

No. 678,421.

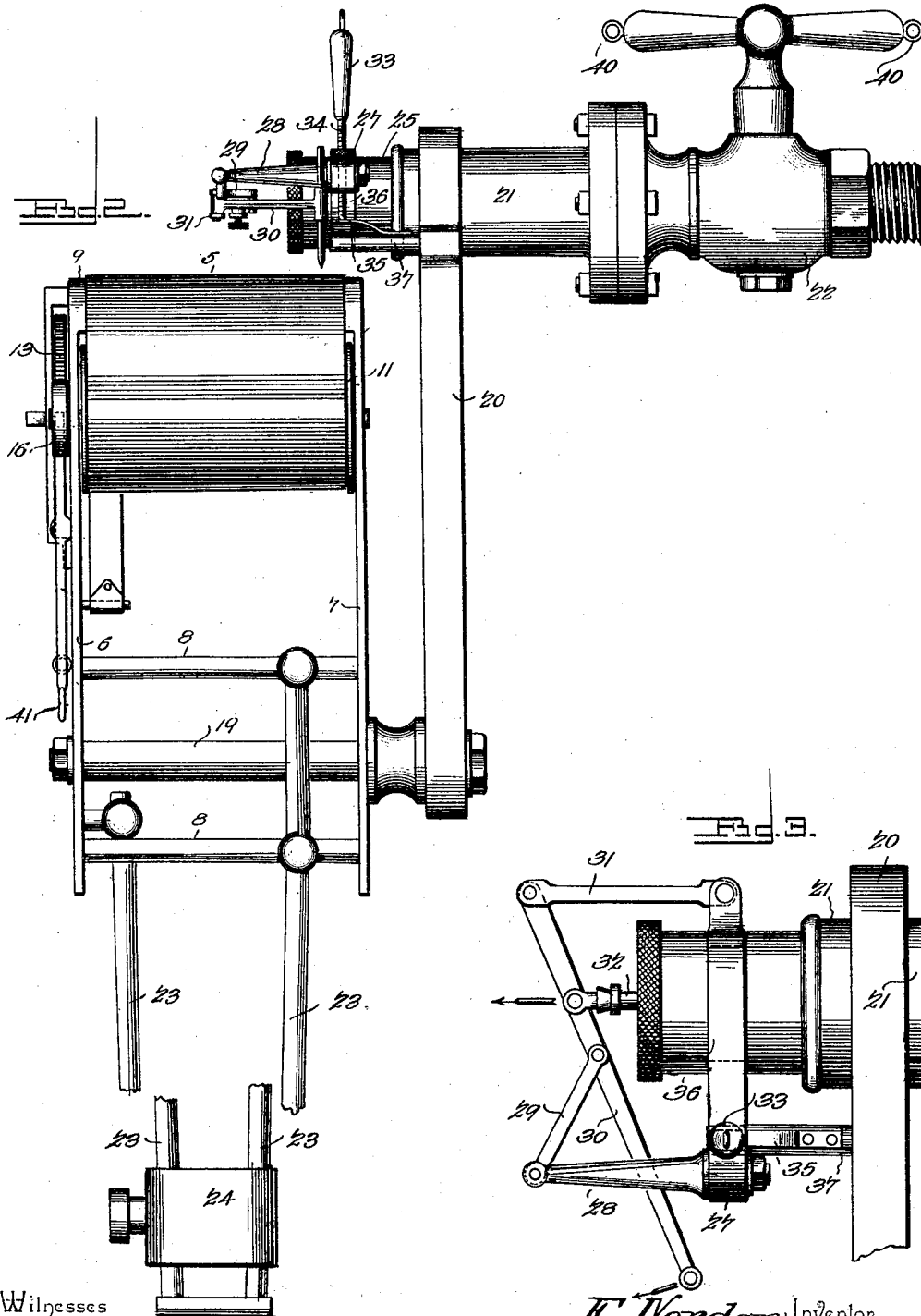
Patented July 16, 1901.

E. NORDEN.
STEAM ENGINE INDICATOR.

(No Model.)

(Application filed Apr. 27, 1901.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ERIC NORDEN, OF WILMINGTON, NORTH CAROLINA.

STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 678,421, dated July 16, 1901.

Application filed April 27, 1901. Serial No. 57,820. (No model.)

To all whom it may concern:

Be it known that I, ERIC NORDEN, a citizen of the United States, residing at Wilmington, in the county of New Hanover and State of North Carolina, have invented a new and useful Steam-Engine Indicator, of which the following is a specification.

This invention relates to indicators for steam-engines; and it has for its object to provide a device for holding a card in operative relation to the marking-stylus and to provide such an arrangement and form of card as will permit of taking a succession of diagrams without necessitating marking over the same card.

A further object of the invention is to provide a construction particularly convenient for making charts for locomotive-engines without necessitating the operator leaving the cab of the engine.

Other objects and advantages of the invention will be apparent from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a front elevation showing the complete apparatus. Fig. 2 is a side elevation of the mechanism shown in Fig. 1. Fig. 3 is a top plan view of the stylus-operating mechanism.

Referring now to the drawings, in the present invention the card is in the form of a continuous strip 5 of paper or other suitable material carried by a pendulum constructed for connection with the cross-head of the engine to be charted to swing the pendulum and move the card in one direction, while the stylus is moved transversely thereof by steam-pressure in the cylinder of the engine. The pendulum in question consists of the parallel plates 6 and 7, connected rigidly by means of a suitable number of posts 8, and which plates at their upper edges are connected by a web 9, bent into arcuate form, the curvature of which is struck from the center of oscillation of the pendulum.

Between the plates 6 and 7 are disposed the two winding-drums 10 and 11, on one of which is originally wound the strip or card 5, this strip or card being taken around the curved

upper end of the pendulum and attached to the second winding-drum to be wound thereon when the latter is rotated. The second winding-drum referred to has a pinion 12 fixed to its shaft, and this pinion engages a gear 13 of a spring-drum, which is also disposed between the plates 6 and 7 and at a point between the winding-drums. The spring of the spring-drum is wound up with a key and has a retaining-pawl 14 in cooperative relation to a ratchet 15, carried by the drum, and this spring-drum communicates rotary motion to the drum 10 through the medium of the engaged gear and pinion, as will be understood. In order that the card may be shifted after the making of a chart or diagram and may be held against such movement when the chart is being made or at times when the apparatus is idle, means must be provided for holding the spring-drum against movement at times and for permitting it to move at other times. This means consists of a disk or pallet 16, mounted upon the shaft of the drum 11, and a spring-pressed lever having a nib 17 for engagement with the notch 18 of the pallet. The nib of the lever holds the drum 11 normally against rotation, and as the spring of the spring-drum tends to rotate the drum 10 the card is held under tension across the face of the pendulum, this face forming a platen. If the lever be operated to disengage the nib from the notch and be then released to permit the nib to lie against the pallet, the pallet will be permitted to rotate once, when the nib will again engage the notch and hold the pallet from rotation until the lever is again operated.

To support the pendulum pivotally, it is provided with a shaft or stud 19, engaged with the plates 6 and 7 to permit the pendulum to oscillate thereon, and at one end of this stud is a hanger 20, to which it is fixed. The hanger is attached to the cylinder 21 at the end of the three-way cock 22, leading from the cylinder of the engine and from which the cylinder-pressure is obtained. The hanger is rigid.

The plates 6 and 7 form what may be termed the "head" of the pendulum, and depending from the head are the rods 23, attached to the connecting-posts of the plates

of the head, and mounted adjustably upon which rods is the block 24 for connection with the cross-head of the engine.

The cylinder 21 has a reduced extension 5 25, which is peripherally grooved to receive the collar at the end of the bracket 36 to permit of pivotal movement of the bracket, and on this bracket, at one side of the cylinder, is a post 27, to which is pivoted an arm 28, having a link 29 pivoted to its upper end, which 10 in turn is pivotally and slidably connected to a stylus-carrying arm 30. The arm 30 is pivoted at its rear end to a link 31, pivoted to the collar of the bracket 36 at the diametrically opposite side of the cylinder from the 15 post 27, and the arm between the links 29 and 31 is connected to the rod 32 of a piston disposed in the cylinder extension 25. The stylus-arm holds the stylus in such position 20 that when the bracket is moved the stylus is brought into engagement with the card, and if the cock be then opened to permit steam to pass to the piston in the cylinder extension 25 the stylus will be moved across the card 25 to make the diagram or chart in the usual manner. A handle 33, having a screw-stem 34, is engaged with the bracket at the base of the post 27, and this handle is adapted for attachment of a cord to swing the bracket to 30 carry the stylus into operative position. The screw-stem lies with its end against a spring-plate 35, carried by the post 37 on the hanger 20, so that the bracket is held normally and yieldably in position to hold the stylus away 35 from the card, and the stylus is swung into engagement with the card against the tendency of this spring. By adjusting the handle the stylus may be held to a greater or lesser distance from the card in its normal 40 position.

To operate the apparatus from the cab of a locomotive, the handle of the cock is provided with rings 40 for attachment of cords, while the releasing-lever of the winding- 45 drums is provided with an eye 41 for engagement of a cord. There are thus four cords, two of which control the feed of steam to the stylus-operating piston, one controls the movement of the stylus to the card, and 50 the fourth releases the card to permit it to move.

It will be evident that with this construction a succession of diagrams may be taken by properly manipulating the cords, and, 55 furthermore, that the stylus apparatus of two cylinders may be disposed in operative relation to the card, so that, as in the case of a compound engine, two diagrams may be made on one card at the same time.

60 In practice modifications of the specific construction shown may be made, and any suitable materials and proportions may be used

for the various parts without departing from the spirit of the invention.

What is claimed is—

65 1. A device of the class described comprising a pendulum having a slidable block for operative connection with the piston of an engine to be charted and having a platen, and a card consisting of a continuous strip 70 disposed for movement across the platen and having means for giving intermittent motion thereto.

2. A device of the class described comprising a pendulum having a slidable block adapted 75 for connection with the piston of an engine to be charted to oscillate the piston, said pendulum having an arcuate platen concentric with the center of oscillation of the pendulum, and means constructed and arranged 80 to hold a card against the platen and to give intermittent movement thereto across the platen.

3. A device of the class described comprising a pendulum adapted for connection with 85 the piston of an engine to oscillate the pendulum, a platen upon the pendulum, winding-drums at opposite sides of the platen and adapted to wind a ribbon from one to the other, means connected with one of the drums 90 for rotating it when the other drum is permitted to rotate and for holding the ribbon taut, and permissive means for holding the other drum normally against rotation.

4. A device of the class described comprising 95 an oscillatory arcuate platen, a winding-drum at each end of the platen, a strip passed over the platen and engaged with the winding-drums to be wound from one to the other over the platen, a spring-drum connected with 100 one of the winding-drums for rotating it, and a manual latch mechanism for holding the other drum normally against rotation, whereby the strip will be held under tension and may be given intermittent motion. 105

5. A device of the class described comprising a pendulum having a slide thereon for connection with the cross-head of an engine, a hanger having a stud with which the pendulum is pivotally engaged, said pendulum 110 having an arcuate upper end forming a platen, a continuous card passed over the platen, winding-drums with which the card is engaged to be wound from one to the other, means for giving intermittent motion to the 115 card, and a stylus in operative relation to the card.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ERIC NORDEN.

Witnesses:

N. M. WETZEL,
J. A. MCGEACHY.