(No Model.) 2 Sheets—Sheet 1.

F. M. SCHMIDT.

ELECTRIC SELF WINDING CLOCK.

No. 475,809. Patented May 31, 1892.

FIG. 1

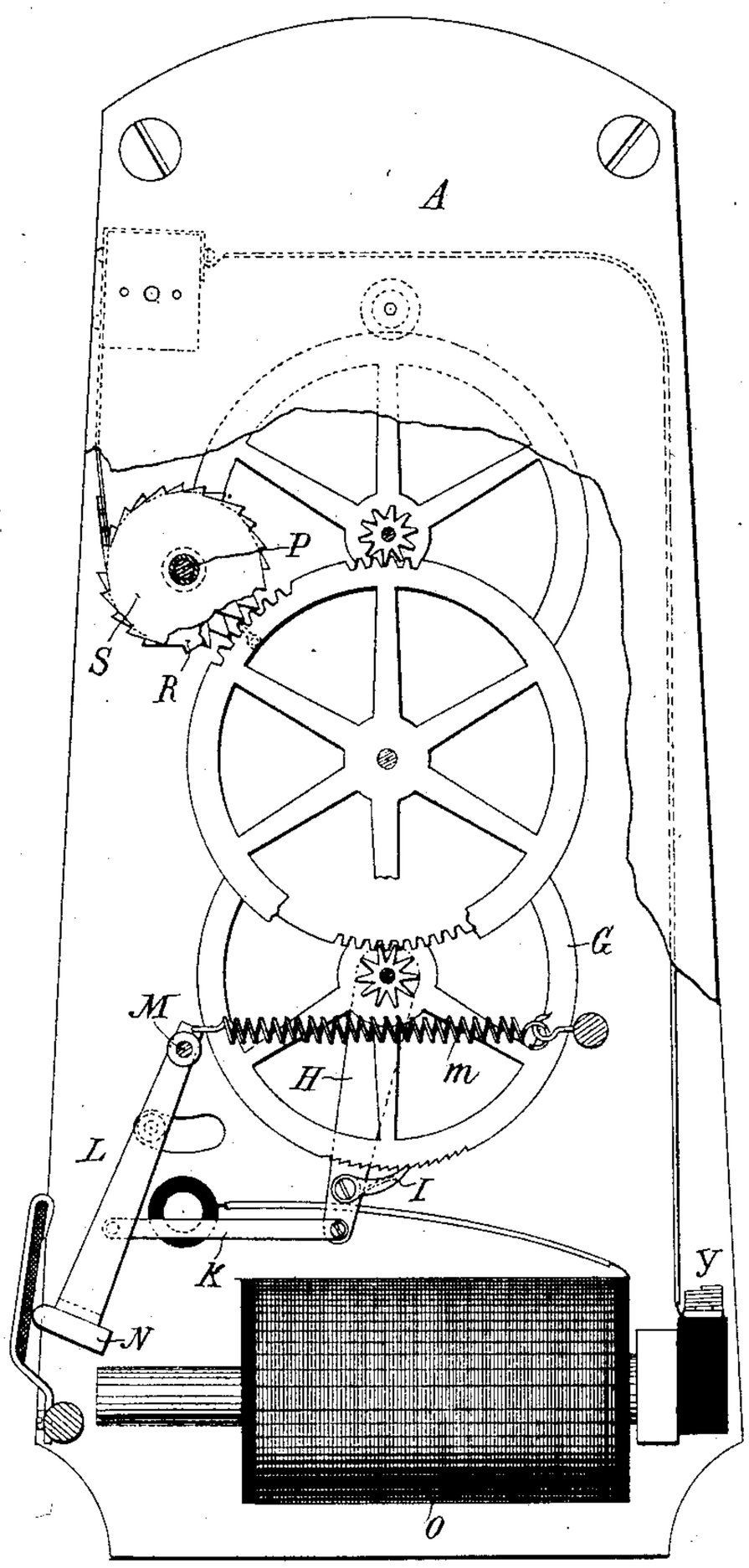
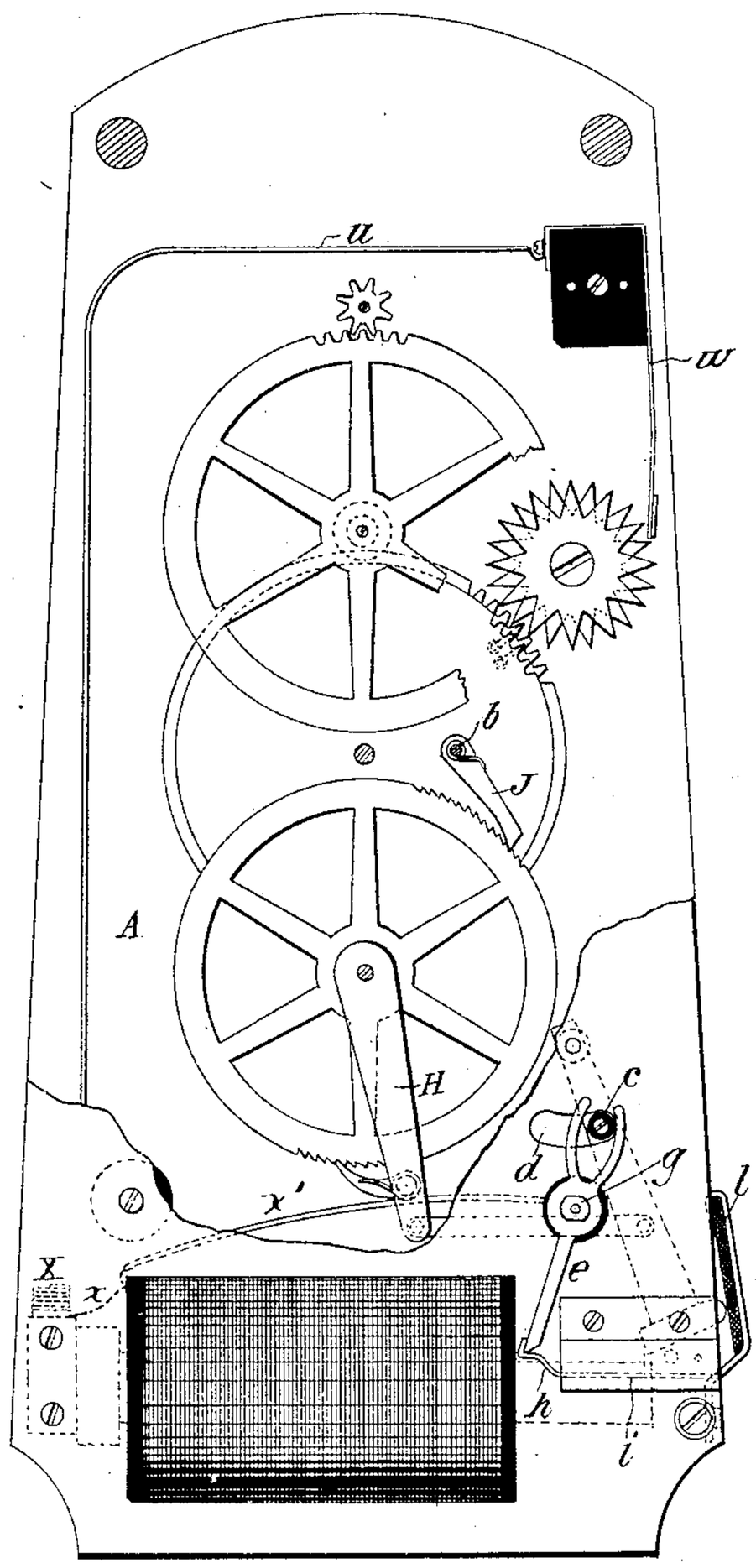


FIG. 2



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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3

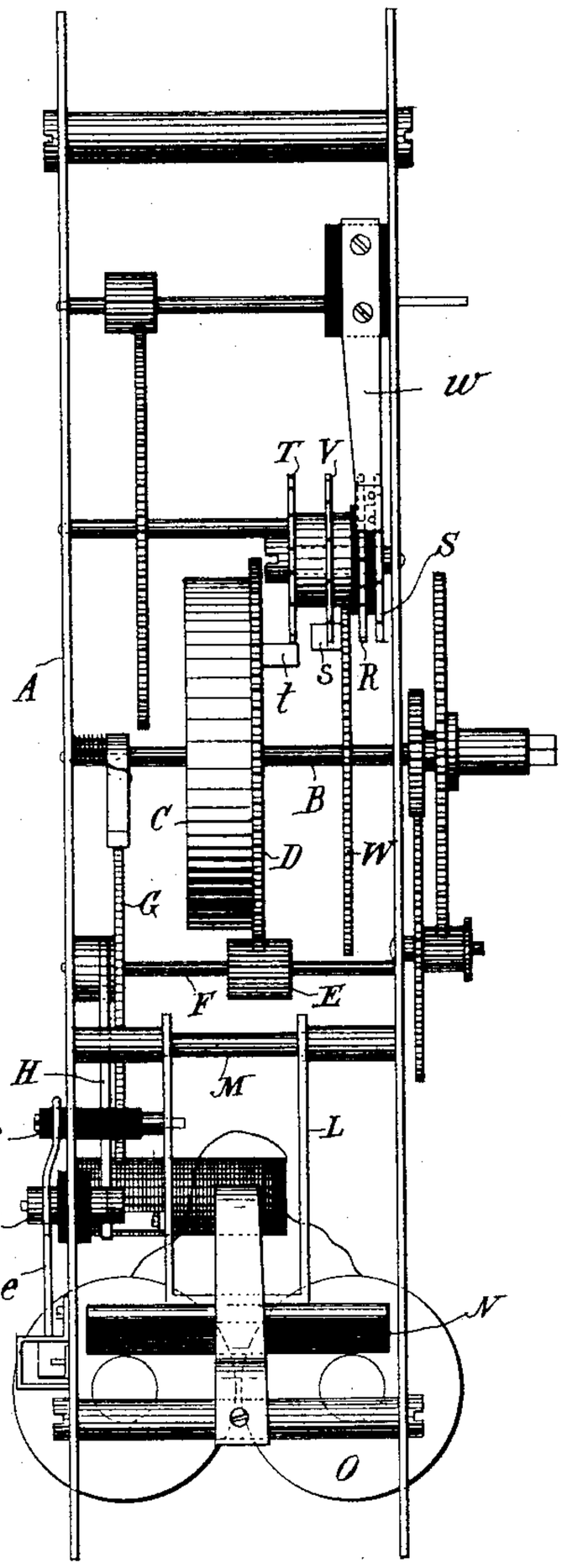


FIG. 5

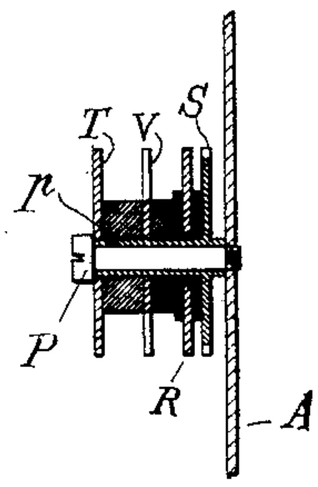
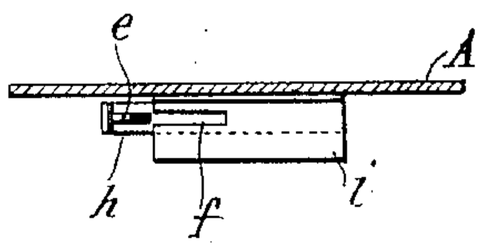


FIG. 4



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UNITED STATES PATENT OFFICE.

FREDERICK M. SCHMIDT, OF BROOKLYN, NEW YORK.

ELECTRIC SELF-WINDING CLOCK.

SPECIFICATION forming part of Letters Patent No. 475,809, dated May 31, 1892.

Application filed October 9, 1891. Serial No. 408,219. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK M. SCHMIDT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Self-Winding Clocks, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The invention subject of my present application is an improvement in self-winding clocks, the improvements being confined to the electrical winding mechanism and the means for controlling the operation of the same. I employ, in combination with a clock-train and mainspring, a reciprocating motor, which at given intervals, determined by the movement of the clock-train, is brought and maintained in operation for a sufficient length of time to rewind the said spring. With this motor I use a circuit-breaker of new and improved character and a form of switch that is independent of the train, but in position to be encountered and moved thereby for controlling the circuit, including the motor.

Referring to the accompanying drawings for a more particular description of the features of construction that constitnte my invention, Figure 1 is a front view in elevation of my improved clock with portions of the frame cut away. Fig. 2 is a similar view of the rear of the same. Fig. 3 is a side elevation of the complete instrument. Fig. 4 is a top view of a detail of the mechanism forming part of the circuit-breaker. Fig. 5 is a section of a circuit-controller.

Any suitable form of clock mechanism may be employed, and I have shown in illustration a frame A of usual construction, designed to contain a train having the usual escapement, pendulum, and other parts of an ordinary clock.

B is the main or driving arbor, on which is placed the going-barrel C, containing the mainspring. A cog-wheel D, fixed to the barrel, engages with a pinion E on an arbor F. On this latter arbor is a ratchet-wheel G, and turning loosely on the same arbor is an arm H, that carries a spring-pawl I, that engages with the teeth of the wheel G. The wheel G is locked against backward movement by a spring-pawl J, pivoted on a stud *b*, set in the back plate. The lower or free end of the swinging arm H is connected by a link K with the frame or lever L, that swings on a shaft M and carries at its lower end a soft-iron armature N. This armature is acted upon by and sweeps over the prolonged poles of an electro-magnet O, mounted on the frame A, and when the circuit of said magnet is properly made and broken it has a reciprocating movement to and from the same that imparts rotation to the ratchet-wheel G, and hence winds the mainspring of the clock.

The action of the magnet is controlled by the movements of the armature frame or support by the following means: An insulated stud *c*, set in the frame L, extends through a slot *d* in the rear plate of the frame and engages with the bifurcated end of a lever *e*, pivoted on a stud *g*, insulated from the frame of the clock. The free end of this lever encounters a spring-plate *h*, preferably secured to the metal frame within a small casing or box *i*, attached to the frame, and from which the end of the said plate *h* projects. To permit sufficient play to the lever *e*, a slot *f* may be cut in the top of the box *i* at its end, when necessary. As the armature and its frame or support rocks back and forth a corresponding motion is imparted to the lever *e*, and the plate *h* is formed or bent in such manner that the lever *e* will come in contact therewith while the armature is withdrawn from the magnet and leave it during the movement of the armature toward the magnet.

By means of the circuit connections hereinafter described the magnet is energized while the plate *h* and lever *e* are in contact and inert while such contact is interrupted; but any appreciable movement of the armature toward the magnet will result in imparting movement to the ratchet-wheel G, and, as will hereinafter be described, such movements, without regard to their individual extent, will continue until the mainspring has been rewound to just the extent it has run down. In practice I cause the lever *e* and plate *h* to break contact before the armature has reached its limit of movement, utilizing the momentum acquired by it to carry it to the end of its path of movement.

A flexible plate or stop *l*, covered with felt

or some sound-deadening material, is used to receive the impact of the armature on its back-stroke. A retractile spring *m*, connected to the frame and armature-support, respectively, withdraws the armature from the magnet when the latter is demagnetized.

P is a stud fixed to the front plate of the frame A and carrying a sleeve *p*, to which are secured two star-wheels T V and two disks or wheels R S. The latter are formed with inclined teeth that alternate in position, the end of a tooth on one disk coming opposite the space between two teeth on the other. One of these disks, as R, is insulated from the sleeve and other parts of the clock, while the other is in metallic contact with the sleeve, and hence with the clock-frame. The star-wheels T V have the same number of teeth as the toothed disks R S, and they are correspondingly placed, so that their teeth alternate.

On a cog-wheel W on the main or hour arbor B is a projection or tooth *s*, extending laterally into the path of the teeth of the star-wheel V, and so arranged that each revolution of the wheel W will move the star-wheel V, and with it the sleeve and parts attached thereto, through one-half the space between two of its teeth, or through a space equal to the distance between one tooth on the wheel V and the next adjacent tooth on wheel T. On the cog-wheel D is a similar projection *t*, adapted to engage with the teeth of the star-wheel T and move the same one-half the space between two of its teeth.

From one of the insulated binding-posts, as X, of the clock a wire *x* conveys the current to the magnet O. The path is thence continued through wire *x'* to the insulated stud *g*, carrying the lever *e*. When the lever *e* is in contact with the strip *h*, the course for the current is continued through the frame to the stud P and ratchet disk or wheel S.

A spring-contact strip *w*, secured to an insulated block or support, bears on one or the other of the disks R or S at all times, but never on both, by reason of the position of their respective teeth, as seen in Fig. 1. The spring *w* is connected by wire *u* with the opposite binding-post Y of the instrument.

The operation of the instrument is as follows: As the clock runs down, being impelled by the mainspring, the projection on the wheel W comes in contact with one of the teeth of the star-wheel V and turns the same, and with it the disks R S, so that the spring *w*, which at the time rested on one of the teeth of the insulated disk R, slips onto one of the teeth of the disk S. As the normal position of the lever *e* is that shown in Fig. 2, where it is in contact with the spring *h*, the circuit through the motor will be closed. The latter will therefore start and continue in operation until the circuit is permanently interrupted. This occurs when the wheel D has been turned through a complete revolution by the winding-motor and mechanism and has advanced the wheels T V R S one step, or so that the spring *w* slips from wheel or disk S to disk R. In this condition the parts remain until the end of the hour or until the wheel W has made another revolution.

It will be seen that the circuit-controlling device composed of the star-wheels and serrated disks R S, while operated by is independent of the train or clock mechanism proper. From the nature of its position a much better contact is secured than is done in ordinary clocks through the oil-bearings of the arbors.

The winding device in my improved clock is called upon to do but little work and the mechanical advantage gained by acting upon the going-barrel or spring indirectly or through the wheel G renders the operation of rewinding much more certain, beside enabling me to rewind at any intervals of time that I wish.

What I now claim as my invention is—

1. In a self-winding clock, the combination, with a winding-motor and the train operated thereby, of a circuit-controller for the motor-circuit, having alternate insulating and conducting sections and a contact bearing thereon, the said circuit-controller being independent of the train, but adapted to be moved step-by-step by the alternate engagement therewith of one of the wheels of the train and a part connected with the going-barrel, as set forth.

2. In a self-winding clock, the combination, with the winding-motor and the train, of two star-wheels and two ratchet wheels or disks, all fixed to the same rotary support, with their teeth alternately disposed and one ratchet-wheel being insulated, a spring-contact bearing at all times on one or the other of said ratchet-disks, according to their position, a pin or projection on one of the wheels of the train in position to engage with the teeth of one of the star-wheels, and a pin on a wheel moving with the going-barrel for engaging with the other star-wheel, as herein set forth.

3. The combination, in a self-winding clock, with the winding-motor and train, of the star-wheels T V and the ratchet-disks R S, carried by the same sleeve, with their teeth alternately disposed and mounted on a stud independently of the train, the contact strip or spring *w*, bearing on the disks R S alternately as the latter are revolved, a projection or tooth on a wheel W on the hour-arbor, adapted to engage with the star-wheel V and by each revolution of the wheel W to shift the spring *w* from a tooth on disk R, which is insulated, to a tooth on disk S, which is connected with the circuit of the motor, and a tooth or projection on wheel D, connected with the going-barrel and adapted to engage with the star-wheel T and by each revolution of the wheel D to shift the contact *w* from disk S to disk R, as set forth.

4. In a self-winding clock, the combination, with the mainspring and barrel, of a recipro-

cating motor consisting of an electro-magnet, a vibrating armature-lever, and means for transmitting the movement of the same to the barrel, a pivoted contact-lever engaged and oscillated by the armature-lever, and a contact-plate in the circuit with the motor-magnet and contact-lever and formed or bent, as described, whereby the contact-lever will be brought into engagement therewith by the withdrawal of the armature from the magnet and out of engagement by the approach of the armature to the magnet, as set forth.

5. The combination, with a clock-train and a circuit-controller arranged to be brought to position by the running down of the train to close the circuit of a winding-motor and by the winding up of the mainspring to break said circuit, of a reciprocating motor composed of a magnet, an oscillating armature connected by a pawl and ratchet-wheel with the barrel, the insulated contact-lever *e*, having a bifurcated end engaged by an insulated stud on the armature-lever, and the contact-strip *h*, with which the lever *e* is adapted to engage, the strip being bent or formed in such manner that the lever *e* will be carried out of contact therewith by the movement of the armature-lever and before the said lever has reached its forward limit of movement, as herein set forth.

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