

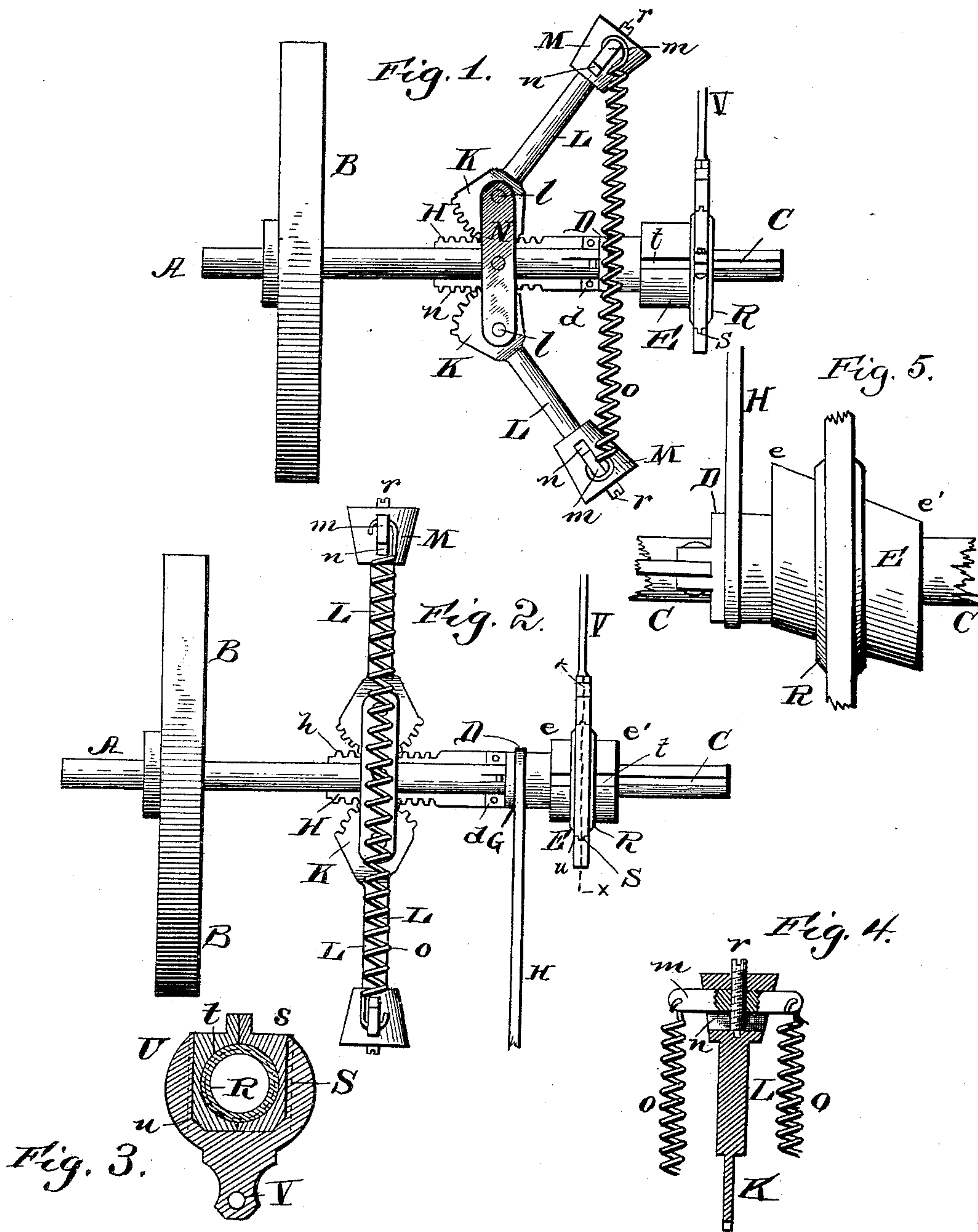
(No Model.)

S. T. BRUCE.

AUTOMATIC CUT-OFF AND REVERSING VALVE GEAR.

No. 462,758.

Patented Nov. 10, 1891.



Witnesses:  
J. B. M. Givv.  
W. J. Beruhard

Inventor:  
Sidney T. Bruce  
By his attorneys,  
Edoent Bros.



# UNITED STATES PATENT OFFICE.

SIDNEY THOMAS BRUCE, OF MARSHALL, MISSOURI.

## AUTOMATIC CUT-OFF AND REVERSING VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 462,758, dated November 10, 1891.

Application filed February 18, 1891. Serial No. 381,910. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY THOMAS BRUCE, a citizen of the United States, residing at Marshall, in the county of Saline and State of Missouri, have invented certain new and useful Improvements in Automatic Cut-Off and Reversing Valve Gear; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvement in reversing automatic cut-off mechanism for steam-engines; and the object is to provide simple and effective means for automatically reducing the speed of an engine and to enable the engine to be readily reversed at will.

With these and other ends in view the invention consists of the combination, with the main shaft of an engine, of a sliding sleeve fitted on the main shaft and carrying a double eccentric, a yoke secured to the eccentric and suitably connected with the valve of the engine, governor arms or levers connected to the sliding sleeve to automatically move the same to reduce the speed of the engine, and means for manually changing or shifting the position of the slidable sleeve.

To enable others to understand the invention, I have illustrated the same in the accompanying drawings, in which—

Figure 1 is a plan showing my improvements applied to the main shaft of an engine. Fig. 2 is an elevation of the same, showing the position of the parts when the valve is cut off. Fig. 3 is a transverse sectional view on the line  $x x$  of Fig. 1, and Fig. 4 is a detail transverse sectional view through one of the governor levers or arms. Fig. 5 is a side elevation of a portion of the main shaft and the eccentric.

Like letters of reference denote corresponding parts in all the figures of the drawings, referring to which—

A designates the main shaft of an engine, which carries a drive or band wheel B, and said shaft is provided with a longitudinal groove or recess C.

On the shaft A is fitted a slidable sleeve D, which is connected to the main shaft so as to revolve therewith by means of keys fitted in

the groove C at both ends of the sleeve D. The sleeve D is provided at one end with a double eccentric E, preferably formed integral with the sleeve D, and this eccentric consists of two eccentrics  $e e'$ , situated on opposite sides of the main shaft and separated by an intermediate neutral portion which is concentric with the main shaft.

G designates an annular groove formed in the sleeve D near the inner end thereof, and in which is fitted the bifurcated end of a reversing-lever H. The sleeve D is further provided at the end opposite to the eccentric E on opposite sides of the main shaft with a pair of lugs  $d$ , which extend rearwardly in line with the sleeve D, and to said lugs are secured the rods or bars II, which are provided with a series of teeth forming the racks  $h$ . The teeth of the racks  $h$  mesh with a series of teeth formed on the segmental edges of the hubs K, which are integral with the levers L, and at the outer ends of the levers L are secured weights M. The levers L are fulcrumed on the main shaft A by means of pivots or bolts  $l$ , which pass through the hubs K and the ends of parallel flat plates N, which are centrally secured to the main shaft and extend from opposite sides thereof.

The weights M are each provided with a transverse chamber or passage  $n$ , within which is fitted a short bar  $m$ , and the outer end of each bar is connected to the corresponding end of the bar  $m$  of the weight by means of coiled springs  $o$ . The bars  $m$  are kept in place within the chambers  $n$  by screw-bolts  $r$ , which pass through the said bars, and by adjusting these screws the bars  $m$  can be moved up or down in the chamber  $n$  to distend the springs  $o$  or to release the tension thereof.

Around the eccentric E is fitted a ring R, and the ring is provided with an inwardly-projecting rib or flange  $s$ , which fits in a longitudinal groove  $t$  in the edge of the eccentric to permit the ring R to revolve with the eccentric. This ring is provided on its periphery with an annular groove, in which is fitted a rib formed on the inner surface of a yoke S, and this yoke in turn has formed in its outer faces the longitudinal grooves or recesses  $u$ , in which are fitted ribs on the inner surfaces of the forked end of a supporting-arm U, rigidly connected to the short rock-



shaft V, journaled in suitable supports below the main shaft, and to one of the arms of this forked supporting-piece is connected one end of a pitman or rod W, the other end of which  
5 is connected with the valve-rod of the valve.

The operation of the engine may be briefly stated as follows: As the main shaft is rotated, the rock-shaft V rocks slightly in its bearings and operates through the arm and  
10 eccentric to reciprocate the rod W and the valve of the engine. If the speed of the engine is increased beyond the desired limit, the centrifugal force causes the weights M to fly outwardly until the levers L are in a  
15 straight line at right angles to the axis of the main shaft. This movement of the centrifugal levers L moves the sliding sleeve on the shaft A until the ring lies in the neutral line or the central portion of the eccentric E, which,  
20 as before stated, is concentric with the main shaft, as shown in Fig. 2. In this position the eccentric E and the ring R revolve freely within the yoke S; but the eccentric does not change or influence the yoke, and hence the  
25 valve is cut off and remains at rest.

To start the engine, the shipping-lever is operated to move the sleeve D longitudinally of the shaft A and bring either of the eccen-  
30 trics  $e e'$  within the plane of the ring R.

It is not essential that the reverse and cut-off mechanism be applied directly to the main shaft of the engine, as said mechanism can be applied with equal advantage to another  
35 shaft running at the same speed as the main shaft, either parallel with said shaft or at right angles thereto.

Changes in the form and proportion of parts may be made without departing from the spirit or sacrificing the advantages of my  
40 invention, and I therefore reserve the right to make such changes as fairly fall within the scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters  
45 Patent, is—

1. The combination, with a rotary shaft, of a slidable sleeve fitted on said shaft, a double eccentric movable with the slidable sleeve, the centrifugal levers fulcrumed on the shaft,  
50 and connections intermediate of the levers and the slidable sleeve for moving the latter longitudinally on the shaft, substantially as described, and for the purpose specified.

2. The combination, with a rotary shaft, of  
55 a slidable sleeve fitted on said shaft and pro-

vided with an eccentric, a rock-shaft, a ring fitted loosely around the eccentric, a forked supporting-arm carried by the rock-shaft and supporting said ring, substantially as shown and described. 60

3. The combination, with a rotary shaft, of a revoluble sleeve fitted on said shaft and adapted to slide thereon, a double eccentric carried by said sleeve, connections intermediate of the eccentric and a valve, the rack-  
65 bars secured to the sleeve and extending in line with the same on the shaft, the levers fulcrumed on the shaft and provided at their inner ends with teeth which mesh with the racks, as and for the purpose specified. 70

4. The combination of a shaft, a slidable sleeve secured to said shaft to revolve therewith, an eccentric carried by the sleeve, with the eccentric portions extending beyond op-  
75 posite sides of the shaft and having an intervening portion concentric with the shaft, a reversing-lever connected to the slidable sleeve at one side of the eccentric, the rack-bars secured to the slidable sleeve, the cross-plates N, secured to the shaft on opposite sides thereof,  
80 the levers pivoted between the plates N and geared to the rack-bars, and a valve-rod, substantially as shown and described.

5. In a governor for steam-engines, the weights, each provided with a transverse  
85 chamber, and a cross-bar fitted in said chamber, in combination with the spring connections between the cross-bars in the weights, and means for adjusting the cross-bars toward or from each other, substantially as and for  
90 the purpose described.

6. The combination, with a shaft, of a sleeve carried by the shaft and provided with an eccentric and the racks, the yoke connected to said eccentric, and the centrifugal  
95 levers geared to the rack-bars, substantially as described.

7. The combination, with a shaft, of a sleeve having the eccentric and the racks, the yoke connected to said eccentric, the centrifugal  
100 levers geared to the racks, and the spring connections intermediate of the free ends of said levers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

SIDNEY THOMAS BRUCE.

Witnesses:

J. B. STARKE,  
MARSH FIELD.