No. 780,289. PATENTED JAN. 17, 1905.

A. T. HILL.

SIGNAL FOR RAILROADS.

APPLICATION FILED MAY 31, 1904.

2 SHEETS—SHEET 1.

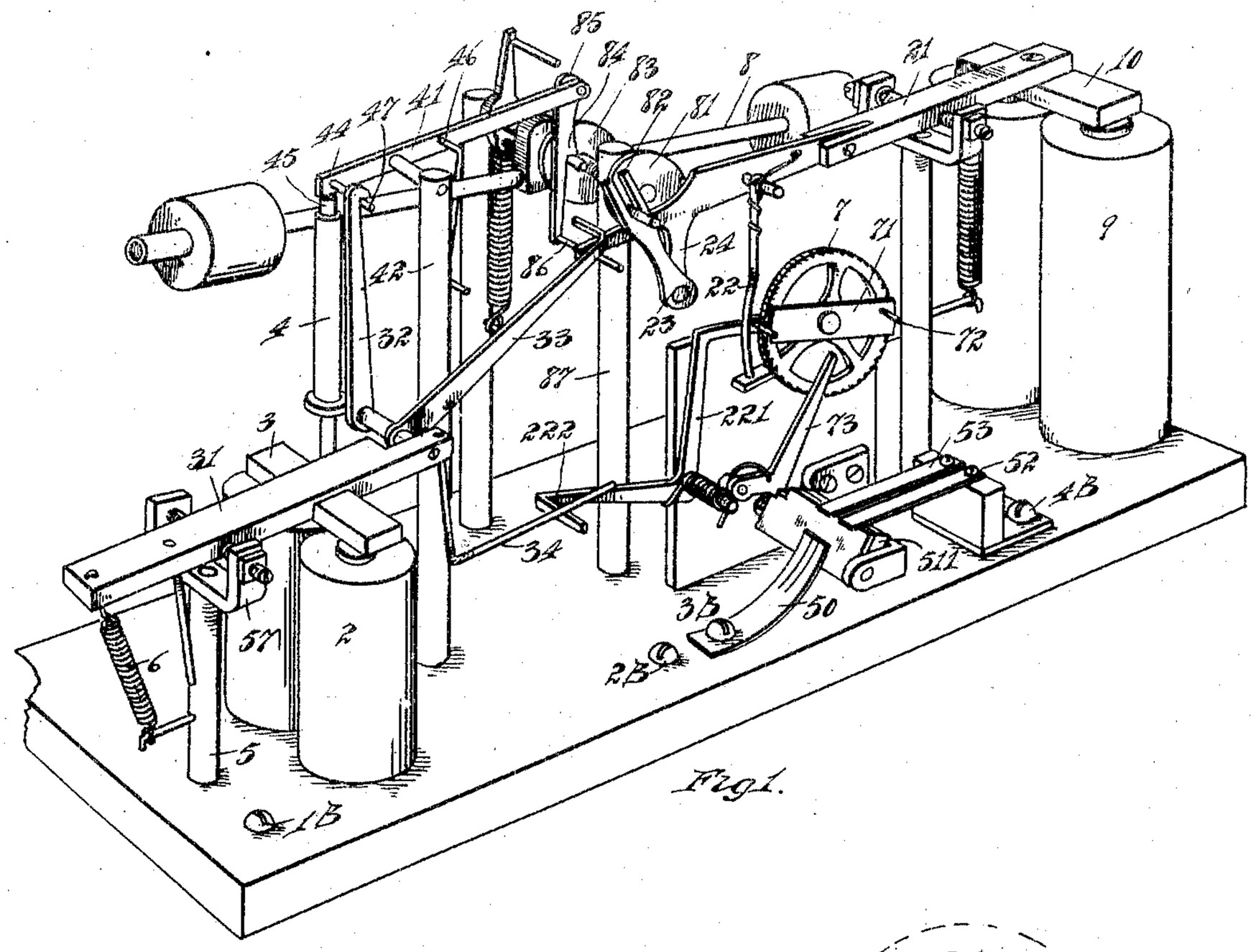

Fig 1.

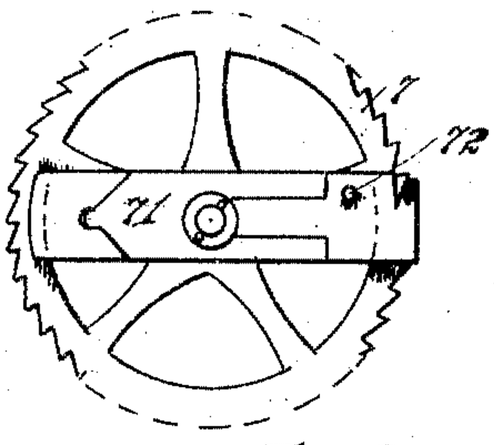

Fig 2.

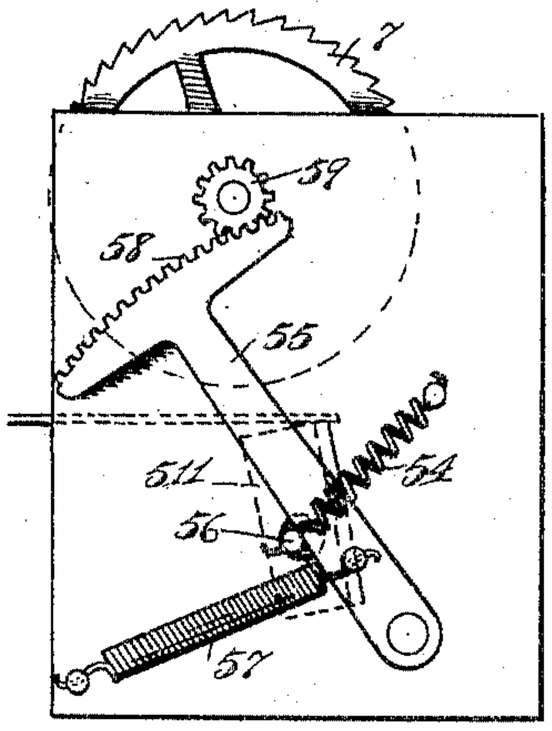

Fig 3.

Fig 4.

WITNESSES

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2 SHEETS—SHEET 2.

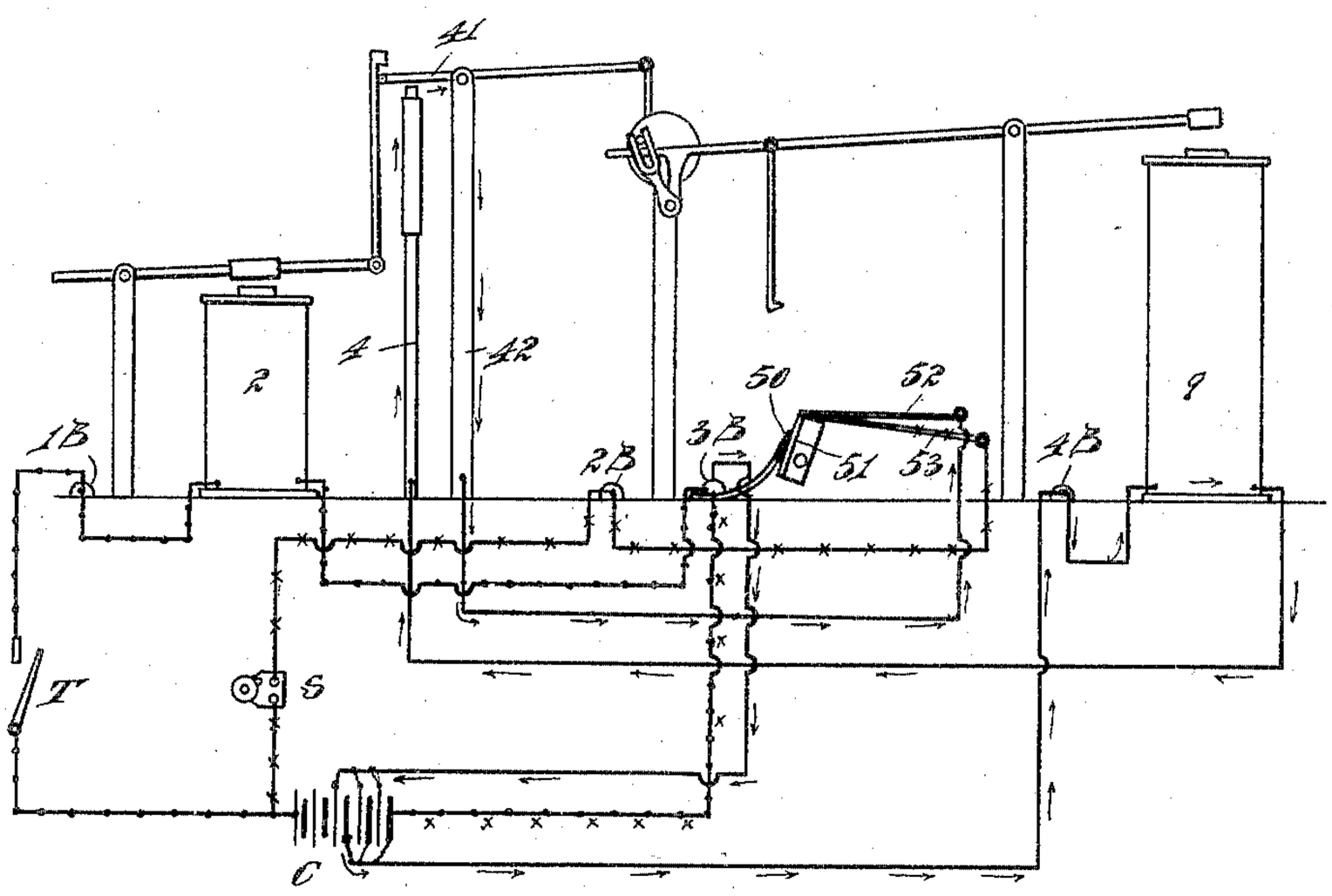

Fig 5.

WITNESSES
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No. 780,289. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

ALVA T. HILL, OF DETROIT, MICHIGAN.

SIGNAL FOR RAILROADS.

SPECIFICATION forming part of Letters Patent No. 780,289, dated January 17, 1905.

Application filed May 31, 1904. Serial No. 210,324.

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 Signals for Railroads; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which 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 signals for railroads.

It has for its object an improved signal to be used at road-crossings and other places where it is desired to indicate the presence at a particular place along the line of a car or train of cars.

In the drawings, Figure 1 is a perspective of the signaling device. Fig. 2 is a detail of a ratchet-wheel that determines the duration of the signal. Fig. 3 is a detail of a spring-actuated rack which transmits power to the ratchet-wheel from a spring in which power is stored by reverse movement of the wheel. Fig. 4 is a detail of a post 4 of Fig. 1. Fig. 5 is a diagram which shows the wiring and connection of the device with the signal-bell.

The device consists, essentially, of a starting-motor, a motor-actuated timing device, and a motor-actuated bell which is sounded for a definite time.

The starting-motor consists of a magnet 2, with an armature 3, carried by a lever 31, which is pivotally supported in a yoke 51 on a post 5 and provided with a spring 6, which normally holds the armature free from the poles of the magnet. The lever 31 is provided with three branches 32, 33, and 34, rigidly secured to it, which engage other parts of the mechanism, to be referred to hereinafter.

The clock-circuit or timing-circuit is a motor-actuated ratchet-wheel 7, governed by a weighted balance lever or pendulum 8, which closes an electrical circuit through a magneto-motor 9 once at each swing of the pendulum. The magneto-motor contains an armature 10, which is actuated or drawn toward the magnet each time the circuit is made, and the armature is at one end of a lever 21, which lifts a pawl 22 and turns the ratchet-wheel 7 each time the current is broken. It also gives to the weighted balanced or pendulum lever 8 an impulse each time the current is broken. The impulse to the lever 8 is given through a crank-disk 81 and a crank 82, that rests in the fork of an arm 23, pivoted to a spur 24 on the lever 21. The engagement of the crank in the fork of the arm 23 accomplishes the requisite oscillation of the crank without a sliding engagement between the wrist-pin and the lever 21, but with only an oscillatory movement of the wrist-pin and a swing of the fork on its own pivot. The axle upon which the pendulum-lever 8 turns is provided with a second crank 83, that engages under a fork 84 of a hanger 85, pivotally hanging from a lever 41, which is itself pivoted to a standard post 42, that rises from the base of the machine. The hanger 85 engages at its lower end by means of a projecting arm 86 with a post 87, that rises from the base. The arm 86, engaging against the post 87, prevents the arm 85 from following the crank-wrist 84 through the full extent of the oscillation of the crank-wrist, but causes a separation of the two as the crank-wrist rises to the upper limit of its throw and immediately after the separation of the parts the hanger drops. There are two causes for the drop of the hanger—first, it is overweighted and heavy, and, second, it has been lifted and the end 44 of the lever has been forced down against a plunger 45, that rests on a spring confined in the hollow post 4, and the spring expands suddenly upon the separation of the parts 84 and 85, and the momentum given to the lever 41 aids in causing the end 44 of the lever to rise until it rises clear from the plunger 45. The contact between the ends 44 and the plunger 45 is an electrical contact made and broken at each swing of the lever 41 and at each oscillation of the pendulum. The depression of the (in Fig. 1) left-hand end of the lever 41, which is accomplished by the upward lift of the crank-wrist 84, closes the circuit at 44 45 and results in the energizing of the magnet 9, which is only ended when

the displacement of the part 84 by the action of the arm 86 against the post 87 enables the overweighting of the right-hand end of the lever 41 and the spring in the post 4 to throw the end 44 up once more, breaking the circuit and terminating the energization of the motor 9. The circuit traverses post 42 and post 4, as will be more fully understood from a reference to the diagram, which will be hereinafter explained.

An arm 46 hangs from the lever 41, engages at an angle against the post 42, and prevents the end with the hanger 85 from dropping too low. A pin 47 extends from the end 44 of lever 41 under a hook at the terminal of the arm 32, and this is used to make the initial completion of circuit at the starting of the instrument when the first current passes through the motor 2. This arm 32 is rigidly associated with the arm 33, which engages over the end of the lever 21 and which is used to give an initial impulse to the lever 21 when the current from the passing train actuates the magnet 2. After the initial impulse has been given the motor 9 continues to act so long as the current from the battery through the motor 9 is unbroken at the contact between the post 3^B and the finger 53, and at each impulse or swing of the lever 21 the free end of the arm 33 is lifted and the arm 32 swings at the same time and the hook which terminates the upper end of the arm 32 swings off from the pin 47 and does not at this time impede the upward movement of the end 44 of the lever 41. The current which actuates the motor and the current which actuates the bell both pass from post 3^B, which is connected directly to the battery through a spring-plate 50 to an oscillating plate 51, where the current divides, and that part which actuates the bell passes through finger 53. Both the circuits are broken between the plate 51 and the fingers 52 and 53 by the oscillation of the plate 51 on its pivots until the conducting or face part of it disengages from the fingers and the body part 511 back of the conducting part engages under the ends of the fingers, supporting them in a position to be again engaged with the conducting part upon the next oscillation of the plate 51. Normally the plate 51 is pulled to a position of non-connection with the fingers 52 and 53 by the spring 54, (seen in Fig. 3,) and a rock-arm 55, pivoted below the plate 51, bears against a pin 56, that projects from the end of the plate 511. The rock-arm 55 is normally pulled by a spring 57, and the rock-arm carries a rack 58, that engages with a pinion 59 on the shaft of the ratchet-wheel 7. The strain of the spring 57 tends to partially rotate the wheel 7 in a direction the reverse of that which is produced by the action of the pawl 22, and the action of the pawl produces a winding up of the spring or straining of the spring 57. The ratchet which controls the winding movement of the wheel 7 consists of two parts—the pawl 22, which is a driving or actuating pawl, and a pawl 221, which is a holding-pawl. The pawl 221 constitutes one branch of a rock-lever, of which the other branch, 222, is engaged under an arm 34 in rigid relation to the lever 31 and the arms 32 and 33, and the primary actuation of the magnet 2 and armature 3 rocks the pawl 221 out of engagement with the wheel 7, and at the same time an arm on the pawl 221, which engages under the stem of the pawl 22, also throws the pawl 22 out of engagement with the wheel 7, and the wheel is now free to oscillate and relieve the strain on the spring 57. Across the face of the wheel 7 is a plate 71, one end of which projects radially beyond the teeth. The plate carries a pin 72. The plate itself may be adjusted around the wheel 7 to bring the pin 72 to any desired relation thereto and to bring the projecting end of the plate to a correspondingly desired relation. The pin 72 engages a holding-pawl 73, pivoted to the frame which carries the timing mechanism and arranged to engage behind the plate 51 and hold the plate 51 to position under the fingers 52 and 53, and this pawl 73 continues to hold the plate in this position against the strain of the spring 54 until the pawl 73 has been swung backward by the pin 72 far enough to disengage its holding connection. During all the time that the pin is in engagement with the pawl 73 and is oscillating it the projecting end of the plate is moving circumferentially toward the actuating-pawl 22 (as shown in Fig. 1 in the direction taken by the hands of a clock) until finally its projecting end engages under the pawl 22 and guards the teeth from further actuation by the pawl 22. This is at the end of the time set for the ringing of the bell, and this occurs at the time or just after the time that the pawl 73 has released the plate 51 and the circuits through both the bell and the motor 9 have been broken. In this position the wheel is under stress of the spring 57 and held by pawls 22 and 221, from which the wheel will be released upon the next actuation of the armature 3, and upon such succeeding actuation of the armature 3 all the parts immediately take their proper position for another signal and the timing mechanism is started and the signal continues to sound for the predetermined time.

In Fig. 5 is a diagram of the wiring, in which the switch T indicates the position at which the signal is made by a passing train. This closes a circuit, which is complete through the post 1^B, the magnet 2, the post 3^B, and through the battery C. The bell-circuit is indicated by crossed lines. Starting from the bell itself, S, the circuit is completed through post 2^B, through finger 53, the plate 51, the spring 50, post 3^B, and back to the battery. The clock or timing circuit is indi-

cated by the arrowed circuit. Starting from the battery the wire leads to post 4^B, thence to motor 9, thence to the pillar or post 4, under the lever 41, through part of the lever 41, and down the post 42, thence to the finger 52, through the plate 51, and the spring-plate 50 to post 3^B, and thence back to the battery, of which, however, it employs only a part of the cells, and so, also, the circuit through the bell employs only a part of the cells.

After the passing car has produced a first actuation of the motor 2 and set the bell-motor and the timing-motor in action they continue to act for a definite time irrespective of any further actuation of the primary motor, and consequently it is entirely immaterial how many cars pass over the primary switch during the time the signal is sounding. Should they continue to pass for a longer period than the time allotted for the signal, the signal will simply be started a second time and be given for a second interval, and it is immaterial in which direction the car is going, provided it passes the signaling-point.

What I claim is—

1. In a railroad-crossing signal, in combination with a primary motor actuated by a passing car, a signal-motor and a timing-motor to determine the time during which a signal shall sound, and interconnecting mechanism between the primary motor and the timing and signaling motors by which the latter two are brought into action, substantially as described.

2. In a railroad-crossing signal, in combination with a motor actuated by an electric current closed to actuate the same by a passing car, a timing-motor electrically actuated by a circuit closed through a switch actuated by said first motor, means actuated by the timing-motor for opening the current connections therethrough, after a definite interval, and means for producing regularly-recurring impulses in the timing-motor, substantially as described.

3. In a timing signaling device, the combination of an escapement-wheel, an electrically-actuated motor, a pawl actuating the escapement-wheel and itself actuated by the motor, means to produce an intermittent electrical actuation of the motor, and a pendulum to determine the time of intermission, substantially as described.

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

ALVA T. HILL.

Witnesses:
MAY E. KOTT,
CHARLES F. BURTON.