

(No Model.)

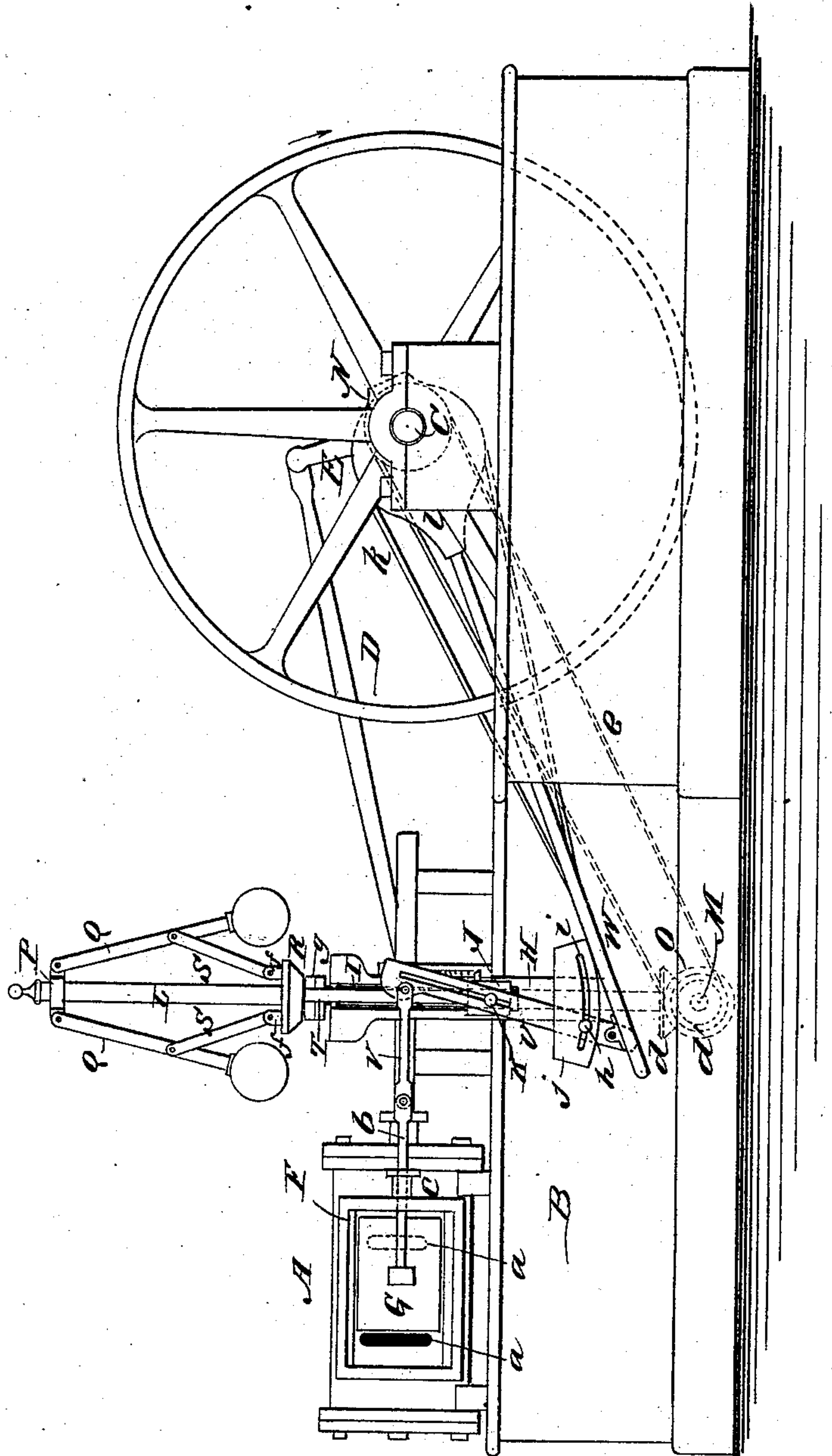
2 Sheets—Sheet 1.

E. QUEROL Y DELGADO.
CUT-OFF FOR STEAM ENGINES.

No. 356,958.

Patented Feb. 1, 1887.

Fig. 1



WITNESSES:

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C. Sedgwick

INVENTOR:

Emilio Querol y Delgado

BY

Munn & Co.

ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3

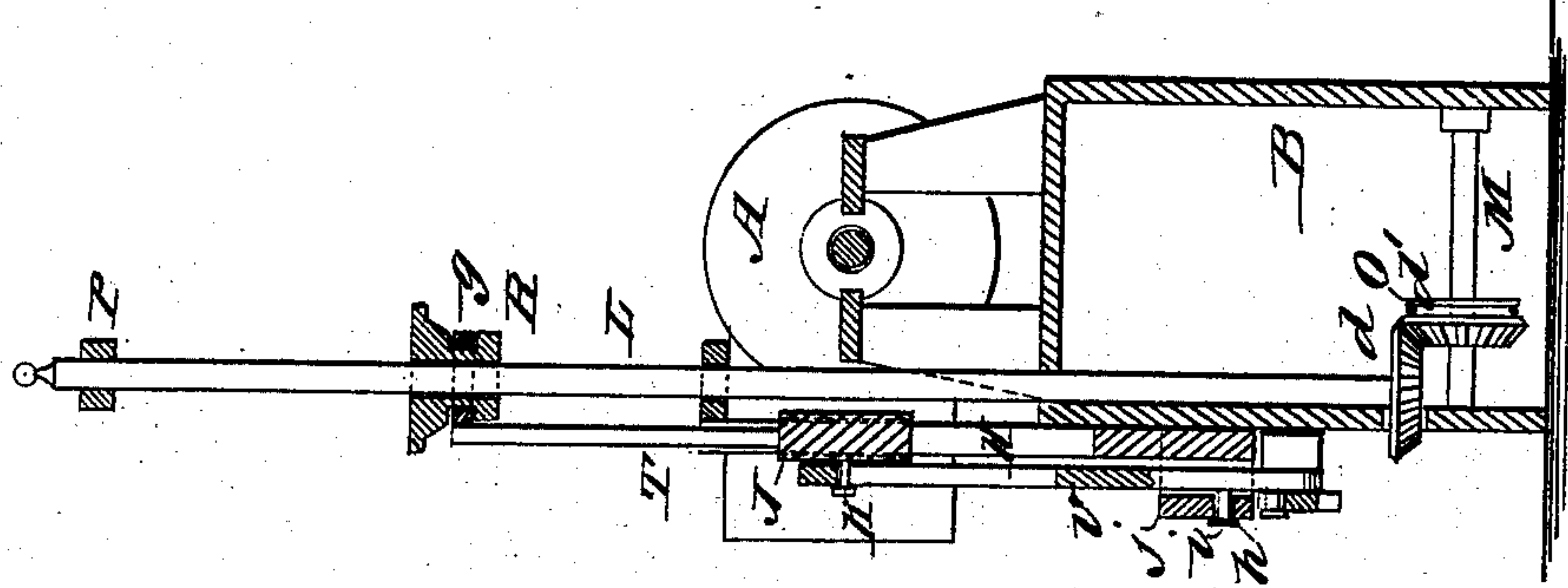
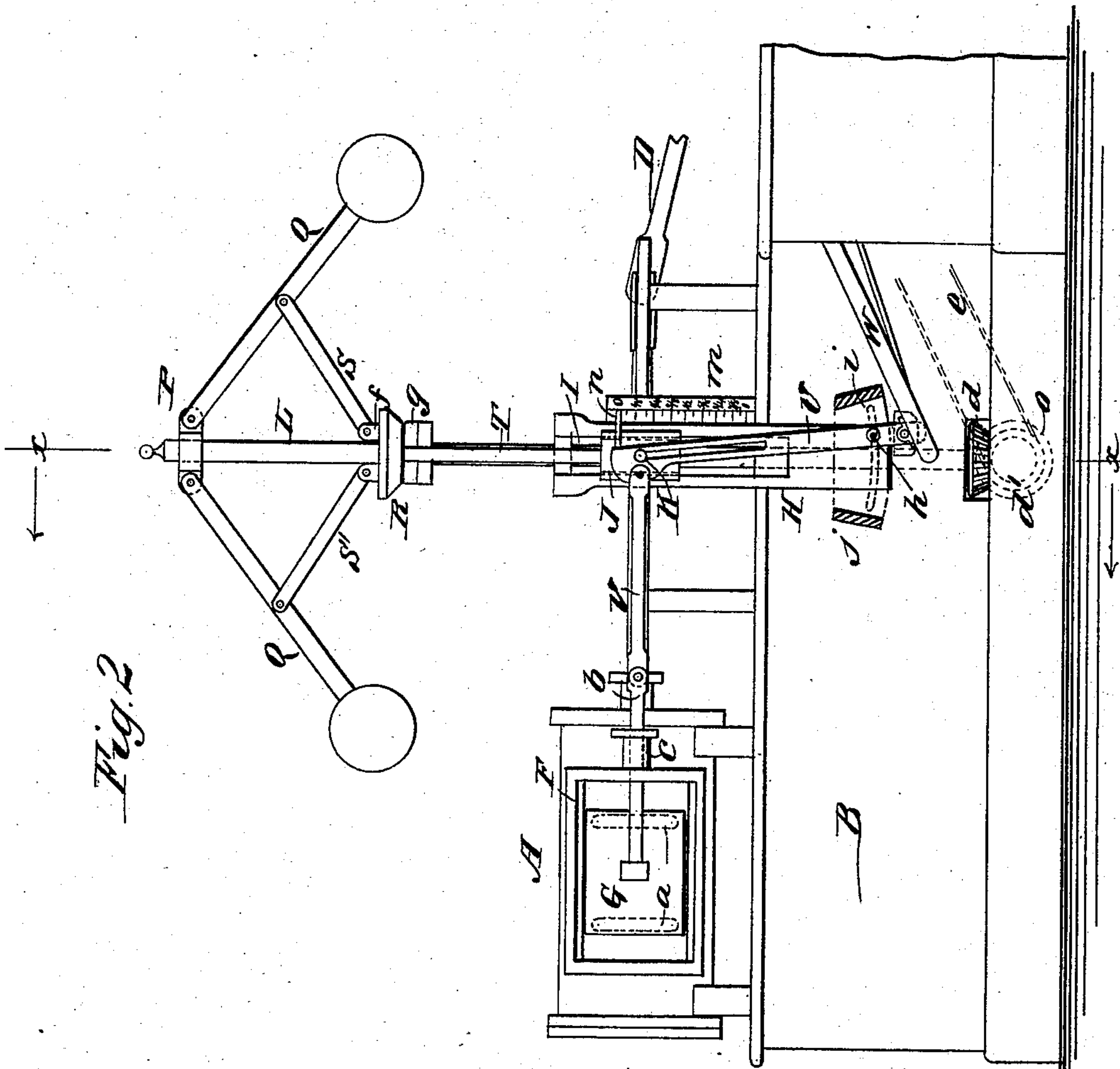


Fig. 2



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UNITED STATES PATENT OFFICE.

EMILIO QUEROL Y DELGADO, OF BROOKLYN, NEW YORK.

CUT-OFF FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 358,958, dated February 1, 1887.

Application filed September 1, 1886. Serial No. 212,411. (No model.)

To all whom it may concern:

Be it known that I, EMILIO QUEROL Y DELGADO, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Automatic Cut-Off for Steam-Engines, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side elevation of a horizontal steam-engine to which my improved cut-off has been applied. Fig. 2 is an enlarged partial side elevation of the engine, showing the position of the parts of the cut-off when the steam is entirely shut off from the cylinder; and Fig. 3 is a vertical transverse section taken on line *x x* in Fig. 2, looking in the direction indicated by the arrows.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct a simple and efficient cut-off for steam-engines, in which the stroke of the slide-valve will be varied in accordance with the load carried by the engine.

My invention consists in the combination, with the slide-valve rod and eccentric-rod of a steam-engine, of a slotted valve-operating lever connected with the said rods, a movable fulcrum for the valve-lever, and a governor driven by the engine and arranged to move the fulcrum of the valve-lever in accordance with the requirements of the engine.

It also consists in the combination, with the movable fulcrum, of an index and scale for indicating the proportion of the stroke of the valve relative to its full stroke.

The engine-cylinder A is mounted on the base B, and provided with a piston and piston-rod, which communicate motion to the main shaft C through the connecting-rod D and crank E in the usual way. The cylinder is provided with the valve-chest F, containing a slide-valve, G, of the ordinary construction, which is capable of opening and closing the ports *a* when moved by the mechanism presently to be described, so as to admit steam alternately to opposite ends of the cylinder. The slide-valve G is provided with the valve-rod *b*, which extends through the gland *c* in the end of the steam-chest F.

To the side of the engine-bed is secured a vertical guide, H, provided with the slot I to

which is fitted a slide, J, carrying a stud, K. In the L-shaped upper end of the guide H is journaled the vertical governor-shaft L, which extends below the bed of the engine, and is provided at its lower end with a miter-wheel, *d*, which receives motion from a miter-wheel, *d'*, on the shaft M, journaled in the lower part of the base B.

The shaft M is provided with a pulley, O, which receives motion through a belt, *e*, from a pulley, N, on the main shaft C. The upper end of the governor-shaft L carries a cross-head, P, to opposite ends of which are pivoted the weighted levers Q.

On the shaft L, between the cross-head P and the guide H, is placed a sliding circumferentially-grooved sleeve, R, provided with ears *f* on its upper end. Links S, pivoted to the ears *f*, are pivotally connected with the weighted levers Q, between their weighted and pivoted ends. In the circumferential groove of the sleeve R is placed a collar, *g*, which is connected with the slide J by a bar, T. By means of this construction the sleeve R is permitted to rotate freely with the governor-shaft, and at the same time to impart vertical motion to the bar T and slide J when moved by the weighted levers Q.

Upon the stud K, carried by the slide J, is placed a slotted valve-operating lever, U, the stud K extending through the slot of the lever. The upper end of the slotted lever U is connected by a connecting-rod, V, with the end of the valve-rod *b*. A stud, *h*, projecting from the face of the slotted lever U, near the lower end thereof, extends through a curved slot, *i*, in a bridge, *j*, secured to the base B, and extending over the lever U. The lever U is free to oscillate on the stud K, and is prevented from falling by the stud *h* and the slotted bridge *j*.

To the lower end of the slotted lever U is pivoted the eccentric-rod W, which is provided with a strap, *k*, encircling an eccentric, *l*, on the main shaft C. The eccentric *l* is arranged in the usual way with reference to the crank E. When the weighted levers Q of the governor are in their lowest position, the stud K is in the lower part of the slot of the lever U, and the eccentric *l* will impart to the valve G the greatest motion of which it is capable, opening the ports *a a* so as to admit steam to

the cylinder A through the greater portion of the stroke of the piston. As the speed of the engine increases, the centrifugal action of the weighted levers Q causes them to rise, moving
 5 with them (through the rod T and slide J) the stud K, thereby diminishing the length of the upper arm of the lever U and correspondingly increasing the length of the lower arm, in this manner reducing the stroke of the valve G.
 10 When the normal speed of the engine is attained, the relation of the stud K to the slotted lever U will be such as to cause the valve G to admit to the cylinder sufficient steam at the early part of the stroke of the piston to maintain the speed of the engine; but should the
 15 load on the engine increase so as to diminish its velocity the weighted levers Q will fall, thereby moving downward the slide J and the stud K, increasing the stroke of the valve so
 20 as to admit steam for a longer period to the cylinder A.

Should the sudden removal of the load from the engine require the complete shutting off of the steam, a slight increase in the motion of
 25 the engine will cause the weighted levers Q of the governor to rise, thereby carrying the stud K to the extreme upper end of the slot in the lever U, opposite the connection of the connecting-rod V. This brings the valve G over
 30 both ports *a*, and the oscillation of the lever U has no effect upon the valve G. The steam in this case will remain entirely shut off until the speed of the engine is sufficiently reduced to allow the weighted levers Q to drop and
 35 again carry the stud K below the connection of the connecting-rod V.

To the side of the guide H is secured a scale, *m*, the whole length of which represents the complete excursion of the slide J. The scale
 40 *m* is divided into equal parts, representing

fractions of the excursion of the slide J, also fractions of the stroke of the valve. To the slide J is secured an index, *n*, which extends over the scale *m*, and is used in making readings of the scale.

It is obvious that, in lieu of the ordinary centrifugal governor shown and described in connection with my improved cut-off, any of the well known governors may be used for
 50 varying the position of the slide J and stud K.

The advantages secured by my invention are its great simplicity and adaptability to ordinary engines provided with plain slide-valves.

Having thus fully described my invention, I claim as new and desire to secure by Letters
 55 Patent—

1. In an automatic cut-off for steam-engines, the combination, with the valve and eccentric-rods of the engine, of the straight-slotted valve-operating lever U, provided with the stud *h*,
 60 and pivotally connected with the valve and eccentric-rods, the bridge *j*, provided with the curved slot *i*, the slide J, provided with the stud K, and means for moving the said slide J, substantially as specified.

2. In an automatic cut off for steam engines, the combination of the slide valve G, valve-rod *b*, straight slotted lever U, connecting-rod V, pivoted to the said valve-rod and slotted
 70 lever, the eccentric-rod W, pivotally connected with the slotted lever U, the guide H, slide J, stud K, carried by the said slide and secured to the slot of the lever U, and the rod T and centrifugal governor connected therewith, substantially as specified.

EMILIO QUEROL Y DELGADO.

Witnesses:

C. SEDGWICK,
 E. M. CLARK.