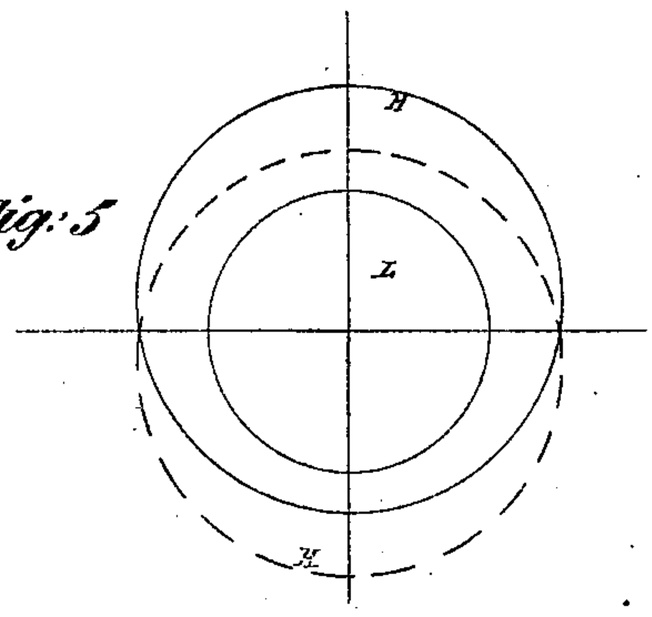
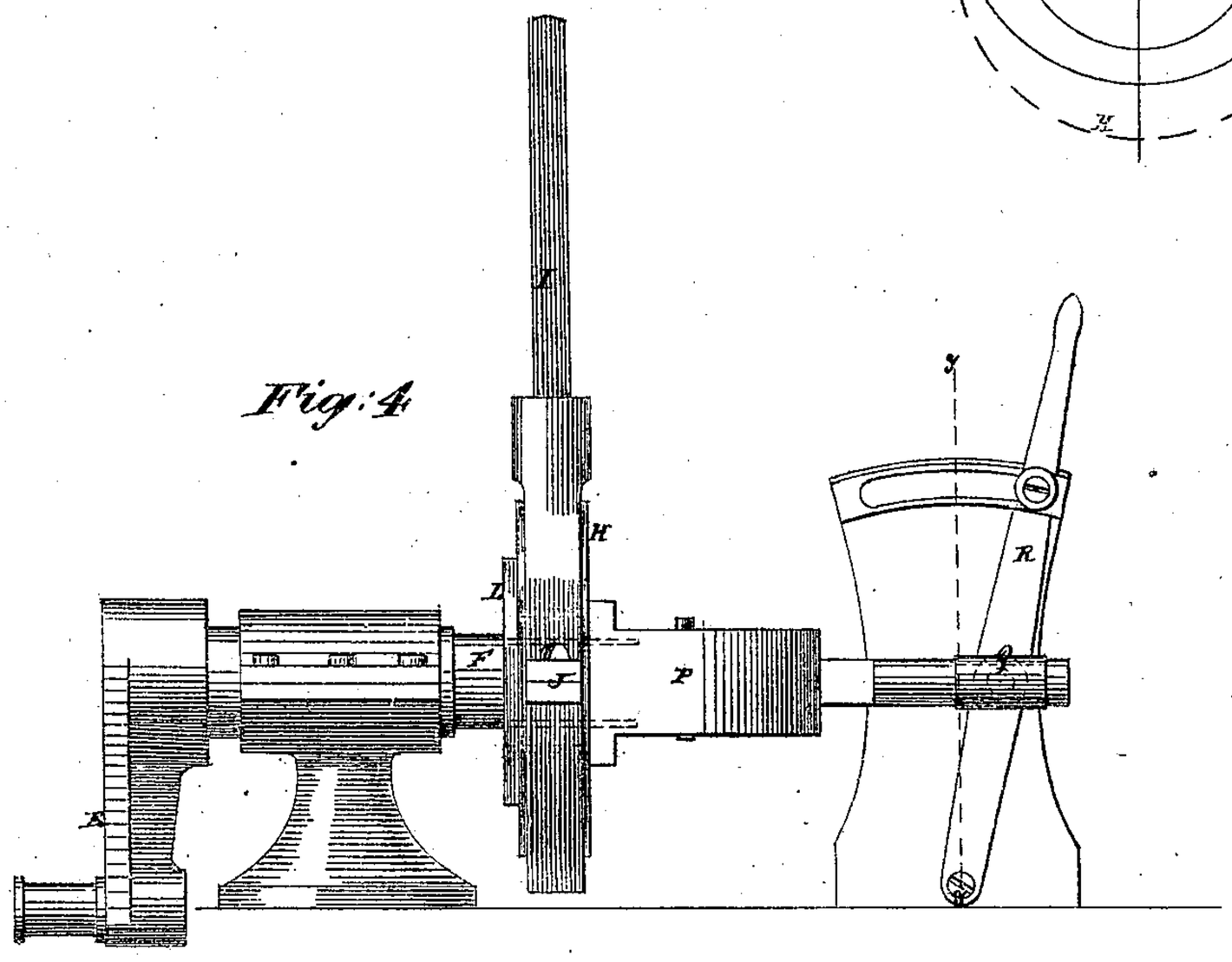


Fig: 4



Witnesses:
Fred Haynes
Benj F. Sharp

Robert McC. Fryer

UNITED STATES PATENT OFFICE.

ROBERT McC. FRYER, OF NASHVILLE, TENNESSEE, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE W. SAULPAW.

IMPROVEMENT IN CUT-OFFS AND REVERSING VALVE-GEARS FOR ENGINES.

Specification forming part of Letters Patent No. **135,794**, dated February 11, 1873.

To all whom it may concern:

Be it known that I, ROBERT McC. FRYER, of Nashville, in the county of Davidson and State of Tennessee, have invented a new and useful Improvement in Cut-Off and Reversing Valve-Gear; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a partly sectional elevation, showing an engine with my improved valve-gear applied; Fig. 2, a partly sectional plan of the valve-gear; Fig. 3, a transverse section at the line *x x;* and Fig. 4, a side view of said gear. Fig. 5 is a diagram showing the eccentric in different positions.

Similar letters of reference indicate corresponding parts.

My invention consists in a novel combination of devices for changing the position of the eccentric which operates the valve of a steam or other engine, whereby the valve may be reversed, or have its cut-off action varied, as required; also be adjusted to stop the engine in a very simple and efficient manner.

A represents the cylinder of a steam-engine; B, its piston-rod; C, its cross-head; and D, its connecting-rod, giving motion, by a crank, E, to a main shaft, F. Any other form of engine, however, may be used. G is the valve-box, containing the valve which controls the motion of the engine-piston; H, the eccentric for operating said valve; and I J, the eccentric rod and strap.

The eccentric H is operated by the engine-shaft F, as follows: A straight or curved slot, *b*, is made transversely through the center portion of the eccentric to allow of the shifting of the eccentric to opposite sides of the engine-shaft F, according to the direction in which it is required to run the engine. To this end, and to provide for rotating the eccentric in common with the shaft, the slotted portion *b* of the eccentric has arranged to receive within it a hollow block or frame, K, of similar configuration on its exterior edges to the sides of the slot *b*, but which is of less length than the slot. This hollow block K is formed by a projection on a disk, L, fast to the engine-shaft. Thus the block K operates as a driver of the eccentric, also as a guide to the same when being slid or adjusted across the shaft.

Although the slot *b* and block K are here shown straight in direction of their length, it is preferred to make them of a curved or arched form to provide for giving lead to the valve.

When the eccentric H is shifted, so that the block K is in a central position within the slot *b*, then the eccentric, although rotating with the engine-shaft, ceases to have any action upon the valve, and the engine is stopped. Accordingly, however, as the eccentric is shifted from such position along the block K to one side or other of the engine-shaft, the engine is set running in one or other of its two directions, and according to the extent of lateral adjustment given to said eccentric is the throw of the valve varied to cut off at any desired point in the stroke, or to give full steam throughout the stroke, as required.

The means for thus setting or shifting the eccentric H consist of a rack, M, and sector, N, formed with an elbow, N′, which is connected by a rod, O, with the one end of the slot *b* of the eccentric. The elbowed sector N has its fulcrum *c* in a support box or bonnet, P, which is bolted to the disk L or block K, so as to revolve in common with them and engine-shaft F. The rack M also rotates in common with the box P, and it may be connected with a swivel-joint piece, Q, with a lever, R, for adjusting the eccentric as required.

The dotted line *y y* in Fig. 4 indicates the position of the lever when the eccentric occupies a concentric position with the engine-shaft, and the motion of the engine is stopped. The diagram, Fig. 5, illustrates the extreme lateral adjustment of the eccentric for reversing the engine. Any intermediate lateral adjustment effects a proportionate cut-off action.

What is here claimed, and desired to be secured by Letters Patent, is—

The combination of the rack M, the toothed sector N with its elbow N′, the rod O, the revolving support or box P, the block K of the revolving shaft F, and the eccentric H with its slot *b*, substantially as and for the purposes herein set forth.

ROBERT McC. FRYER.

Witnesses:
FRED. HAYNES,
BENJ. P. SHARP.