

No. 689,640.

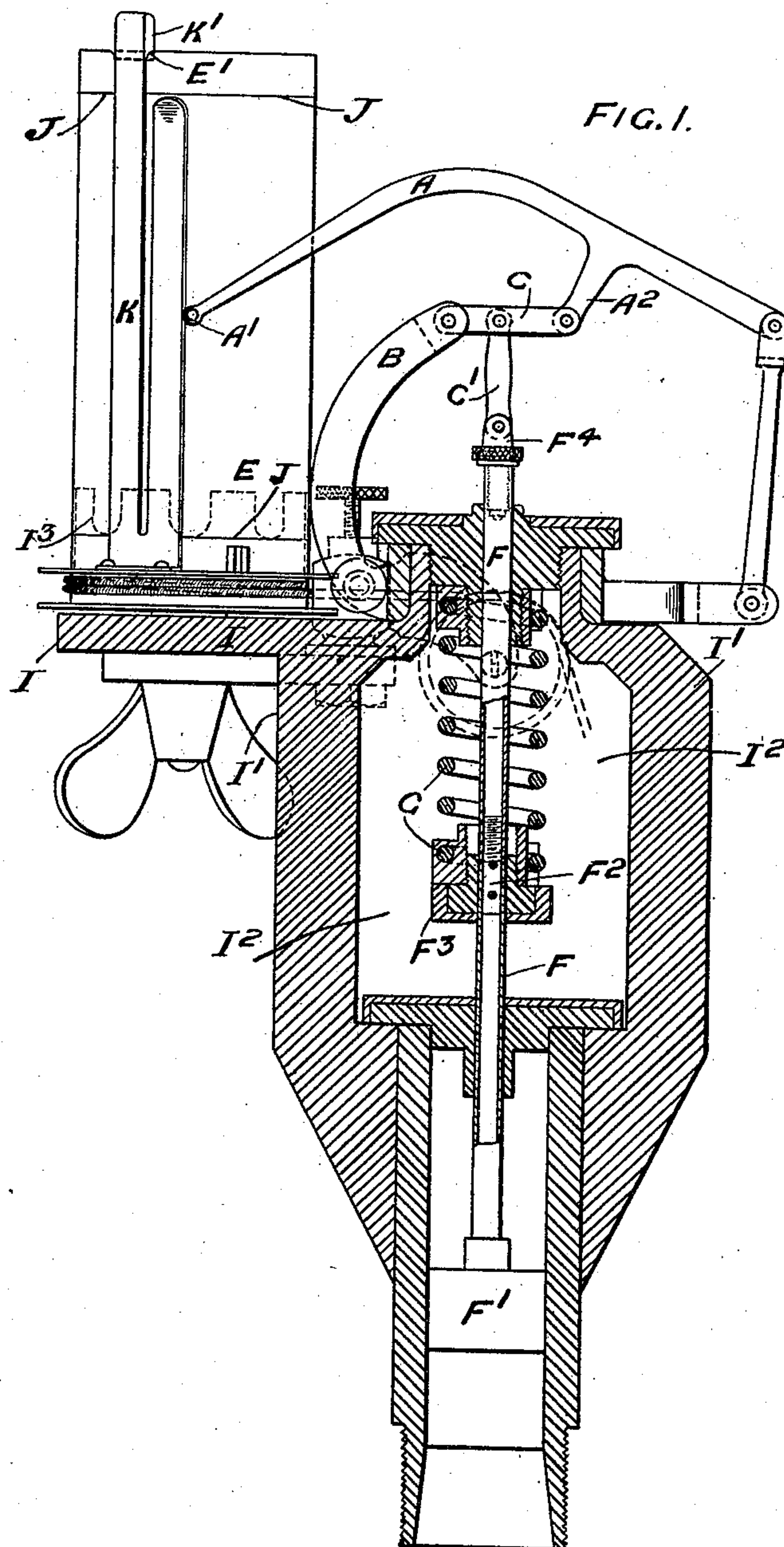
Patented Dec. 24, 1901.

J. C. DOBBIE.  
STEAM ENGINE INDICATOR.

(Application filed Dec. 10, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.  
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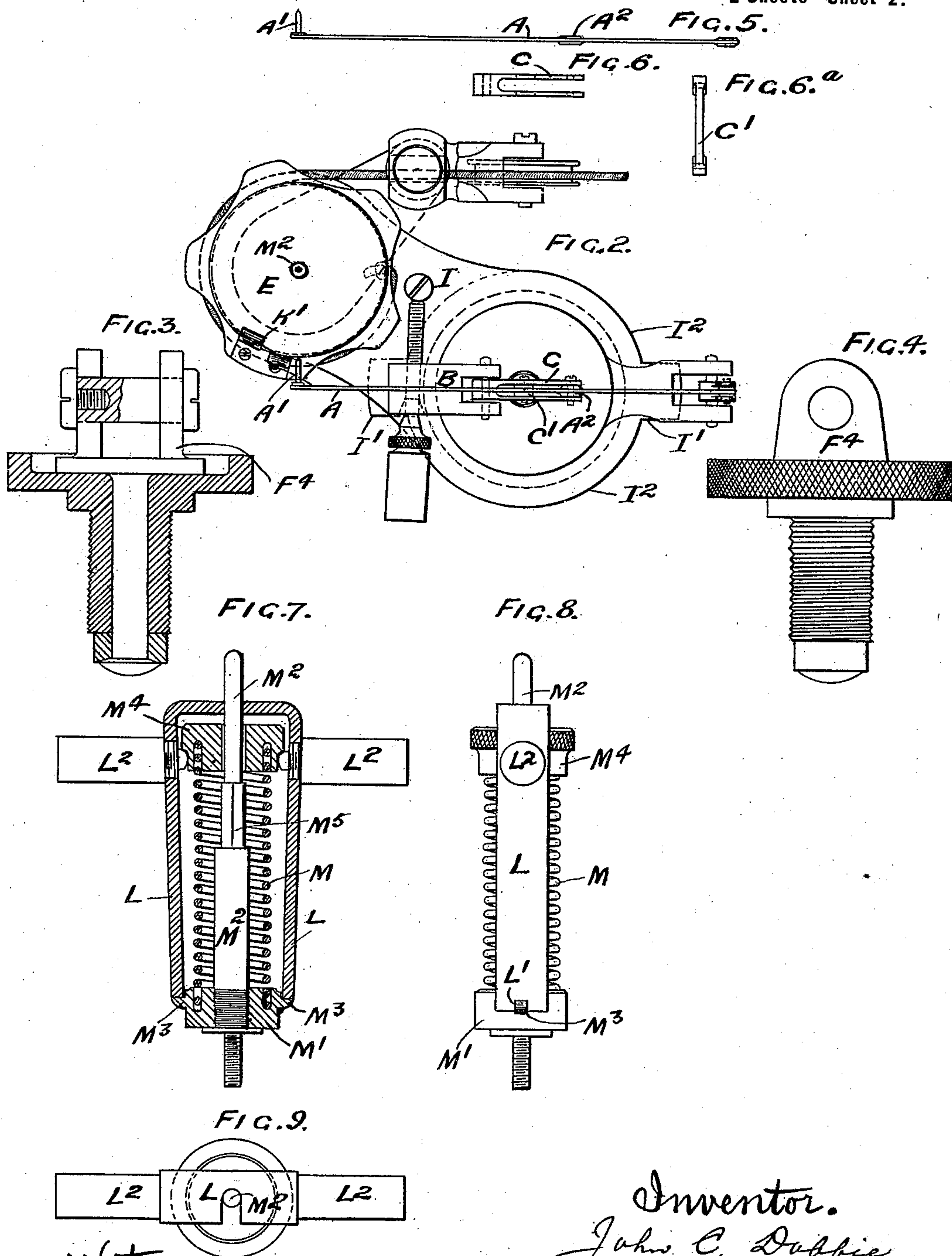
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# UNITED STATES PATENT OFFICE.

JOHN CLARK DOBBIE, OF GLASGOW, SCOTLAND.

## STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 689,640, dated December 24, 1901.

Application filed December 10, 1898. Serial No. 698,851. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN CLARK DOBBIE, a citizen of the United Kingdom of Great Britain and Ireland, and a resident of 45 Clyde Place, in the city of Glasgow, Scotland, have invented new and useful Improvements in Steam-Engine Indicators, (which have been patented in Great Britain by Letters Patent dated the 14th day of May, 1898, No. 11,026,) of which the following is a specification.

This invention has for its object to simplify and improve the construction of steam-engine indicators.

The invention is illustrated by the accompanying drawings.

Figure 1 is a vertical section, and Fig. 2 a plan, of a steam-engine indicator as constructed under my invention. Fig. 3 is a section and elevation, on a large scale, of a jaw in which is pivoted the lower end of the link C'; and Fig. 4 is an elevation of the same on a plane at right angles to that of Fig. 3. Fig. 5 is a plan of the arm which carries the pencil. Fig. 6 is a plan of the radius-link in which said arm is pivoted. Fig. 6<sup>a</sup> is an elevation of the link C', which connects said radius-link with the piston-rod of the indicator. Fig. 7 is a vertical section of the drum-spring and related parts. Fig. 8 is an elevation on a plane at right angles to that of Fig. 7, and Fig. 9 is a plan of the same.

Referring to Figs. 1 and 2, in order to obviate overhanging of the arm A, carrying the indicator-pencil A', to clear the upright bracket B, on which the radius-link C, connecting the arm A to the link C', is centered, the said arm A is according to the present invention formed with a downwardly-projecting knee or branch A<sup>2</sup>, to the lower end of which the radius-link C is jointed, and the outer end of the indicator-arm is curved or bent downward over the upright bracket B, so that its extremity carrying the pencil may reach to the bottom of the card-drum E when the piston-rod F of the piston F' is at its lowest point and traverse the length of the drum E in a vertical line as the piston-rod F rises. The radius-link C is connected to a link C', which is in turn connected to a jaw F<sup>4</sup> on the upper end of the piston-rod F, said jaw F<sup>4</sup> being

constructed as shown to enlarged scale at Figs. 3 and 4 and screwed into the tubular piston-rod F.

The helical spring G, which is provided to counterbalance the steam-pressure and is usually placed within the upper end of the cylinder H, containing the moving piston F' of the indicator, is rendered more readily accessible for removal and interchanging by cutting a chamber I<sup>2</sup> through and through the upper part of the upward extension I', the walls of the chamber forming uprights which carry the framing I or are formed integral therewith, the said spring G being accessible through said chamber I<sup>2</sup>. The piston-rod F, where it is inclosed by the spring G, is divided and one length is screwed into the other or joined thereto by a screwed piece F<sup>2</sup>, while a vulcanite or other non-conducting ferrule or collar F<sup>3</sup>, on which the spring G bears, is secured on the piston-rod F to provide for unscrewing one part of the rod F from the other. By separating the meeting ends of the divided piston-rod F the spring G can be withdrawn and replaced.

The barrel or drum E, on which the indicating-paper J is wound, is set on a pulley which is pivoted on the framing I. The cylindrical flange I<sup>3</sup> of said pulley is cut out to form prongs, as shown, which clamp on the said drum E. The indicator-card J is secured to the drum E and the latter held down on its seat on the pulley by a blade-spring K, attached at its lower end to the pulley, extending up the side of the drum E and terminated at its upper end in a catch K', which engages with a notch E' in the upper end of the drum E. The drum-spring M is fitted with a head M', having an internal screw-thread the convolutions of which are left-handed when those of the spring M are right-handed and which is screwed onto a screw-threaded stem M<sup>2</sup> in the center of the corded I. A device for screwing the head M' of the drum-spring M onto its spindle M<sup>2</sup> is shown at Figs. 7, 8, and 9 and consists of a bridge-piece L, having notches L' at its lower end, which engage projections M<sup>3</sup> on the drum-head M', the actuating-handles L<sup>2</sup> of this bridge-piece being carried through to engage



and raise the head  $M^4$  at the upper edge of the spring  $M$  from the square portion  $M^5$  of the spindle  $M^2$ .

5 The pencil-arm  $A$  and also the radius-link are constructed, as shown at Figs. 5 and 6, with bosses around their connecting-eyes.

Having now described the invention, what I claim, and desire to secure by Letters Patent, is—

10 The combination in a steam-engine indicator of a cylinder adapted to be connected with the cylinder of the steam-engine, a piston  $F'$  therein adapted to be moved in one direction by the steam-pressure, a jointed piston-rod  
15  $F$  connected with said piston  $F'$ , a coiled spring  $G$  adapted to move said piston  $F'$  in a direction opposite to the steam-pressure, a link  $C'$  pivotally connected with said piston-rod  $F$ , a radius-link  $C$  pivoted on the outer

end of said link  $C'$  at the middle part of said 20 link  $C$ , a curved oscillating bracket  $B$  pivoted at its lower end to a stationary support and at its upper end to one end of said radius-link  $C$ , a pencil-carrying arm  $A$  pivoted at its outer end to an upright oscillating arm, a 25 knee  $A^2$  on said arm  $A$  pivotally connected with the end of said radius-link  $C$  opposite to said bracket  $B$ , and a rotating paper-carrying drum  $E$  adjacent to the free end of said pencil-carrying arm  $A$  whereby a pencil on said 30 arm  $A$  marks a diagram on the paper on said drum  $E$ , substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JOHN CLARK DOBBIE.

Witnesses:

WALLACE FAIRWEATHER,  
JNO. ARMSTRONG, Junr.