

No. 687,827.

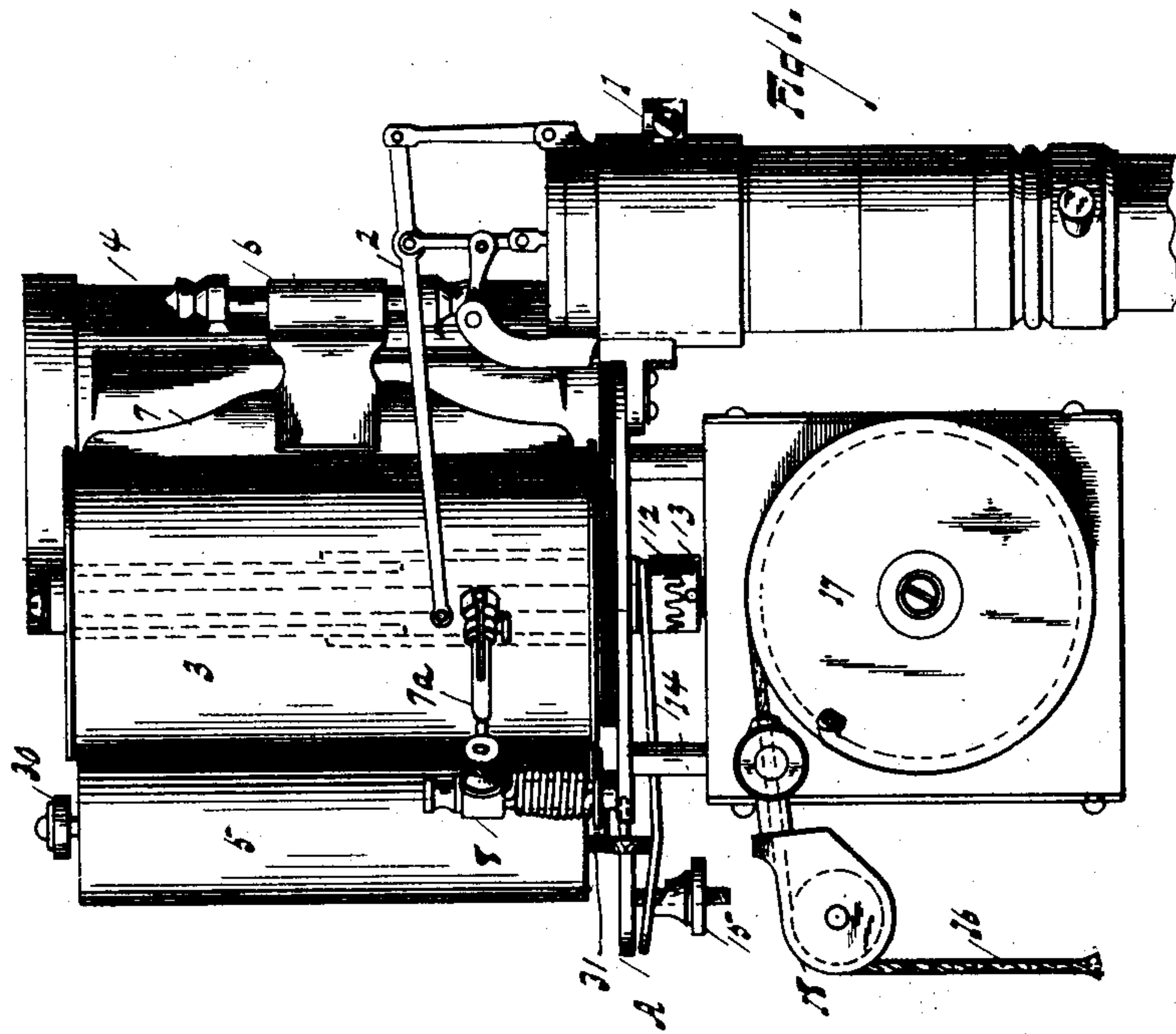
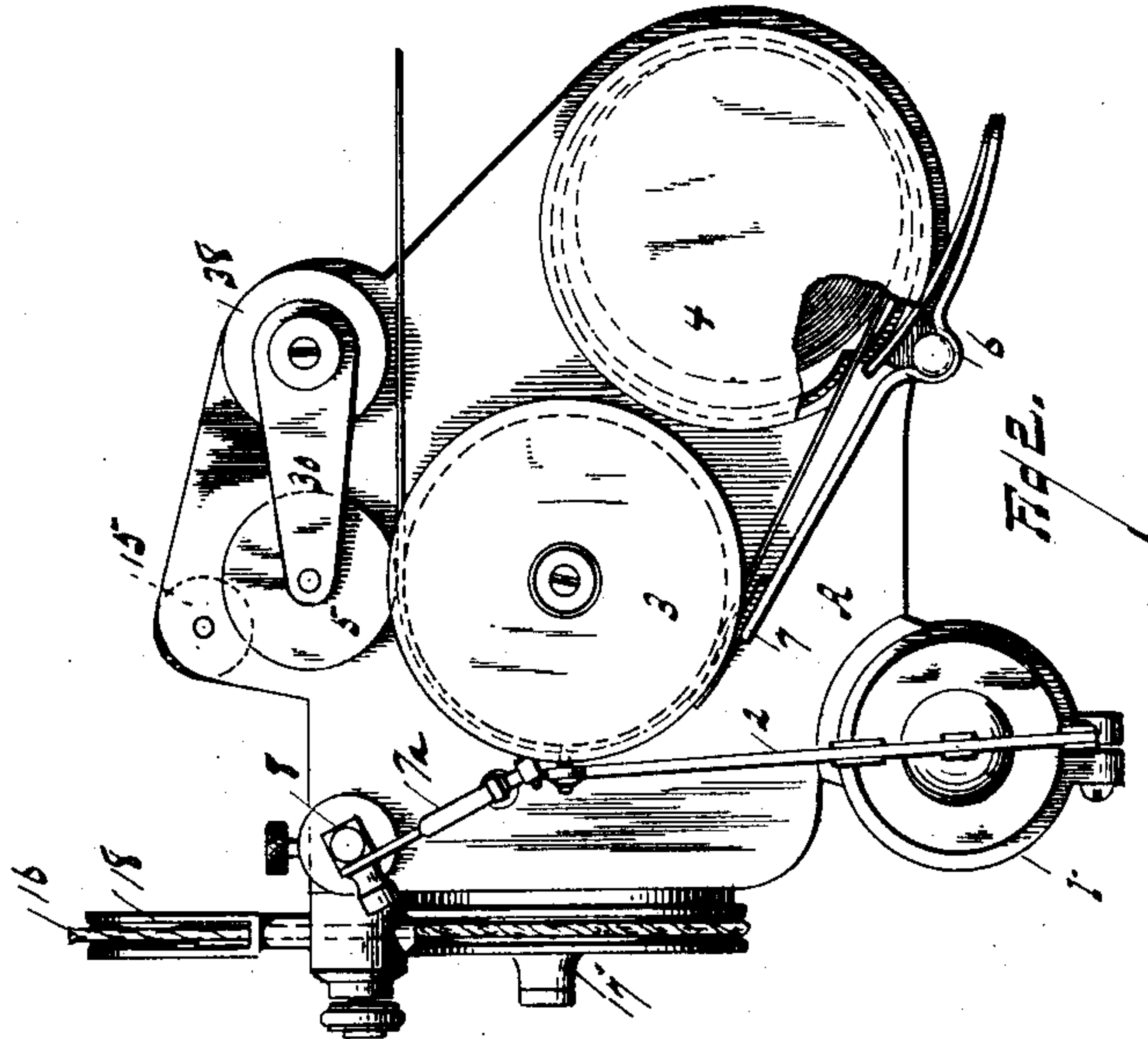
Patented Dec. 3, 1901.

A. T. HILL.
RECORD MOTOR FOR ENGINE INDICATORS.

(Application filed June 17, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES.

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INVENTOR.

Alva T. Hill

By Parker & Burton
ATTORNEYS.

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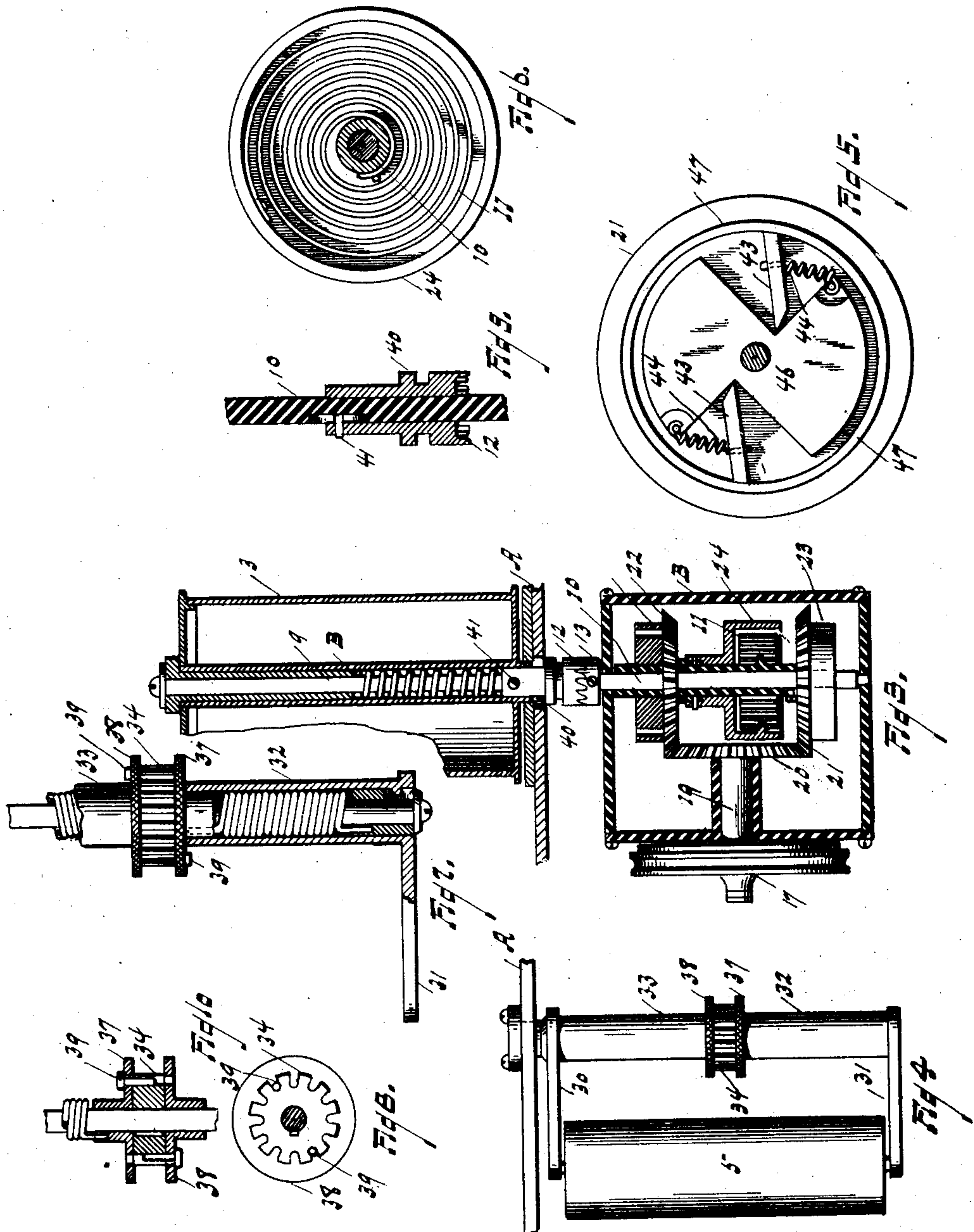
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WITNESSES

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UNITED STATES PATENT OFFICE.

ALVA T. HILL, OF DETROIT, MICHIGAN.

RECORD-MOTOR FOR ENGINE-INDICATORS.

SPECIFICATION forming part of Letters Patent No. 687,827, dated December 3, 1901.

Application filed June 17, 1901. Serial No. 64,796. (No model.)

To all whom it may concern:

Be it known that I, ALVA T. HILL, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Record-Motors for Engine-Indicators; and I declare the following to be a full, clear, and exact description of the invention, such as it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to steam-engine indicators, and has for its object an improved indicator in which the diagram is made on a continually-moving strip; and the invention relates more especially to the mechanism employed to cause the strip to move continually under the actuating impulse of the engine from which the diagram is taken, and in making such forward movement the error arising from what is known as "backlash" is eliminated entirely.

In the drawings, Figure 1 is a side elevation. Fig. 2 is a plan view. Fig. 3 is a vertical section through the driving mechanism. Fig. 4 is a detail of the pressure-roll that holds the diagram-paper to the feed-cylinder. Fig. 5 is a detail view showing the clutch mechanism by which the main shaft is actuated. Fig. 6 is a detail of the spring which actuates the mechanism during the return stroke of the engine. Fig. 7 is an enlarged detail of the holding-rod and sleeve of Fig. 4. Fig. 8 is a detail of the adjusting-nut of Fig. 7. Fig. 9 is a detail of the shaft of the main feed-drum.

The indicator comprises a frame or bed-piece A, provided with a clip 1 to engage the cylinder of an ordinary indicator that is provided with a pressure-arm 2, arranged to be actuated in the ordinary way by steam and to be attached in the ordinary way to the steam-engine. This is not a part of the invention, and it need not be described, as it is well known. On the frame is mounted a feed-drum 3, a storing-roll 4, a pressure-roll 5, and a post 6, on which there is held a spring-compressed blade 7, that bears against the paper as it is drawn from the roll 4 over the drum 3 and under the pressure-roll 5.

The device is arranged to allow the pres-

sure-arm 2 to bear against the cylinder 3 or against the paper rolling over the cylinder 3, and as the paper rolls over the cylinder 3 under the frame the diagram is marked thereon by the pencil in the arm 2. A line is also marked thereon at the same time by a pencil carried in an arm 7^a, that is held under spring-pressure from a post 8.

Motion is given to the feed-drum 3 by means of a shaft 9, upon which the feed-drum is mounted. The shaft 9 is mounted in the casing B and is actuated directly by the engine on one stroke and by the spring 11 on the reverse stroke. The shaft 10 is normally in clutch engagement with a sleeve 40, that is held by pin 41 to rotate with shaft 9.

The clutches 12 13 can be disengaged by the forked lever 14 and can be held out of engagement by the set-screw 15, that bears against the end of the forked lever 14. The engine is connected either directly or by means of a lever which reduces the length of throw by a cord 16, that has one turn around the wheel 17, thence over a sheave 18 to either the piston or the end of a lever connected with the piston. The stroke of the piston turns the wheel 17, unwinding the cord 16 therefrom, and on the return stroke the wheel 17 is rotated in the reverse direction by the spring 11.

The shaft 19 of the wheel 17 carries at its inner end a bevel-gear 20, that meshes with two bevel-gears 21 and 22. The bevel-gear 21 is provided with a clutch-housing 23 and with a clutch, which engages with the shaft 10 when the engine makes a direct stroke. The bevel-gear 22 is connected by a sleeve to a housing 24, in which is contained a spring 11. One end of the spring 11 is made fast to the housing 24 and the other end of the spring 11 is made fast to a sleeve on the shaft 10. This sleeve extends through the hub of the bevel-gear 22, where it engages with a clutch similar to that in the housing 23, but arranged to give to the shaft a direct motion on the reverse stroke of the engine when the wheel 17 is being returned by the spring 11.

The spring 11 causes the forward motion of the shaft 10 to be constant irrespective of any irregularities there may be in the gearing caused by imperfection in the making of the gears. It keeps a constant tension on the shaft, tending to rotate it in a forward direc-

tion, and compels it to move regularly. To such an extent is this result brought about that a constant forward motion of the shaft and drum can be produced by moving either
 5 one of the wheels 21 or 22 within the limits of what may be termed their "backlash." Although neither is moved to such an extent as to produce a movement of the wheel 17, constant forward motion of the drum will be
 10 brought about.

The paper is held on the drum by a pressure-roll 5, and this is held in arms 30 and 31. There is a double spring, one section of which is found in the sleeve 32 and another of which
 15 is found in the sleeve 33, and one of which actuates the arm 31 and the other of which actuates the arm 30, so that both ends of the pressure-roll 5 are held independently down against the feed-drum, thus tending to keep
 20 the sheet of moving paper constantly under equal pressure at each end, so that it may feed straight and even.

The tension of the springs in the sleeves 32 and 33 is adjusted by the head 34, the hub
 25 of which engages both springs. The head 34 is between disks 37 and 38, that terminate the sleeves 32 and 33, and it is held in its adjusted position by a pin 39.

The sleeve 40 is movable longitudinally
 30 along the shaft 10, and at one end it has the clutch-section 12, which engages clutch-section 13, that is pinned to the shaft 10.

The clutch employed with miter-wheel 21 is similar to that employed with miter-wheel
 35 22. In this clutch there are two loose levers 43, held by a spring 44, each with its inner end in engagement against the disk 46 and with its outer end in frictional engagement with the barrel 47. This clutch is a quick-
 40 acting clutch, and although it will permit a free movement of the drum on the disk in one direction it quickly causes the two to move together in the reverse direction. The two clutches are arranged so that each pro-
 45 duces motion of the shaft in the same direction.

What I claim is—

1. In an indicator, the combination of a feed-roll, two rotary clutch mechanisms

adapted to drive the feed-roll in the same 50 direction, means for connecting said clutch mechanism to the engine adapted to reciprocate said clutch mechanisms in opposite directions synchronously with reciprocation of the piston, and an elastic member connect- 55 ing said clutch mechanisms together and acting by its resilience to urge said clutch mechanisms in opposite directions.

2. As a means of producing continuous rotary movement, a shaft, a driving-wheel, 60 means for connecting said wheel to a direct actuator, a spring-retractor, an intermediate gear and clutch between the driving-wheel and the shaft and an intermediate wheel and clutch mechanism between the spring and 65 shaft, the driving-wheel being arranged to wind the spring, when actuated by the direct actuator, substantially as described.

3. In an indicator, in combination with a feed-roll, and means for giving it a constant 70 rotary movement, a pressure-roll, and means for pressing each end of said pressure-roll against the feed-roll, the means for pressing one end of said pressure-roll against the feed-roll being independent of the means for press- 75 ing the other end of said pressure-roll against the feed-roll.

4. In an indicator, in combination with a feed-roll, and means for giving it a constant rotary movement, a pressure-roll, means for 80 holding the two ends of the pressure-roll independently against the feed-roll, and means for adjusting the pressure, substantially as described.

5. In an indicator, the combination of a 85 main driving-wheel, a flexible connection adapted to cause rotation of the wheel, a retrieving-spring, a shaft, pinions sleeved thereon and arranged to be actuated by the driving-wheel, and friction-clutches arranged to 90 turn the shaft, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

ALVA T. HILL.

Witnesses:

CHARLES F. BURTON,
 ELLIOTT J. STODDARD.