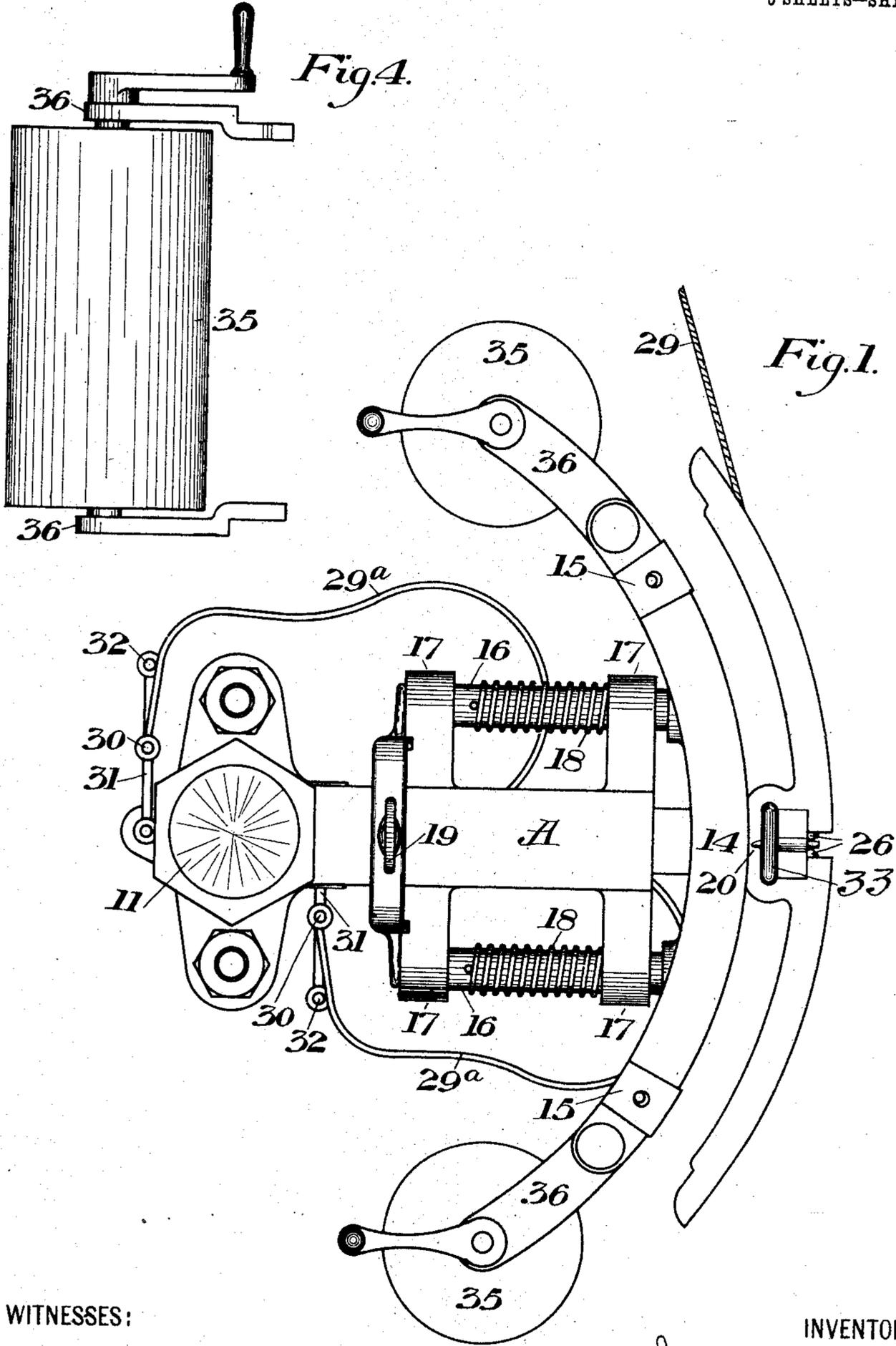


No. 886,021.

PATENTED APR. 28, 1908.

J. W. THOMPSON.  
ENGINE INDICATOR.  
APPLICATION FILED AUG. 17, 1908.

5 SHEETS—SHEET 1



WITNESSES:

*W. W. Swartz*  
*A. M. Corwin*

INVENTOR

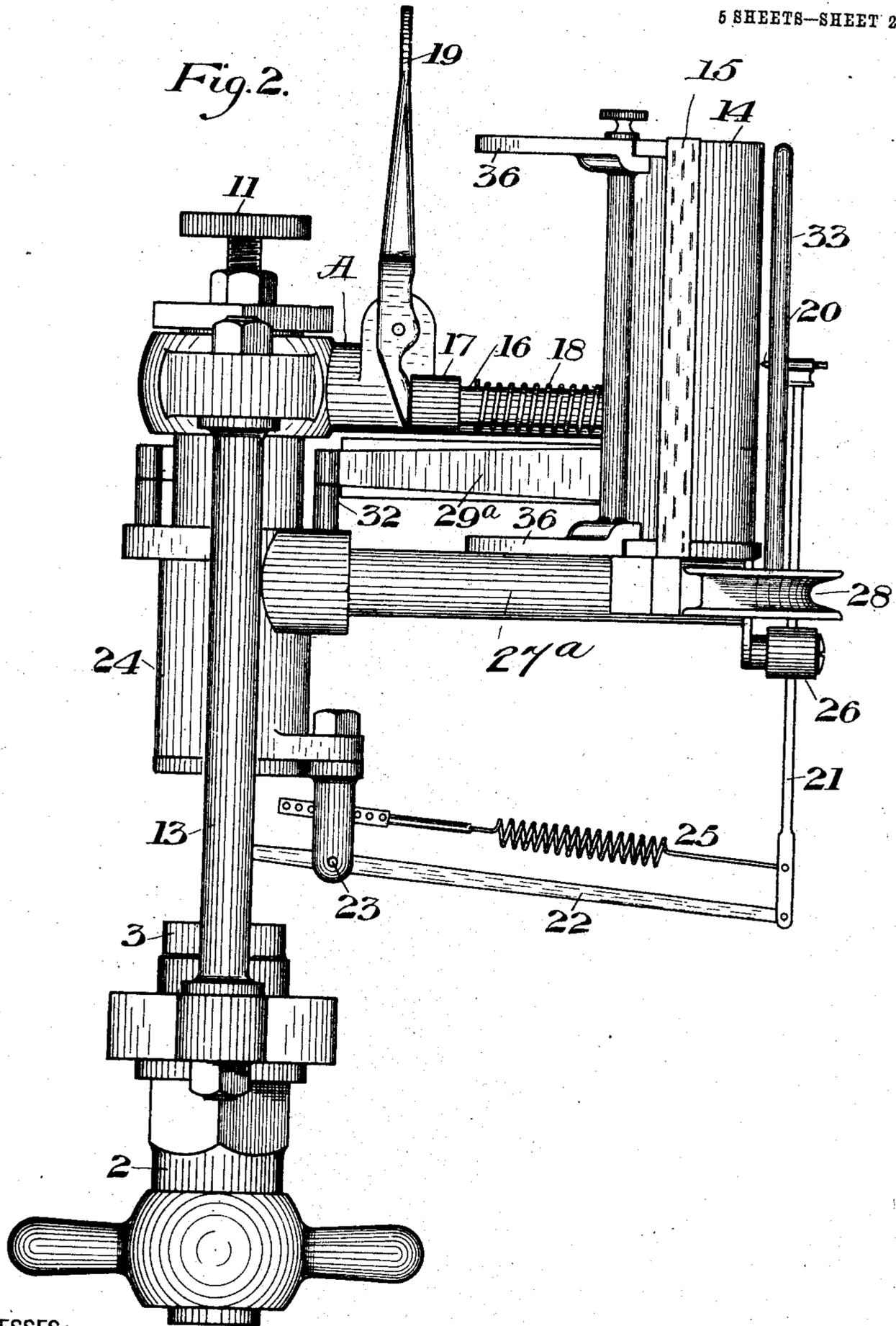
*Joseph W. Thompson,*  
*By Babcock & Byrnes,*  
*his attys.*

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5 SHEETS—SHEET 2.



WITNESSES:

*W. W. Swartz*  
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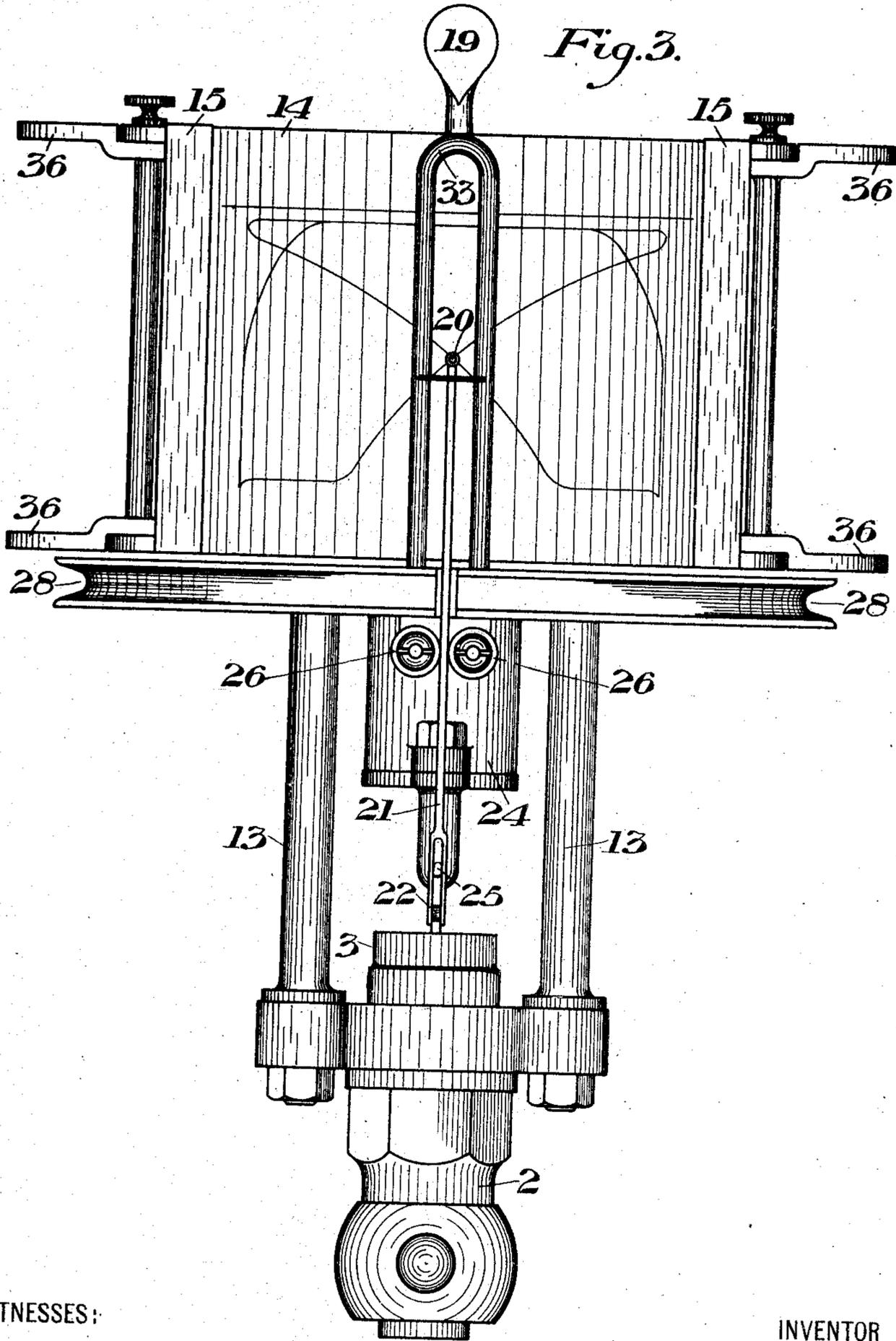
*Joseph W. Thompson,*  
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5 SHEETS—SHEET 3.



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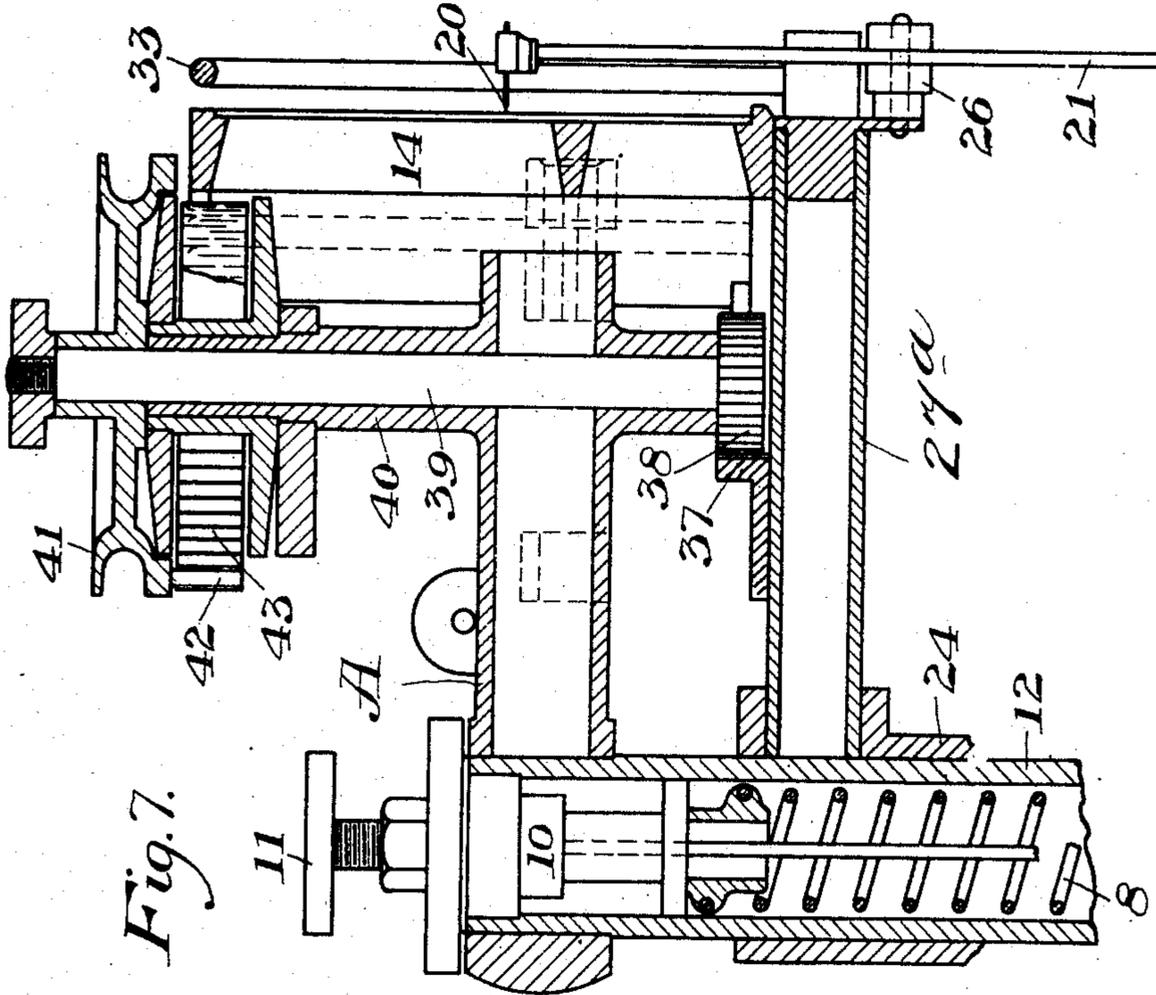


Fig. 7.

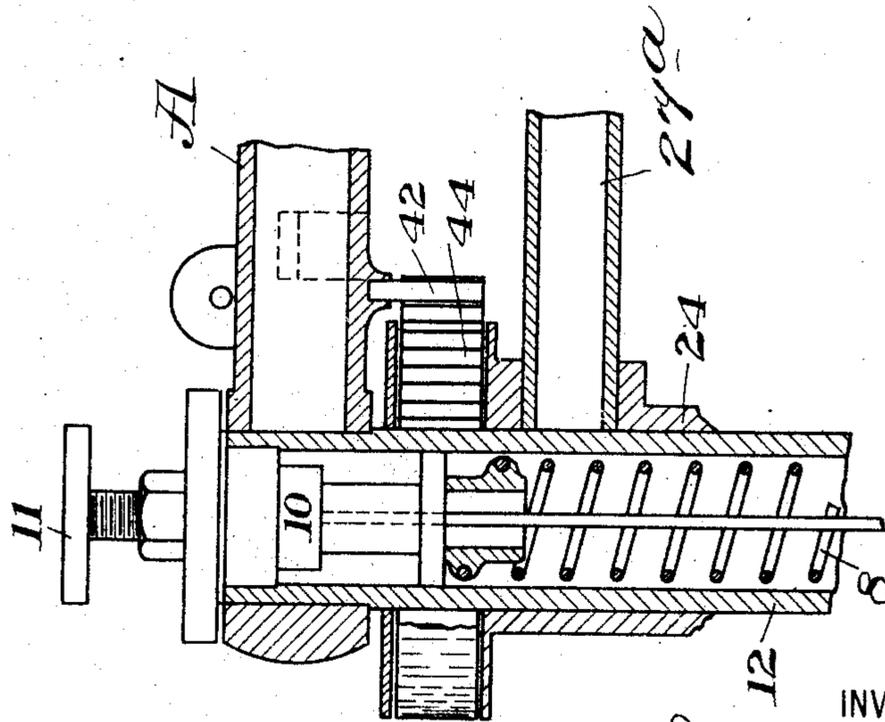


Fig. 8.

WITNESSES:

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INVENTOR

*Joseph W. Thompson*

BY  
*Robbwell & Byrnes*  
his ATTORNEYS

# UNITED STATES PATENT OFFICE.

JOSEPH W. THOMPSON, OF SALEM, OHIO, ASSIGNOR TO BUCKEYE ENGINE COMPANY, OF SALEM, OHIO, A CORPORATION OF OHIO.

## ENGINE-INDICATOR.

No. 886,021.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed August 17, 1906. Serial No. 331,091.

*To all whom it may concern:*

Be it known that I, JOSEPH W. THOMPSON, of Salem, Columbiana county, Ohio, have invented a new and useful Engine-Indicator, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view showing one form of my improved indicator; Figs. 2 and 3 are side and front elevations, respectively; Fig. 4 is a detail view, showing the means of attaching the roll-holder; Fig. 5 is an enlarged vertical section; Fig. 6 is a detail view, showing another form of piston device; and Figs. 7 and 8 are detail views, showing other forms of spring devices.

My invention relates to the class of engine indicators and is designed to provide a device of this character in which the card or record is visible during its making and the paper is stationary while such record is made.

Another object of the invention is to provide for continuous records wherein the paper is wound from one roll to another, separate records being taken and torn off, if desired.

In the drawings, referring to the form of Figs. 1 to 6, 2 represents the hollow plug or attachment which is connected to the source of pressure. I have shown this as arranged to extend vertically, though the instrument may extend in any desired direction. The plug contains a cylinder or bore 3 containing piston 4 having ball and socket connection 5 with a vertical stem 6, to the upper end of which is screwed a collar or sleeve 7 secured to the lower portion of the spiral spring 8. The upper portion of this spring is secured to a similar collar 9 screwed to an adjustable plug 10, which may be adjusted by a screw device 11. The spring and adjusting device are mounted in the bushing 12 carried upon the opposite stems or standards 13. The paper is supported upon a curved platen 14, being held by springs or clips 15. This platen is carried upon a pair of sliding pins 16 movable through guides 17 and normally retracted to the limit of their rear movement by spiral springs 18 surrounding them. The platen may be forced forward against the resistance of the springs by the pivoted hand lever 19, this lever acting to bring the paper on the platen into contact with a pencil when it is desired to make a diagram. The guides

17 are carried by a bracket A which is in turn carried by the stationary bushing 12 that is supported by the standards 13.

The pencil 20 is carried upon a stem or rod 21, pivoted at its lower end to a lever 22, which is fulcrumed at 23 on a bracket secured to a turn-sleeve 24 surrounding the stationary tubular sleeve 12. The rear end of the lever 22 projects into an annular groove in an enlargement of stem 6, so that as the stem rises and falls under the varying pressures, the pencil will be moved proportionately. Tension is given to the pencil by a spring link 25 adjustably connected to the bracket by turning sleeve 24. The pencil-carrying stem is engaged on opposite sides by the two rollers 26 carried on a depending lug of a curved segment 27 which is supported by an arm 27<sup>a</sup>. This segment is centrally slotted to allow passage of the pencil and is grooved, as shown at 28, to receive a cord 29 which is attached to a reciprocating part of the engine. The cord oscillates the pencil segment in one direction, while the return oscillation is imparted by springs 29<sup>a</sup>, shown in Fig. 1, and which are attached to the stationary part by pins and links 30 and 31. These springs 29<sup>a</sup> are so arranged that by shifting the pins from the points 30 to points 32, the force of the springs may be reversed so that the card may be attached at the opposite end of the segment 27, if desired.

33 is a vertically extending guide for the pencil in its vertical movement.

I show in Fig. 6 a smaller cylinder 34, which preferably has an area equal to about one-quarter of a square inch and which may be attached to the instrument in place of cylinders 2 where it is to be used for very high pressure. The paper roll 35 and its manner of attaching to the end arms 36 may be seen in Figs. 1 and 4. In the use of the device it is attached in the usual manner and the pressure upon the piston 4 acts to give the pencil its vertical movement, while the oscillating segment imparts the other movement to the pencil. By adjusting the screw 11 a series of superposed diagrams may be made one slightly above the other, or the paper may be rolled from one roll to the other to give a succession of diagrams along the continuous sheet.

Instead of the spring return devices which I have shown in Figs. 1 to 6, I preferably

employ spring barrels. I have shown such devices in Figs. 7 and 8. In Fig. 7, 37 illustrates a segmental rack secured to the oscillatory carrier for the pencil and engaged by a pinion 38 on the shaft 39. The shaft 39 is supported by the stationary part 40 and is rotated by a pulley 41 which is oscillated in one direction by a cord attached to the engine and is returned by pin connection 42 with a spring barrel device 43. In Fig. 8 I show a spring barrel device 44 which I prefer to employ instead of the springs 29<sup>a</sup> of the first form, for returning the segment to its normal position.

The advantages of my invention result from the visibility of the record during its taking, and the fact that the paper is stationary at this time. The instrument is well adapted for continuous roll work, though it may be used for ordinary cards. The screw affords ready means for adjusting the position of the pencil, in order to take one diagram above another. The cord may be attached to either end of the grooved wheel or segment, so that the pencil bar and its attachments may be moved in either direction. The device is simple and not liable to get out of order.

Many changes may be made in the form and arrangement of parts without departing from my invention.

I claim:

1. In an engine indicator, a stationary convex platen, a pencil holder in operative relation with the convex side of the platen, and connections to move the pencil holder in accordance with the pressure and the reciprocating part of the engine; substantially as described.

2. In an indicator, a curved stationary platen, a movable pencil holder in operative relation with the convex side of the platen, a pressure device connected with the pencil holder, and means for oscillating the pencil holder; substantially as described.

3. An engine indicator, a stationary convex platen, means for attaching a roll of paper to the convex side of the platen, a pencil in operative relation with the convex side of the platen, connections for actuating the pencil, and means for moving the platen into contact with the pencil; substantially as described.

4. In an engine indicator, a platen having a convex paper-supporting surface, a movable pencil in operative relation with the convex side of the platen, and hand controlled means for moving them into and out of contact with each other, the platen being stationary with respect to the directions of movement of the pencil, substantially as described.

5. In an engine indicator, a curved platen having a convex paper-supporting surface, a pencil, a holder therefor, a piston having

lever connection with the pencil, and means for oscillating the holder and pencil during the taking of the card, the platen being stationary with respect to the directions of movement of the pencil, substantially as described.

6. In an engine indicator, a platen having a convex paper-holding surface, an oscillating pencil holder, a pencil pivoted thereto, and an oscillating segment arranged to move the pencil, the platen being stationary with respect to the directions of movement of the pencil, substantially as described.

7. In an engine indicator, a piston, a stem connected thereto, a lever connected to said stem to oscillate about the same, and to move vertically therewith, a pencil holder carried by said lever, and an adjustable spring link arranged to impart pressure to the pencil holder.

8. In an engine indicator, a pencil holder, a piston device connected thereto, rollers between which the pencil holder moves, and mechanism for moving the rollers bodily during the taking of the diagram.

9. In an engine indicator, a convex platen, and an oscillating pencil carrier in operative relation with the convex side of the platen and arranged for connection to a cord at either end thereof to move the pencil relatively to the convex surface of the platen, the platen being stationary with respect to the directions of movement of the pencil, substantially as described.

10. In an engine indicator, a platen having a convex paper-supporting surface, an oscillating pencil carrier in operative relation with the convex paper-supporting surface and arranged for connection to a cord at either end thereof, and springs arranged to oppose the movement of the pencil carrier when drawn in either direction, the platen being stationary with respect to the directions of movement of the pencil, substantially as described.

11. In an engine indicator, a piston device, a vertically movable stem connected thereto, a spring for opposing the movement of the stem, an oscillating pencil carrier mounted to rotate about the stem and to move vertically therewith, and a convex platen, said carrier having a pencil carrying arm arranged to move over the face of said platen which is stationary with respect to the directions of movement of the pencil.

12. In an engine indicator, a curved platen having a convex paper supporting surface, sliding pins carrying the said platen, spring means for normally holding the platen in retracted position, and a hand lever arranged to move the platen forwardly against the action of the spring means, the platen being fixed against movement except in the direction of the movement of the sliding pins, substantially as described.

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13. In an engine indicator, a pressure actuated stem, a lever arm mounted to oscillate about same and to move vertically therewith, a pencil bar carried by said lever, means  
5 whereby said lever is moved in one direction by connection with a reciprocating part of the engine, and spring means for moving said lever in the opposite direction.

14. In an engine indicator, a pressure cylinder, a convex platen concentric with the  
10 cylinder, and a pencil holder in coöperative relation with the convex side of the platen, said holder being actuated by the pressure cylinder in the direction of its axis and also  
15 oscillated around the cylinder as an axis by a moving part of the engine, substantially as described.

15. An engine indicator comprising a

pressure cylinder, a frame carrying a stationary platen having a convex face concentric with respect to the pressure cylinder, and  
20 a pencil holder carried with the frame in cooperative relation with the convex face of the platen, said holder being mounted for oscillation by a moving part of the engine in the  
25 convex direction of the platen, and also associated with the pressure cylinder for reciprocation thereby in a path at substantially  
30 right angles to its first described movement, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOSEPH W. THOMPSON.

Witnesses:

LEORA M. THOMPSON,  
W. G. HARD.