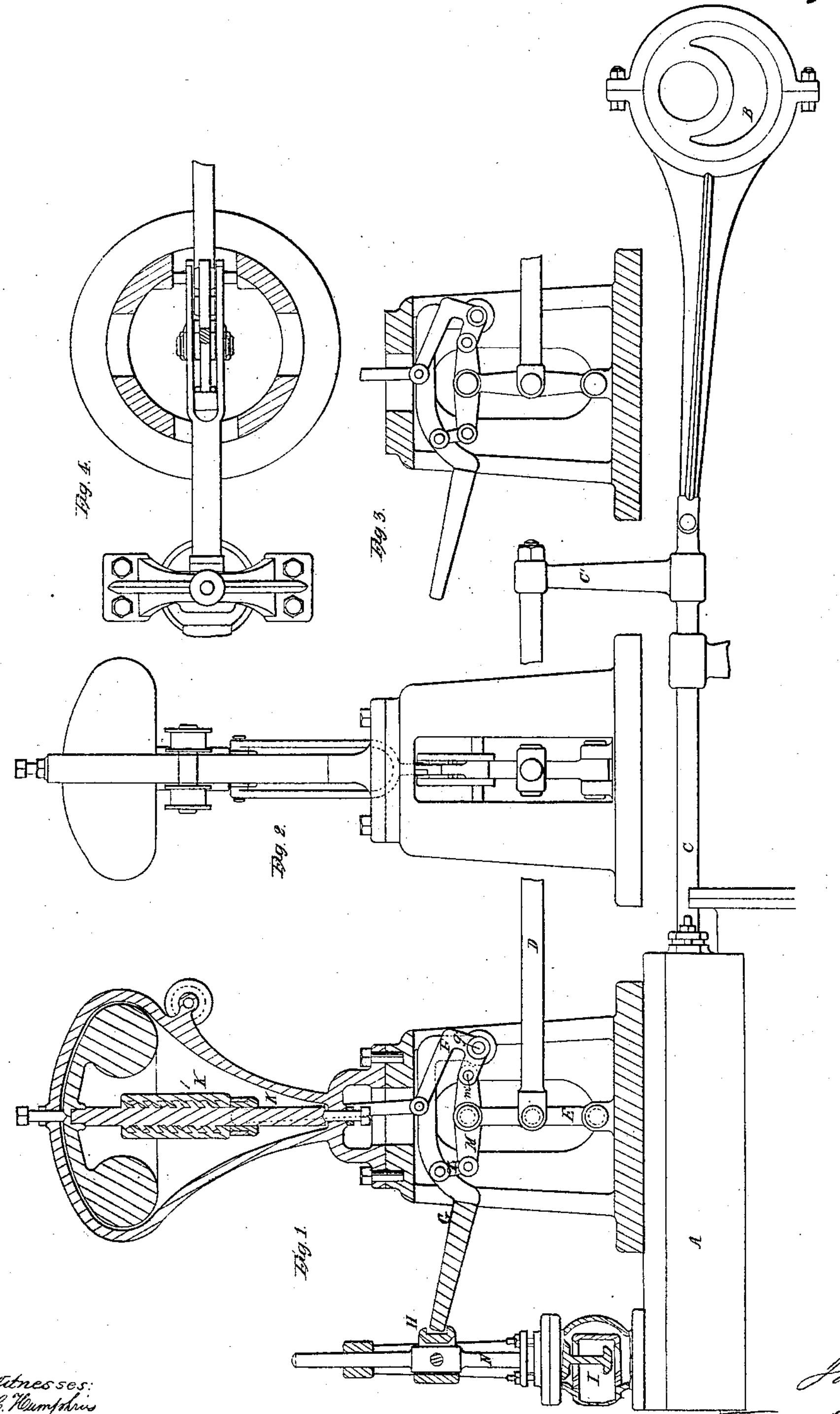
J. T. Rich,

Steam-Engine Valve-Gear.

No. 53,680. Patented Apr. 3, 1866.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

JOHN T. RICH, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN CUT-OFF VALVE-GEARS.

Specification forming part of Letters Patent No. **53,680**, dated April 3, 1866.

To all whom it may concern:

Be it known that I, JOHN T. RICH, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Governor Cut-Off and Combined Governor and Throttle 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 annexed drawings, in which—

Figure 1 is a vertical longitudinal section. Fig. 2 is an elevation. Fig. 3 is an elevation showing part. Fig. 4 is a plan.

The same letters refer to identical parts.

A is the steam-chest, the valve being moved by the valve-rod C, receiving motion from the eccentric B. To the main valve-rod B a standard, C′, is attached, communicating motion to the connecting-rod D.

Working in a suitably-arranged frame is the toggle-joint E, to the middle joint of which is attached the connecting-rod D. The upper arm of the toggle-joint is hinged to the bar M, which crosses it horizontally, and is hinged at *m′* to the bell-crank F, which is acted upon by the governor K. The other end of the bar M is hinged by the link L to the lever G. This lever G is bent as shown in the drawings, and is hinged at Q to a pivot, on which is also hung the bell-crank F. The other arm of this lever plays freely up and down and gives motion to the rod N and balanced puppet-valve I by means of the stud H.

The stud H is attached to the stem N of the cut-off valve I by a pivot, allowing a slight vibratory motion vertically, the lever G working alternately against its upper and lower jaws as the cut-off valve is opened and closed.

It will be observed that when the arms of the toggle-joint are extended the end of the lever G is raised and the valve I opened. When the toggle-joint is bent at either extremity of the stroke of the connecting-rod D the lever G is depressed and the cut-off valve closed. Thus at each revolution of the engine the cut-off valve is twice opened and twice closed. No springs or weights are needed, as in working other cut-off valves, the valve being opened and closed by the direct action of the lever G, as set forth. By this means, also, the valve is quickly lifted to its full opening, and thereby permitting the full amount of the steam to enter the cylinder at once, avoiding wire-drawing the steam and permitting the full advantages of working steam expansively to be enjoyed.

The governor being attached, by the bell-crank F, as set forth, to the lever by means of the rod M and link L, the governor acts directly upon and controls the motion of the valve I, and will, if it should become necessary by a sudden strain upon the engine, open the valve after it had been closed for cutting off, or instantly close it when open.

Having thus fully explained the nature and operation of my improvements, what I claim as my invention, and seek to secure by Letters Patent, is—

1. Actuating the cut-off valve of a steam-engine positively, both in opening and closing, through the medium of a toggle-joint, and multiplying the motion thereof, substantially as set forth.

2. So combining the governor and cut-off valve of a steam-engine by means of a bell-crank, F, lever G, and other connecting mechanism, as set forth, that the valve may be operated by the governor in connection with and independently of the toggle-joint E, substantially as set forth.

3. The connecting-rod D, toggle-joint E, bar M, link L, and lever G, in combination with the stud H, valve-stem N, and valve I, the parts being constructed and arranged substantially as and for the purpose set forth.

4. In combination with the cut-off valve-stem N, the stud H, constructed substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. RICH.

Witnesses:

JAMES MCCLENAHAN,

WM. P. HIBBERD.