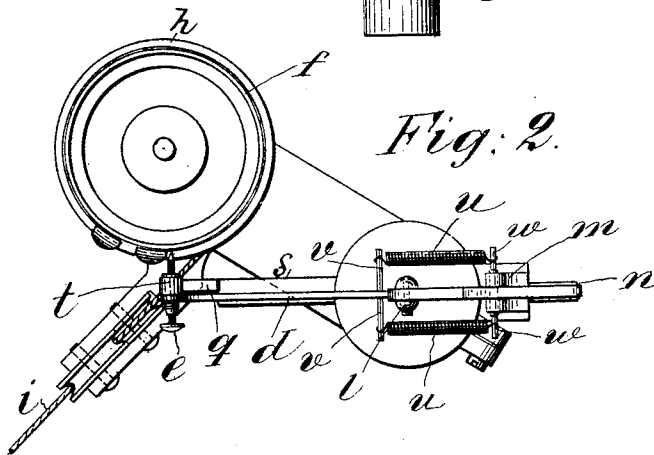
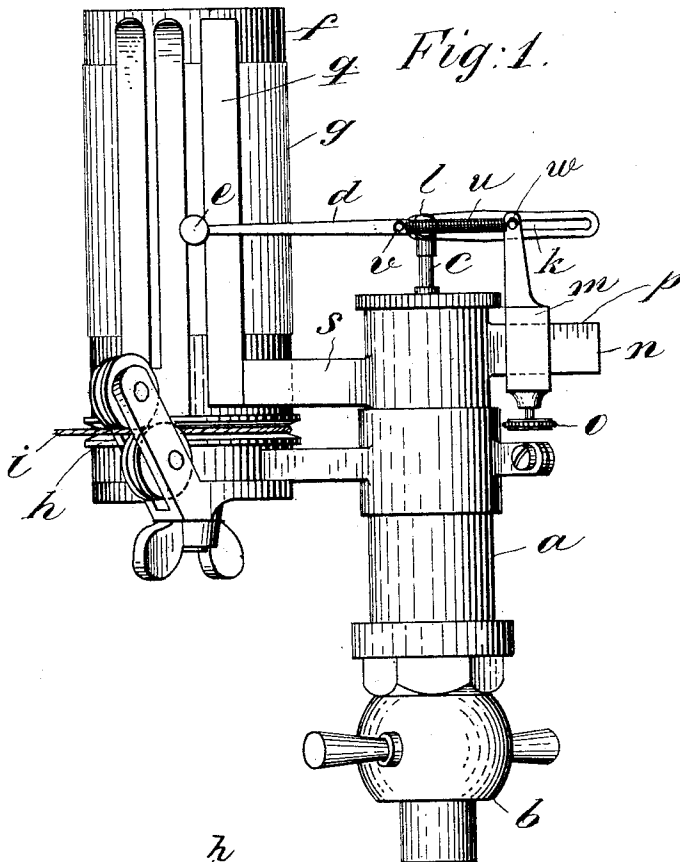


(No Model.)

A. WINBORG.
STEAM ENGINE INDICATOR.

No. 583,219.

Patented May 25, 1897.



INVENTOR:

Abel Winborg

WITNESSES:

W. H. Morgan
F. A. Thayer

By

A. O. Thayer

Attorney.

UNITED STATES PATENT OFFICE.

ABEL WINBORG, OF BROOKLYN, NEW YORK.

STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 583,219, dated May 25, 1897.

Application filed August 1, 1896. Serial No. 601,297. (No model.)

To all whom it may concern:

Be it known that I, ABEL WINBORG, a subject of the King of Sweden and Norway, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Steam-Engine Indicators, of which the following is a specification.

The object of my invention is to provide for varying the range of the pencil-carrying staff to better adapt the instrument to engines of different speeds, better results being obtained by shortening the range of the pencil as the speed of the engine is greater, and it enables one instrument to be used for both high and low speed engines, for which two are necessary as commonly constructed.

Another object is to provide better means for causing the vertical movements of the pencil in a right line for making more accurate cards, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved indicator, and Fig. 2 is a plan view of the same.

The indicator is mainly constructed in the usual form as the steam-cylinder *a*, having the coupling *b* for making the connection with the engine to be tested, said cylinder containing the usual piston, from which a rod *c* projects upward through the cover of the cylinder and connects with the pencil-staff *d*, carrying the pencil *e* up and down along the rotating barrel *f* for marking the paper sheet *g*, carried on the barrel, said barrel having the usual pulley *h* and cord *i* and retracting-spring for operating it.

According to my invention I provide a movable fulcrum-pivot *w* for the pencil-staff and fit said staff thereon by a slot-opening *k* for the pivot, whereby through shifting the fulcrum toward and from the point of connection *l* of the staff and piston-rod the length of the fulcrum-arm of the staff will be varied, and the range of the pencil will be varied accordingly. In this example of my invention I have provided a sliding post *m* on a horizontal arm *n*, attached to the side of cylinder *a*, for carrying the pivot *w*, with a bind-

ing-screw *o* to set the post in position, and the arm has a graduated scale *p*, by which the fulcrum may be set for any predetermined range of the pencil.

For causing the pencil to traverse a straight vertical line a vertical guideway *q* is located at one side of the path of the pencil on a supporting-arm *s*, projecting from the steam-cylinder, against which guideway the pencil-holding stud *t* is caused to bear by springs *u*, connected to the studs *v* of the pencil-staff and to studs *w* of the fulcrum-post, and the staff is made with suitable freedom in its hole for the pivot *l* to allow the staff to shift relatively to the piston-rod for allowing the movements of the pencil in the right line. This makes more accurate cards than if the pencil-staff turns on the pivot *l* as on a fixed center.

I claim—

1. In a steam-engine indicator, in which the pencil-staff is actuated by a steam-piston, the pencil-staff pivoted on the piston-rod and having a fulcrum-pivot movable along the arm of the staff to vary the range of the pencil substantially as described.

2. In a steam-engine indicator, the combination with the pencil-staff, of a fulcrum-pivot movable along the arm of the staff to vary the range of the pencil, a movable post carrying the pivot, and a lateral arm of the steam-cylinder supporting the post, substantially as described.

3. In a steam-engine indicator, the combination with the pencil-staff, of a fulcrum-pivot movable along the arm of the staff to vary the range of the pencil, a movable post carrying the pivot and a lateral arm of the steam-cylinder supporting the post, said arm having a graduated scale for gaging the lengths of the movements of the pencil substantially as described.

4. In a steam-engine indicator, the combination with the pencil-staff and vertical guide for the pencil, of the springs causing the pencil to move along and in contact with the guideway and pencil, said staff being movable laterally on the piston-rod pivot and on its fulcrum-pivot and carrying the pencil in a straight line substantially as described.

5. In a steam-engine indicator, the combination of the pencil-staff having the movable pivot, adjustable post for supporting the movable pivot, vertical guide for the pencil and
5 the springs causing coaction of the guideway and pencil said springs connected to said post substantially as described.

Signed at New York city, in the county and State of New York, this 27th day of July, A. D. 1896.

ABEL WINBORG.

Witnesses:

W. J. MORGAN,
A. P. THAYER.