

No. 840,051.

PATENTED JAN. 1, 1907.

J. L. DU FRANE.
TAPE PUNCHING REGISTER.
APPLICATION FILED APR. 12, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

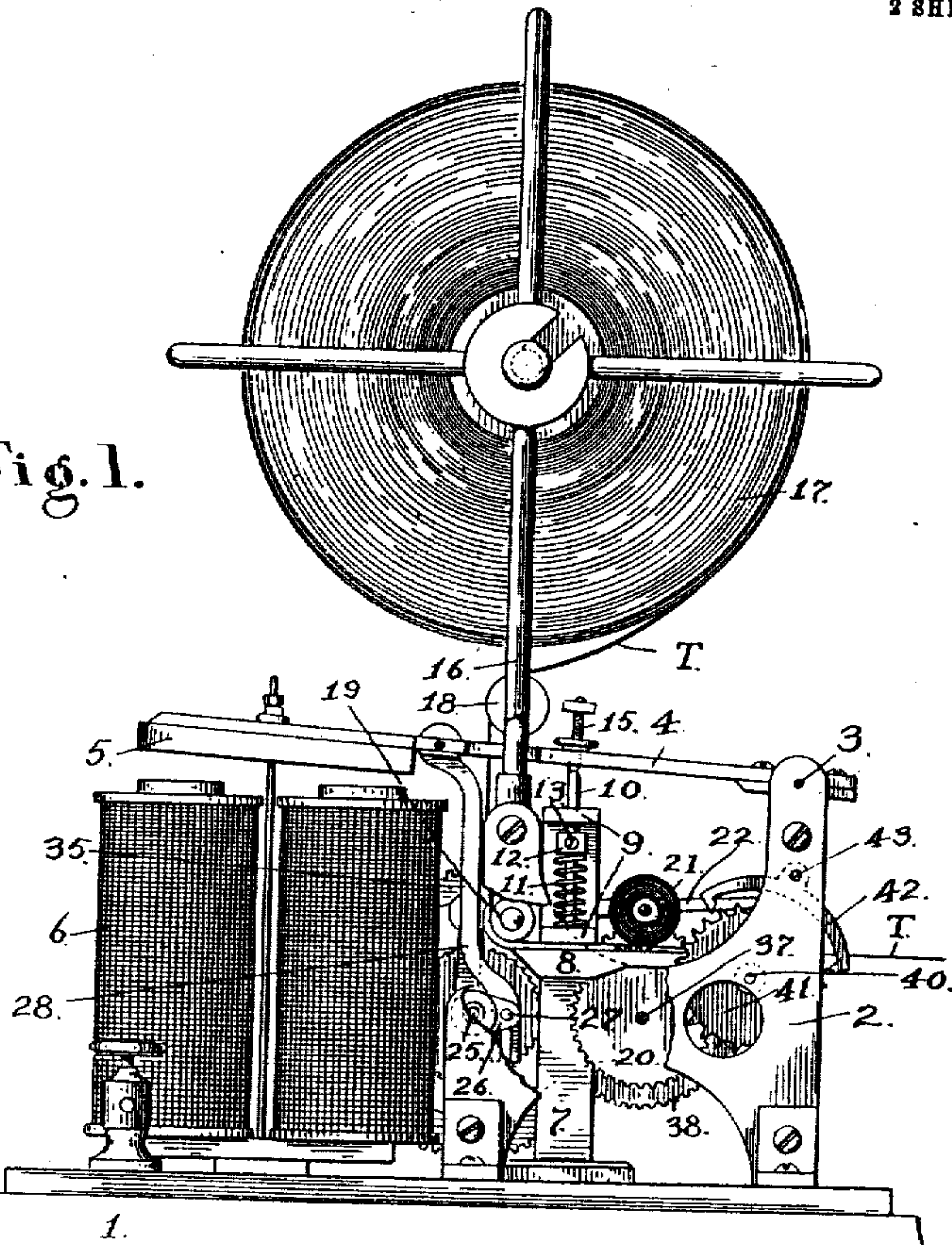
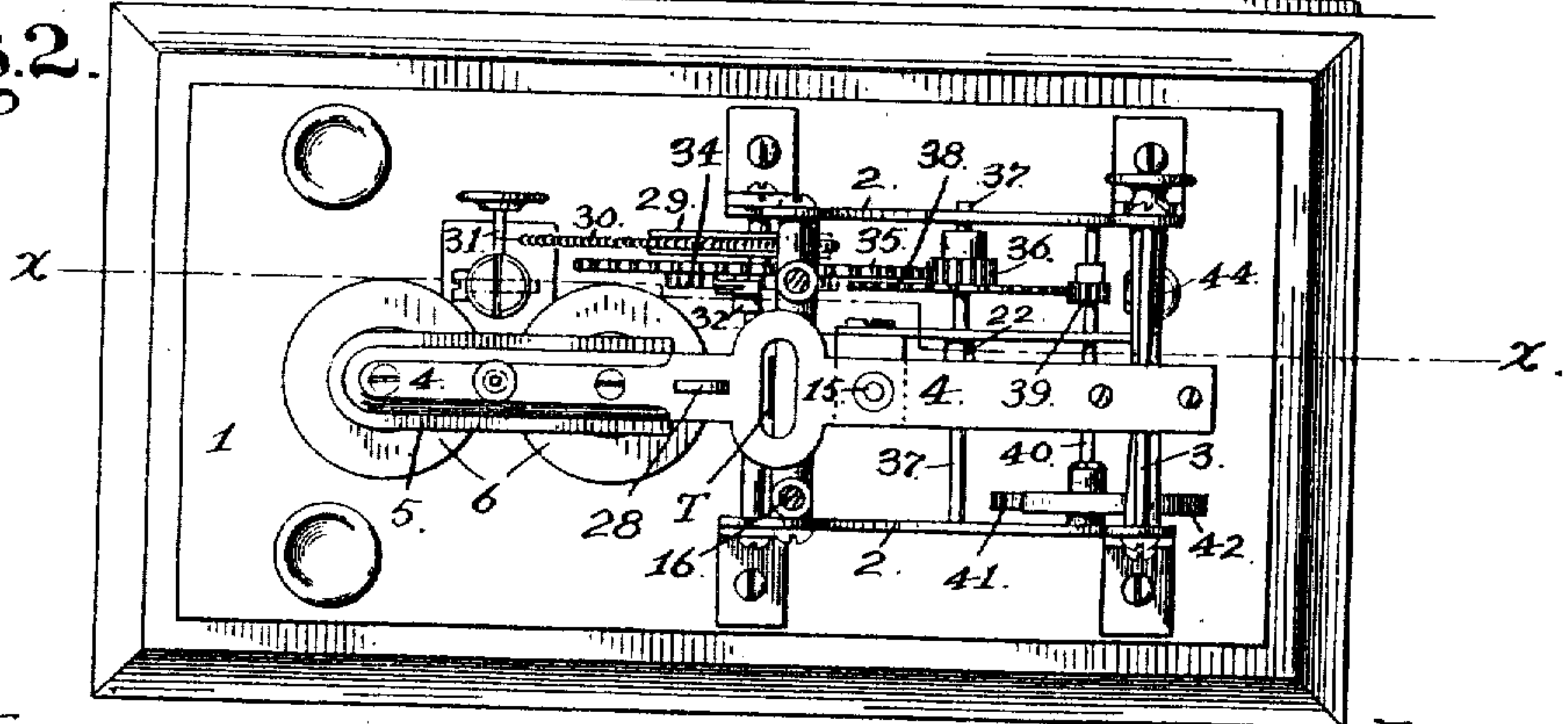


Fig. 2.



Witnesses.

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coding and Punching,
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Draftsman.

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2 SHEETS—SHEET 2.

Fig. 3.

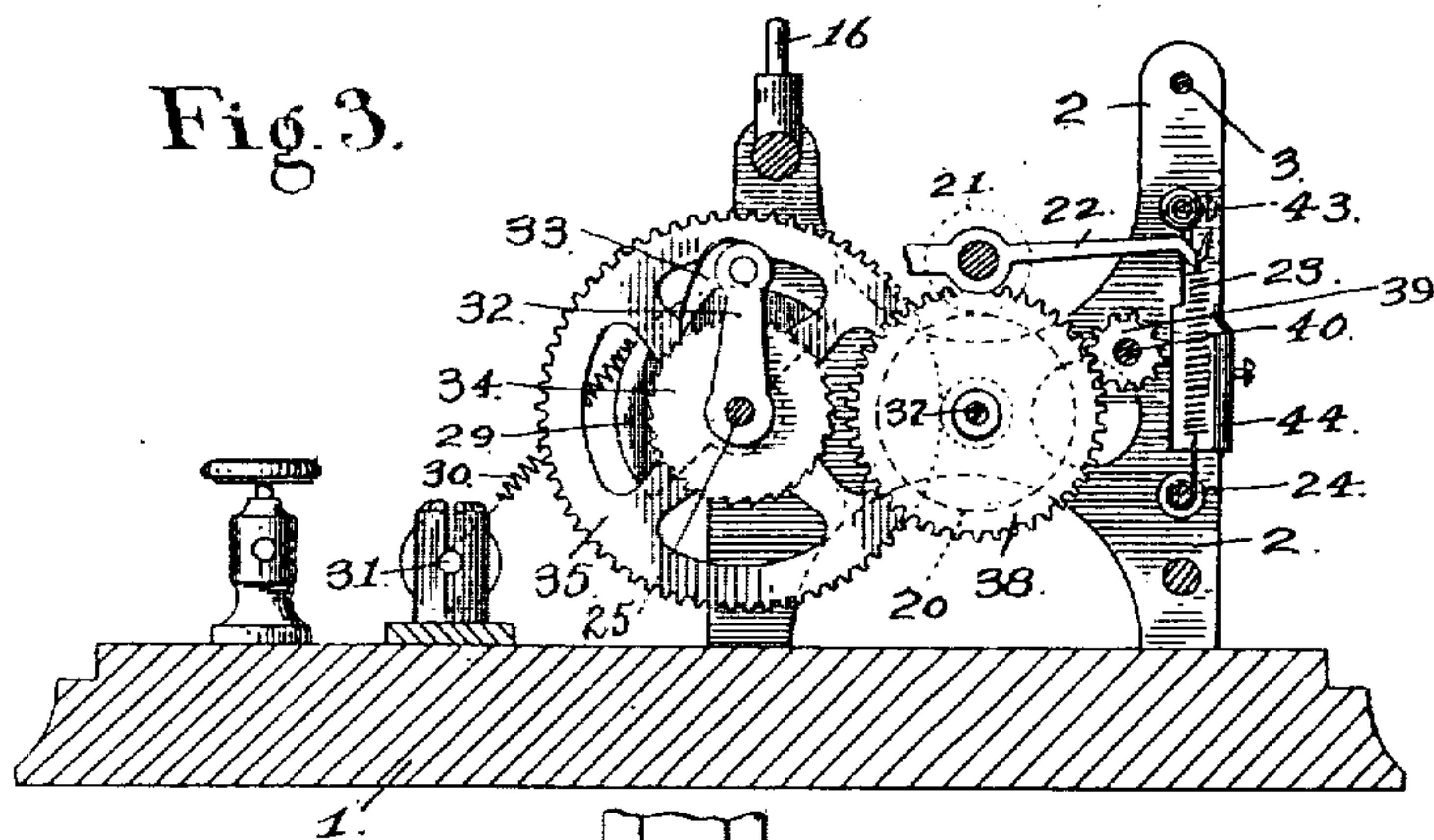
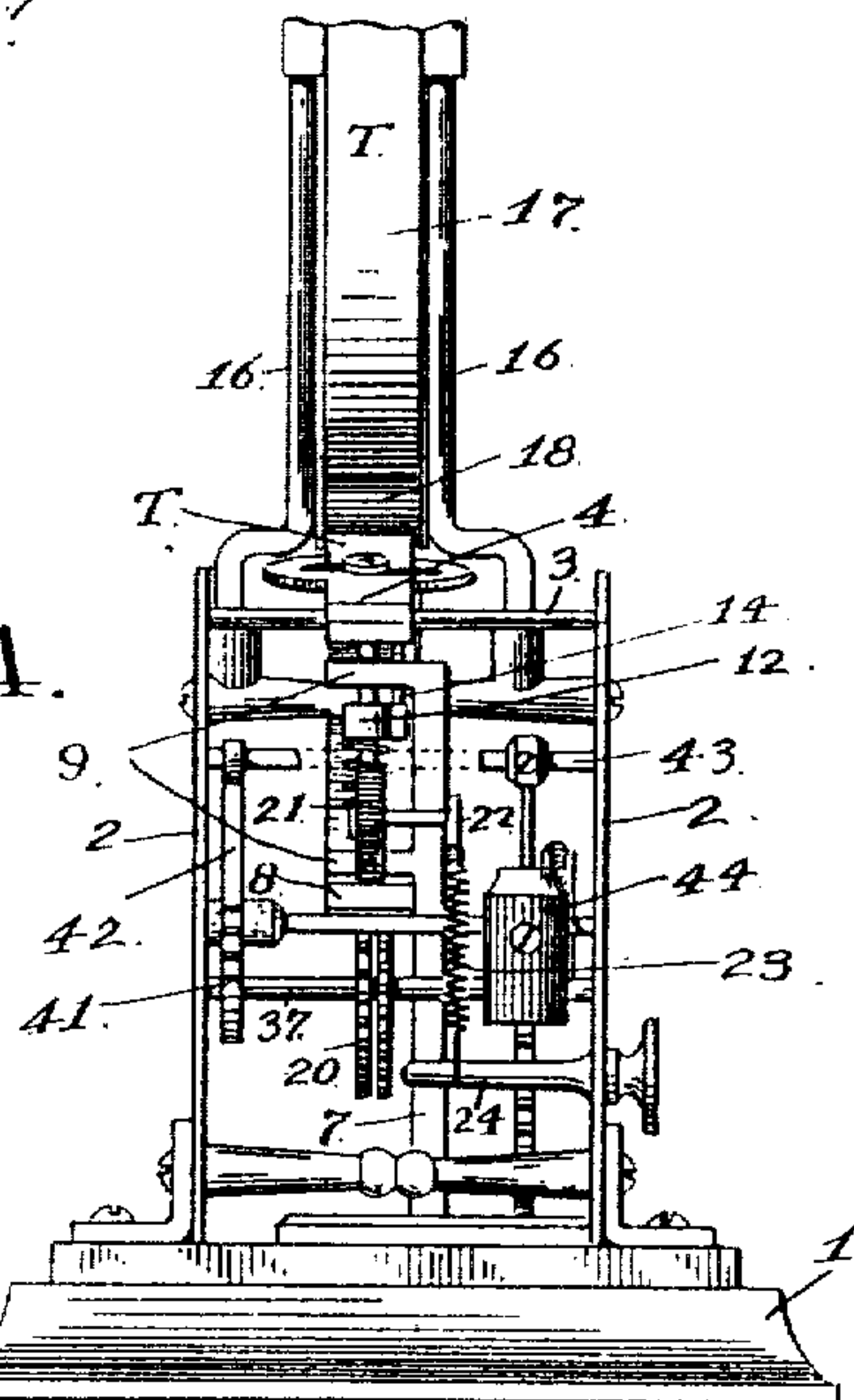


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN L. DU FRANE, OF OAKLAND, CALIFORNIA.

TAPE-PUNCHING REGISTER.

No. 840,051.

Specification of Letters Patent.

Patented Jan. 1, 1907

Application filed April 12, 1906. Serial No. 311,239.

To all whom it may concern:

Be it known that I, JOHN L. DU FRANE, a citizen of the United States, residing at Oakland, in the county of Alameda, State of California, have invented certain new and useful Improvements in Tape-Punching Registers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of punching registers in which a tape is perforated and fed by means of devices set in operation by electrical impulses for any purpose which is subserved by such a record—as, for example, fire-alarms.

My invention has for its object the simplifying of the construction of the machine, with its consequent advantages of economy in manufacture and accuracy in operation.

It has also the further object of providing a machine which is automatically set by its own operation, so that it does not require any attention to prepare it for use initially or to keep it so prepared.

These objects are attained by making both the punching operation and the power required for the feed of the tape the direct and immediate result of the pressure of the armature-bar under the electrical impulse in contradistinction to the common practice of making the armature-bar serve only the initial function of liberating a previously-set device, such as a clock mechanism under the control of a wound-up mainspring.

To this end my invention consists in the novel machine which I shall hereinafter describe and in the novel construction, arrangement, and combinations of its parts, as I shall fully point out.

Referring to the accompanying drawings, which illustrate my invention, Figure 1 is a side elevation of my tape-punching register. Fig. 2 is a plan with the tape-roll removed. Fig. 3 is a section on the line *xx* of Fig. 2. Fig. 4 is an end view of the machine.

1 is a base to which a frame 2 is secured. To a pivot-shaft 3 in the top of the frame is clamped or otherwise fitted the bar 4 of an armature 5, operated by an electromagnet 6.

Rising from the base 1 is a post 7, to which is secured the tape punching and feed table 8. In a bracket 9 of the post 7 is mounted the punch 10, controlled by a spring 11, which spring bears between the lower arm of the bracket and an upper stop 12, mounted adjustably upon the punch by a set-screw 13, whereby its tension may be suitably va-

ried. This stop has a guide-pin 14 extending through the upper arm of the bracket and serving to steady the punch in its vertically-reciprocating movement. Through the armature-bar 4 is fitted adjustably a contact-pin 15 in the form of a screw which is adapted to bear upon the upper end of the punch and to operate said punch by forcing it down.

Rising from the frame 2 is the reel-bracket 16, in which is mounted the tape-roll 17. The tape T from this roll passes down over a guide-roller 18 in the lower part of the reel-bracket, then through an opening in the armature-bar 4, and under a guide-roller 19, by which it is directed upon the punching-table 8, and beneath the lower arm of the punch-carrying bracket 9, and thence forwardly upon said table to the feed-rolls. The lower feed-roll 20 is a toothed one, playing up through an opening in the table. The upper or presser roll 21 is a smooth-surfaced one carried by an arm 22, pivoted at one end to the post 7 and having attached to its other end a spring 23, by which the presser-roll is held down on the tape with the proper pressure. This pressure may be regulated by attaching the lower end of the spring 23 to a short shaft 24, upon which it may be wound to increase its tension or unwound to decrease it.

Mounted in the frame 2 is a rock-shaft 25, having a crank 26, with a pin 27. Upon this pin is fitted the forked lower end of a connecting-rod 28, the upper end of the rod being suitably attached to the armature-bar 4. Upon the rock-shaft 25 near one end is fixed a grooved crank 29, best formed in the shape of a pulley-segment. To this pulley-crank is attached one end of a spring 30, the other end of the spring being secured to a turnable pin 31, by which the tension of said spring may be suitably regulated.

Fixed upon the shaft 25 by an arm 32 is a spring-controlled pawl 33, which engages with a ratchet 34 on the side of a large gear 35, which is loosely mounted on the shaft 25. The large gear meshes with a pinion 36 on a shaft 37, which carries the lower or toothed tape-feed roll 20. The shaft 37 also carries a gear 38, which meshes with a pinion 39 on a shaft 40, carrying the escapement-wheel 41, with which engages the escapement-pawl 42 on a shaft 43, carrying an adjustable pendulum 44.

The operation of the machine is as follows: The magnet 6 being electrically energized,

the armature 5 is drawn down, thereby swinging downwardly the armature-bar 4. This movement of said bar causes its contact pin or screw 15 to force down the punch 10, which perforates the tape T on the table 8. This same downward movement of the armature-bar 4, acting through the connecting-rod 28 and the crank 26, turns the shaft 25. The axial movement of the shaft 25 turns the pulley crank or segment 29, which has the effect of putting the spring 30 under operative or power tension by drawing it out. In this direction of movement of the shaft 25 the pawl 33 slips on the ratchet 34 without engaging its teeth. It will thus be seen that the same movement of the armature-bar which is the direct cause of the tape-punching also puts the necessary power into the machine to operate the gear-train which effects the tape-feed. In other words, it sets the machine ready for action to feed the tape. When the electrical impulse ceases and the armature is released, the armature-bar 4 rises under the influence of the punch-spring 11, the forked lower end of the connecting-rod 28 simply slipping up on the pin 27 of the crank 26. Immediately the spring 30, acting on the pulley-segment or crank 29, turns the shaft 25 back. In this direction the pawl 33 engages the ratchet 34, and thereby turns the large gear 35, to which it is attached. This gear, through the gear-train described, operates the feed-roll 20 and causes the advance of the tape. A second electrical impulse repeats the operation, and it is obvious that by properly separating the impulses the necessary spacing and variety of spacing of the tape-perforations may be had.

It will be seen that the machine is always ready for use without that initial and subsequent attention which would be required if its operation were dependent upon a main-spring which had to be wound and rewound. Here the setting is automatic, so to speak, for the power required to operate it is placed in it by the electrical impulses themselves at the time of its operation, and it requires no manual setting.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a tape-punching register, the combination of a tape-feed mechanism, a magnet, an armature-bar pivotally supported at one end and having an armature-plate at its opposite end in operative relation to the magnet, a spring, and a lever pivoted directly to said bar intermediate its ends and operatively associated with said spring to put the same under tension, and connections between the spring and tape-feeding mechanism to operate the tape-feeding mechanism.

2. In a tape-punching register, the combination of a tape-feed mechanism, an electrically-operated armature-bar, a punch for per-

forating the tape under the pressure of the armature-bar, a spring, means for putting the same under operative tension including a pivoted segment and a lever operatively associated at its respective ends with the segment and the armature-bar, and connections from the spring to operate the tape-feed mechanism.

3. In a tape-punching register, the combination of a tape-feed mechanism, an electrically-operated armature-bar, a punch for perforating the tape under the pressure of the armature-bar, a spring, connections from said bar to put the spring under operative tension by the same movement of the bar which effects the punching, and connections from the spring to operate the tape-feed mechanism.

4. In a tape-punching register, the combination of a tape-feed mechanism, a spring, an electrically-operated armature-bar, connections from said bar to put the spring under operative tension consisting of a rock-shaft, a crank thereon to which the spring is connected, a second crank on said shaft and a connecting-rod between said second crank and the armature-bar, and connections from the rock-shaft to operate the tape-feed mechanism.

5. In a tape-punching register, the combination of a tape-feed mechanism, a spring, an electrically-operated armature-bar, connections from said bar to put the spring under operative tension consisting of a rock-shaft, a crank thereon to which the spring is connected, a second crank on said shaft and a connecting-rod between said second crank and the armature-bar, and connections from the rock-shaft to operate the tape-feed mechanism consisting of a pawl and ratchet and a gear-train to said mechanism.

6. In a tape-punching register, the combination with a tape-feed mechanism, including a rotatable roller, a depressible bar pivoted at one end and free at its opposite end, electrical operating means for said free end, a punch arranged below the bar for engagement thereby, a spring, connections from said bar intermediate its ends to put the spring under operative tension by depressing said bar, and connections from the spring to operate the tape-feed mechanism.

7. In a tape-punching register, the combination of a tape-feed mechanism, an electrically-operated armature-bar, a punch for perforating the tape under the pressure of the armature-bar, a spring, connections from the armature-bar to put the spring under operative tension consisting of a rock-shaft, a crank thereon to which the spring is connected, a second crank on said shaft and a connecting-rod between said second crank and the armature-bar, and connections from the rock-shaft to operate the tape-feed mechanism.

8. In a tape-punching register, the combination of a tape-feed mechanism, an electrically-operated armature-bar, a punch for perforating the tape under the pressure of the
5 armature-bar, a spring, connections from the armature-bar to put the spring under operative tension consisting of a rock-shaft, a crank thereon to which the spring is connected, a second crank on said shaft and a
10 connecting-rod between said second crank and the armature-bar, and connections from the rock-shaft to operate the tape-feed mechanism consisting of a pawl and ratchet and a gear-train to said mechanism.

15 9. In a tape-punching register, the combination with a tape-feed mechanism, including a rotatable roller, of a punch for perforating the tape, a bar for depressing said punch,

means for operating said tape-feed mechanism, said means including a spring, and connections between the spring and said bar and tape-feed mechanism whereby the depressing of the bar operates to place the spring under operative tension and the raising of the bar causes said spring to advance the tape,
20 said connections including a rock-shaft, a crank thereon to which the spring is attached, an operative connection between the shaft and bar.

In witness whereof I have hereunto set my
hand. 30

JOHN L. DU FRANE.

Witnesses:

J. COMPTON,
D. B. RICHARDS.