(No Model.) 2 Sheets—Sheet 1.

R. A. MITCHELL.

ELECTRIC SELF WINDING CLOCK.

No. 561,943. Patented June 9, 1896.

FIG. I.

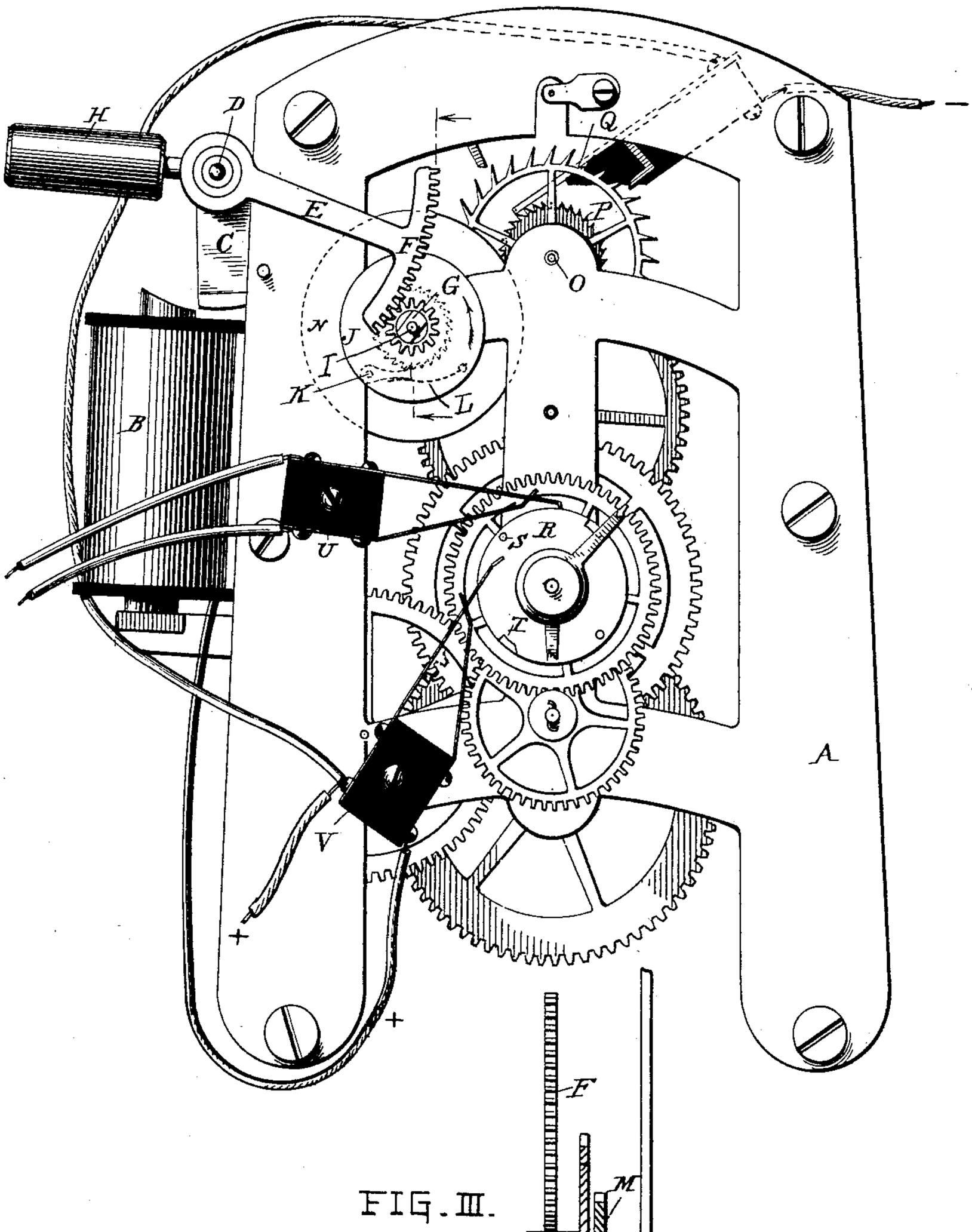
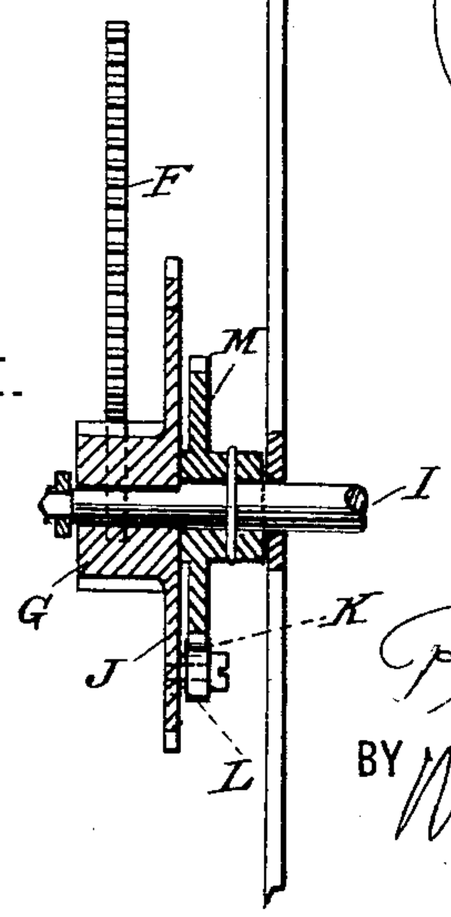


FIG. III.



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(No Model.) 2 Sheets—Sheet 2.

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FIG. II.

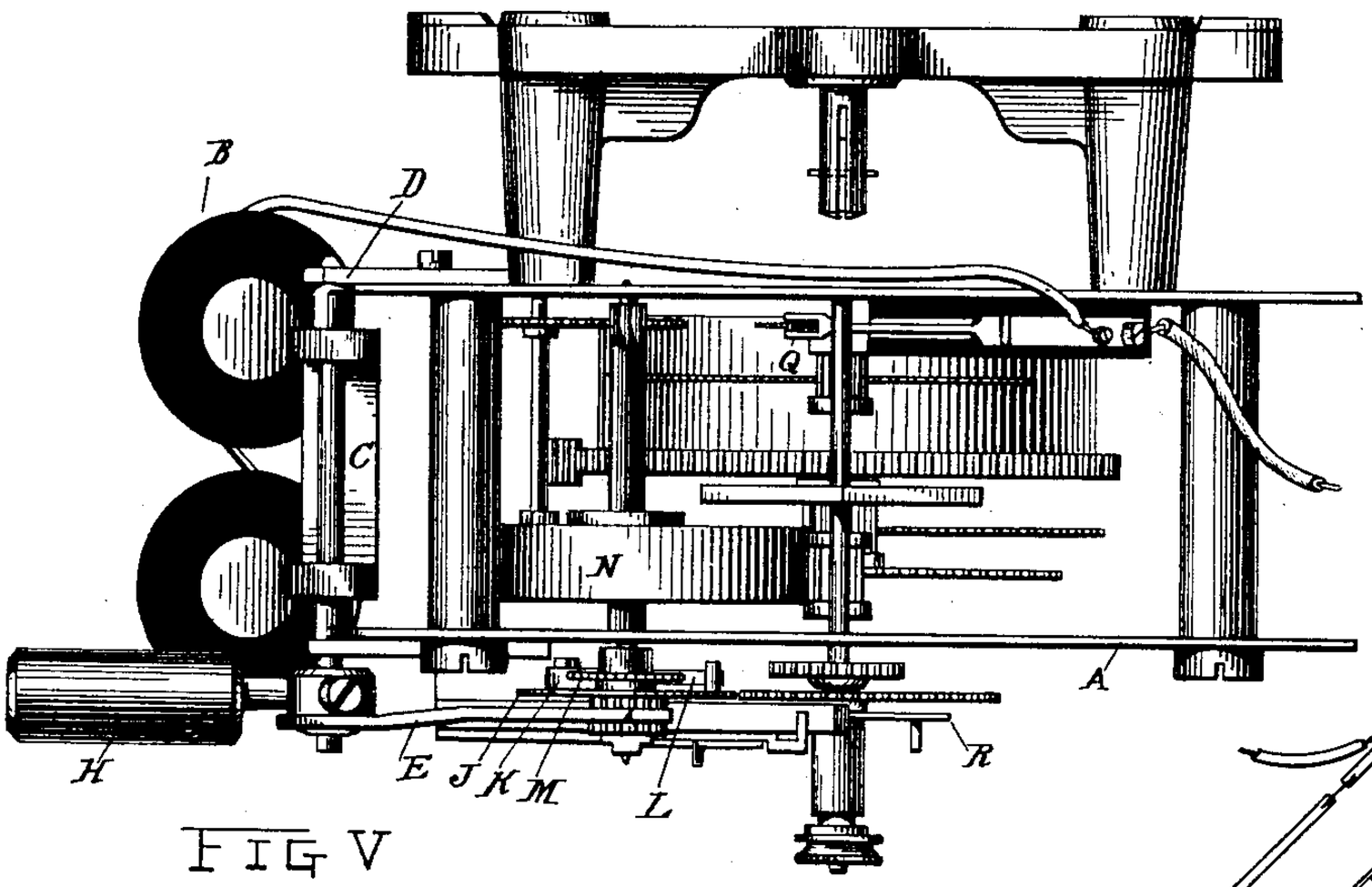


FIG V

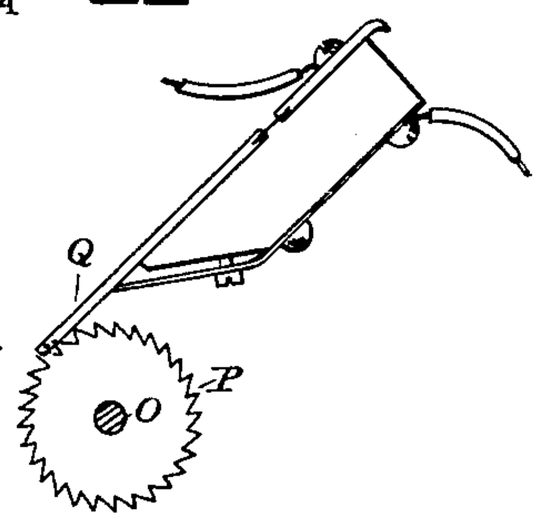
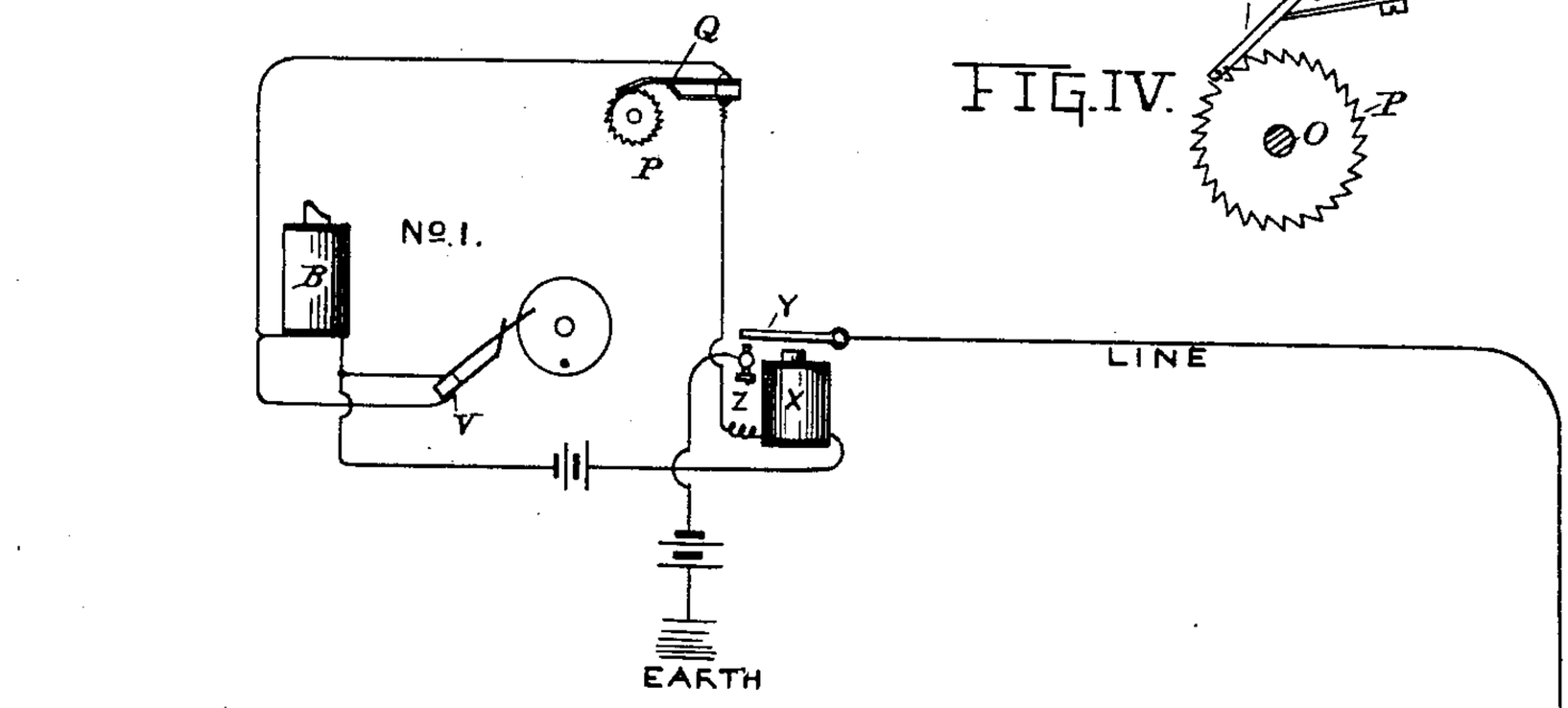


FIG. IV.



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UNITED STATES PATENT OFFICE.

ROBERT A. MITCHELL, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE SELF WINDING CLOCK COMPANY, OF NEW YORK, N. Y.

ELECTRIC SELF-WINDING CLOCK.

SPECIFICATION forming part of Letters Patent No. 561,943, dated June 9, 1896.

Application filed January 16, 1895. Serial No. 535,064. (No model.)

To all whom it may concern:

Be it known that I, ROBERT A. MITCHELL, a citizen of the United States, residing at Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Electric Self-Winding Clocks, of which the following is a specification.

My invention relates to a novel system of electrical circuits in connection with a series of clocks, whereby an electric current winds all the clocks of said series and synchronizes all with the master-clock of the series.

The object of my invention is to simplify the means for doing this work, to economize on the consumption of electric current, and, by the devices to be hereinafter described, to make a more perfect and more reliable system than those now in use, and to accomplish these ends with a single line-wire.

Referring to the accompanying drawings, which form a part of this specification, Figure I shows a front view of one of the clock-movements, having attached thereto the winding magnet and mechanism, together with certain make-and-break contact devices, to be hereinafter described. Fig. II is a plan view of the same. Fig. III shows in detail the construction of the means whereby the action of the winding-magnet is transmitted to the clock-movement. Fig. IV is a detail view of the contact device which controls the current going to the winding-magnet, and Fig. V shows diagrammatically a circuit containing the master-clock and two secondary clocks.

In Figs. I and II, A represents a clock-frame containing the usual or any form of movement actuated by a spring or weight. B is an electromagnet, preferably of bipolar type, fixed to the clock-frame, as shown. C is a swinging armature suspended from an axis D and carrying at one extremity of said axis the arm E, terminating in the arc F, having teeth on its edge which gear with the pinion G. H is a counterbalance for normally retaining the parts in the position shown in the drawings.

In Fig. III will be seen a section of pinion G, showing that it is free to revolve on its shaft I and that it is at its back expanded into a disk J. Said disk J carries a pawl K, pressed by a spring L into engagement with the teeth of a ratchet-wheel M, which is secured against revolving upon the shaft I by a pin or similar device. Fixed upon the shaft I is a comparatively heavy fly-wheel N, and a pinion upon the other end of the same shaft meshes into the first of a train of gears, which transmits motion to the clock-driving spring or weight for winding up the same. Upon the escapement-arbor of the clock-movement O (shown in detail in Fig. IV) is a ratchet-wheel P, which has resting upon its edge the light lever Q of a make-and-break contact device in circuit with the magnet B.

At each beat of the escapement the contact is made or broken alternately. From this disposition of parts it follows that periodic currents are sent through the magnet B, causing the armature C to swing over the poles thereof and the pinion G to revolve in the direction of the arrow marked thereon, Fig. I. During the time between the electrical impulse the counterbalance H restores the parts to the position shown, but through the agency of the ratchet K and pawl M and the inertia of the fly-wheel N the rotation is kept up until the next impulse is given. In this way a continuous rotation of the winding mechanism is produced by a series of intermittent efforts of the magnet B.

Upon the hour-arbor of the clock-movement is a disk R, revolving therewith, and having pins S and notches T at its circumference, as shown. Two make-and-break contact devices U V are attached to the clock-frame A, and are opened and closed by the notches T T and pins S S. The position of these parts is such that when the circuit through one of said devices U V is closed that through the other shall be open, and vice versa.

The make-and-break device V has wires leading from its two sides to join the entering and issuing wires of the winding-magnet B, (shown more fully in No. 3 of Fig. V,) from which it follows that when the contact-points of V are together the magnet B is short-circuited and no current flows through it. The wires from the make-and-break device U short-circuit in a similar way the synchronizing-magnet, which is omitted from the draw-

ings, as they show particularly the master-clock, in which such device is not used, but which is shown in the diagram Fig. V at W. The object of short-circuiting one of these magnets while the other is in operation is to maintain a uniform resistance in the circuit.

By reference to Fig. V the arrangement of the master-clock No. 1 and its relation with the line and secondary clocks No. 2 and No. 3 may be seen.

In the master-clock No. 1 B is the winding-magnet, V is its short-circuiting device; P Q is the make-and-break device acting on the escapement-arbor. At X is shown the magnet of a "relay," whose armature Y is intermittently brought into contact with the part Z by the same current which passes through magnet B, being continued to embrace said relay-magnet X as well. A battery or other source of current in the line sends impulses through said line at each descent of the relay-armature Y. These impulses pass through all clocks on the line, and are at each one sent either into the winding or synchronizing magnets, as the position of the short-circuiting devices on each clock shall elect. As one short-circuiting device only is in operation at a time one only of the magnets can receive impulses. At all times, except for a short interval during the day, the winding-magnets of the secondary clocks are receiving impulses and the driving powers of said clocks are kept wound up. A switch may be arranged to prevent overwinding by cutting out the winding-magnet when the winding-drum has made a certain number of revolutions.

During the interval when the winding-magnets are short-circuited, as heretofore described, the synchronizing-magnets receive the impulses from the master-clock and by the usual synchronizing mechanism set the secondary clocks to agree with the master-clock.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a self-winding clock, the combination of the electromagnet B, having means for intermittently energizing it, the vibrating armature C pivoted at D and having counterweight H and arm E (the latter bearing segment-rack F), the pinion G, with disk J, free to revolve on its shaft, spring-pawl K, and ratchet-wheel M connected to the winding-train substantially as set forth.

2. In a self-winding clock, the combination of a winding-electromagnet having a swinging armature, a segmental rack moved by said armature, and gearing with a pinion forming the first of a train of winding-gears, and arranged to revolve on its arbor, a fly-wheel and a ratchet-wheel on said arbor and a pawl carried by said pinion, together with a circuit-closing device on the escapement-axis of said clock.

3. In a self-winding clock, the combination of a winding-electromagnet having a swinging armature, a segmental gear having a counterbalance and moving with said armature, a train of winding-gears driven by raid electromagnet through a ratchet and pawl, a fly-wheel, and a current-interrupter actuated by said clock.

4. In a self-winding-clock system, the combination of an electric circuit, and means for sending electric impulses therethrough, with a series of clocks, each having two magnets, one a winding-magnet and the other a synchronizing-magnet, all of which magnets are included in series in said circuit, a shunt for each magnet, and means operated by each clock for opening and closing the circuit through the shunts of the winding and synchronizing magnets alternately, whereby the electric impulses will always pass through one-half of all the magnets, viz., only one of each clock, as set forth.

5. In a self-winding-clock system, the combination of a single line-wire, and a master-clock provided with means for sending periodic electric impulses over said line-wire, with a series of secondary clocks, each having a winding and a synchronizing magnet, all of which are included in series in the selecting devices in the secondary clocks for alternately short-circuiting the winding and synchronizing magnets to cause the electric impulses to pass through the magnets not short-circuited, whereby the electric impulses will always pass through one-half of all the magnets and the resistance on the line will be constant, as set forth.

ROBERT A. MITCHELL.

Witnesses:
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HENRY OPDYKE.