H. BILGRAM.

Cut-Off Valve-Gear.

No. 164,132. Patented June 8, 1875.

Fig. 1.

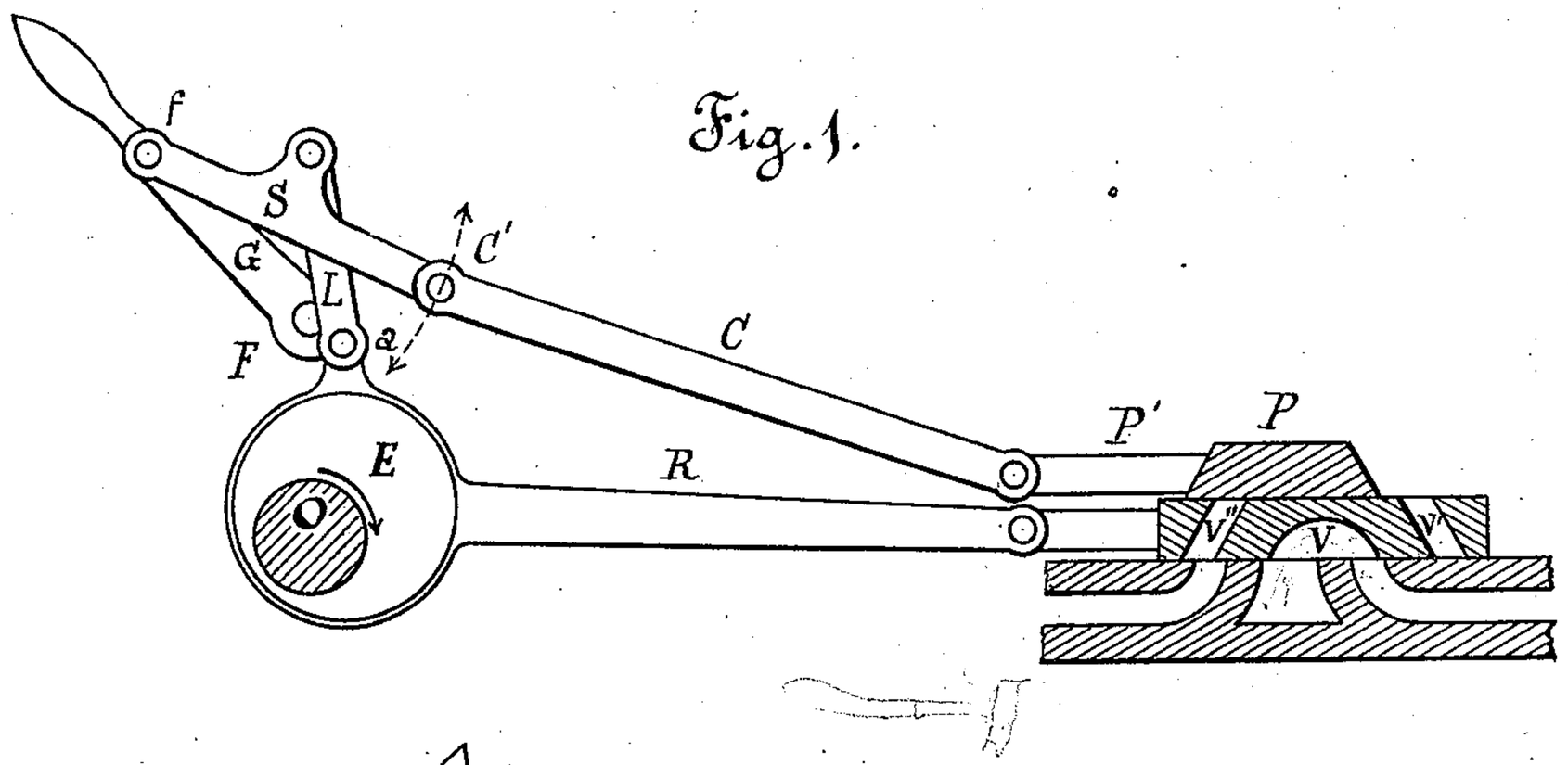
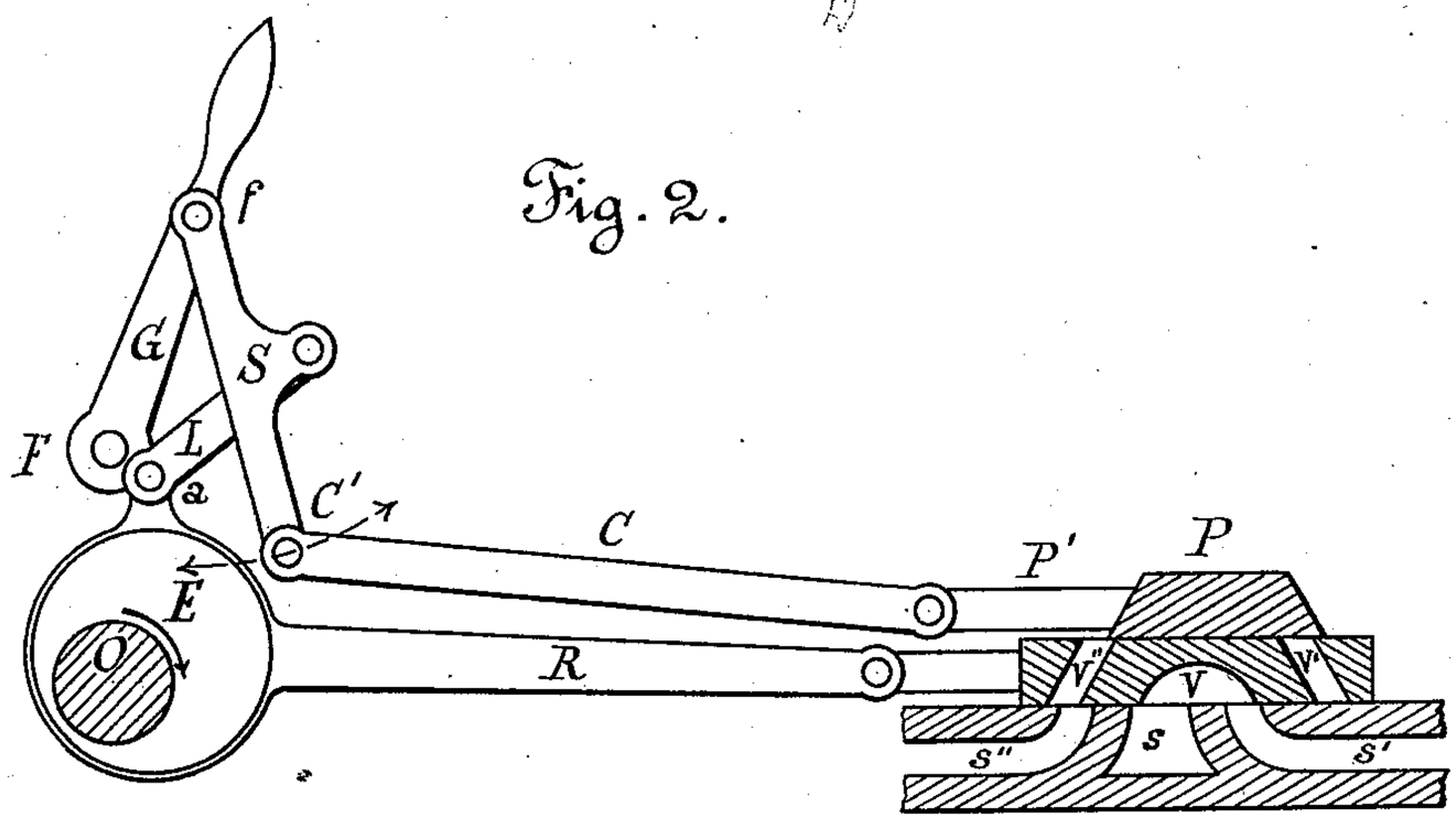



Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN CUT-OFF-VALVE GEARS.

Specification forming part of Letters Patent No. **164,132**, dated June 8, 1875; application filed May 22, 1875.

*To all whom it may concern:*

Be it known that I, HUGO BILGRAM, of the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Mechanism for Operating the Valves of Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, and letters of reference marked thereon.

The nature of my invention consists in a device for producing from the rotary motion of the crank-shaft of an engine a reciprocating motion, the direction of which can be changed and adjusted for the purpose hereinafter fully described, and from which another reciprocating motion of variable time and extent is derived and applied to the cut-off valve, the latter sliding on the back of the principal steam-admission valve of the same engine.

The device is illustrated in the accompanying drawing, showing the valve-gear and a section through the steam-valves and the valve-seat of the steam-cylinder. Both Figures 1 and 2 show the same device with the adjustment-lever in different positions.

O represents the crank-shaft of an engine, with the eccentric E and eccentric strap and rod R, the latter being connected in the usual manner with the principal steam-admission valve V. The adjustment-lever G is secured by its fulcrum F to the engine bed or frame, and carries near its end a pin, *f*, forming a fulcrum for the rocker S. The link L connects the pin *a*, which forms a part of the eccentric-strap, with the rocker S, the end C′ of which is connected through rod C and the valve-stem P′ with the cut-off plate P. The steam-valve V has passages or ports V′ and V″, and slides on the valve-seat over the exhaust-canal *s* and the steam-canals *s′* and *s″*.

When the shaft O is rotated in the direction of the arrow shown in the drawing, the eccentric E will operate the principal steam-admission valve V in the usual manner. The circular movement of the pin *a* of the eccentric-strap will at the same time, through the link L, transmit an oscillating motion to the rocker S, which is held by its fulcrum *f*. A component or part of the reciprocating motion of the pin C′ of the rocker S is transmitted, through the connecting-rod C and the valve-stem P′, to the cut-off valve P. An adjustment of the lever G (see Fig. 2) changes the position of the fulcrum *f* of the rocker S, thereby varying the direction in which the point C′ of the rocker S is reciprocating, and will thus change the extent and time of motion transmitted to the cut-off plate P.

The principal steam-admission valve tends to regulate the admission of steam as the ordinary slide-valve does. The cut-off plate P, however, effects a closing of either of the steam-passages V′ or V″, and cuts off the steam at an earlier or later period of the stroke, according as the lever G is adjusted, and as the rocker S is more or less inclined. The amount of steam admitted to the cylinder can be thus regulated.

The lever G may be operated by a governor, effecting the adjustment automatically.

This invention can also be applied to reversing engines where the principal steam-admission valve is moved by a link motion or other reversing-gear; but the connection between the eccentric E and the rocker S—now effected by the link L—must then be more complicated.

It will be seen upon examination that the aforesaid invention is a modification and improvement upon a former invention of mine fully described in Letters Patent of the United States 158,669, granted to me January 12, 1875. The invention set forth in the present specification is therefore subject to the aforesaid Letters Patent.

The improvement consists in substituting for an angularly-adjustable slide a rocker of adjustable angularity, which absorbs less friction, and which, by virtue of its shape, permits of a reduction of the number of parts of the mechanism.

I claim—

The combination of the rocker S, which is angularly adjustable by its fulcrum *f*, and is operated by the eccentric E through the eccentric-strap and the link L, with a rod, C, conveying motion to the cut-off valve P of an engine.

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