J. GRANZ.

MOTOR DEVICE FOR ELECTRIC CLOCKS.

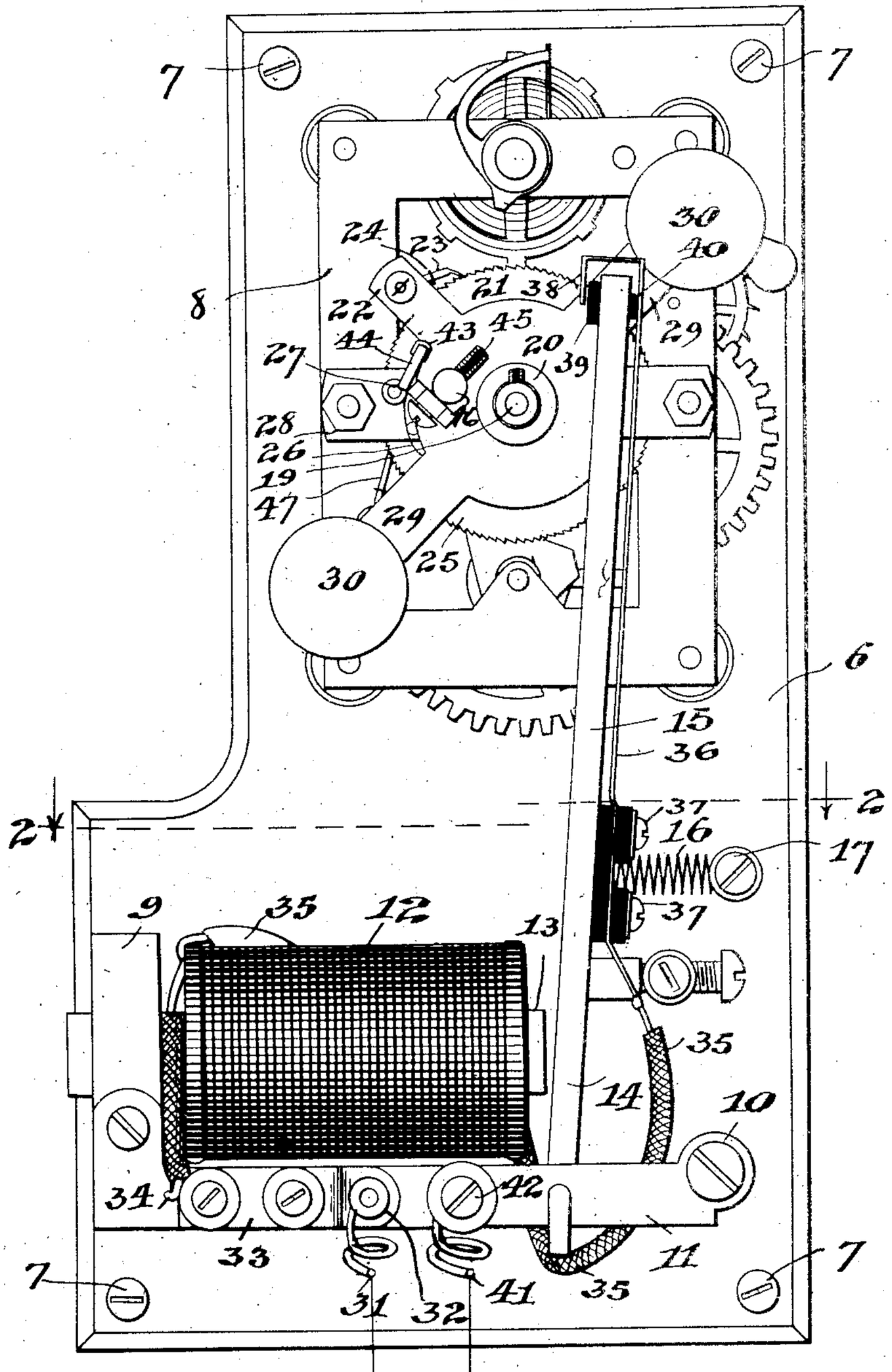
APPLICATION FILED JAN. 22, 1909.

945,716.

Patented Jan. 4, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 6.

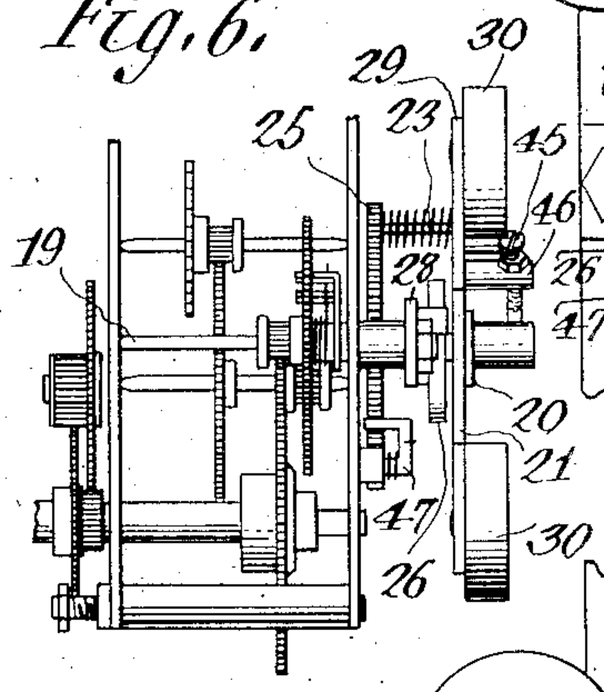


Fig. 3.

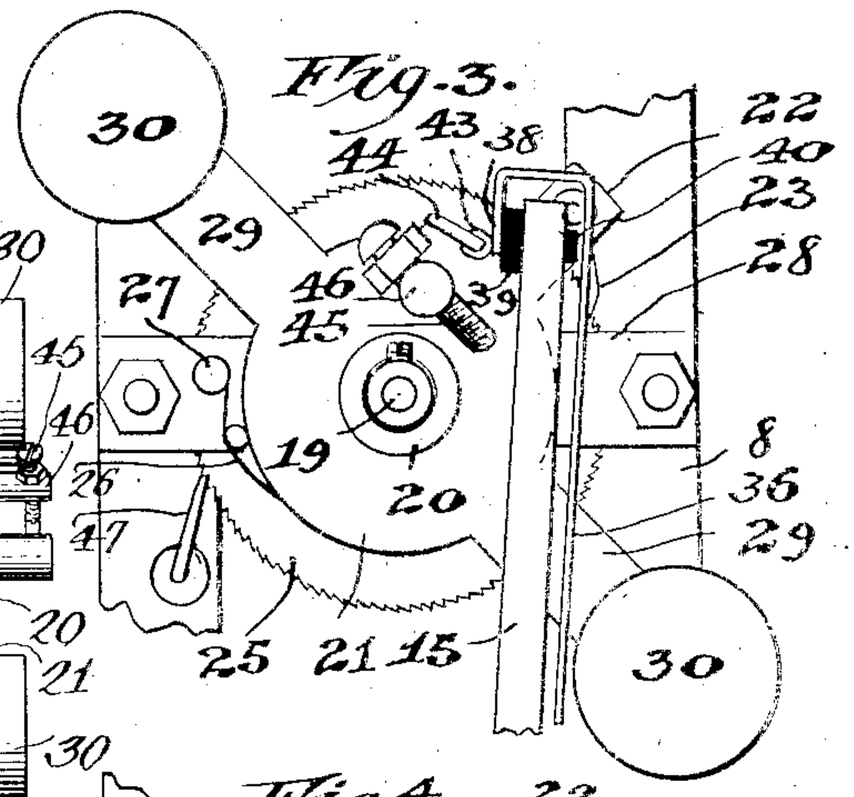


Fig. 4.

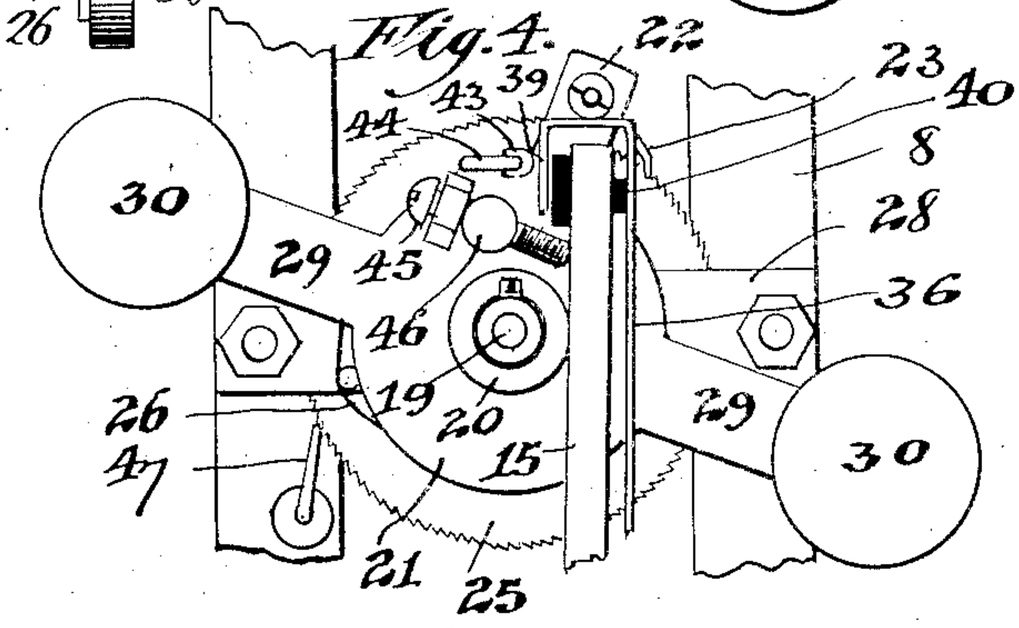


Fig. 2.

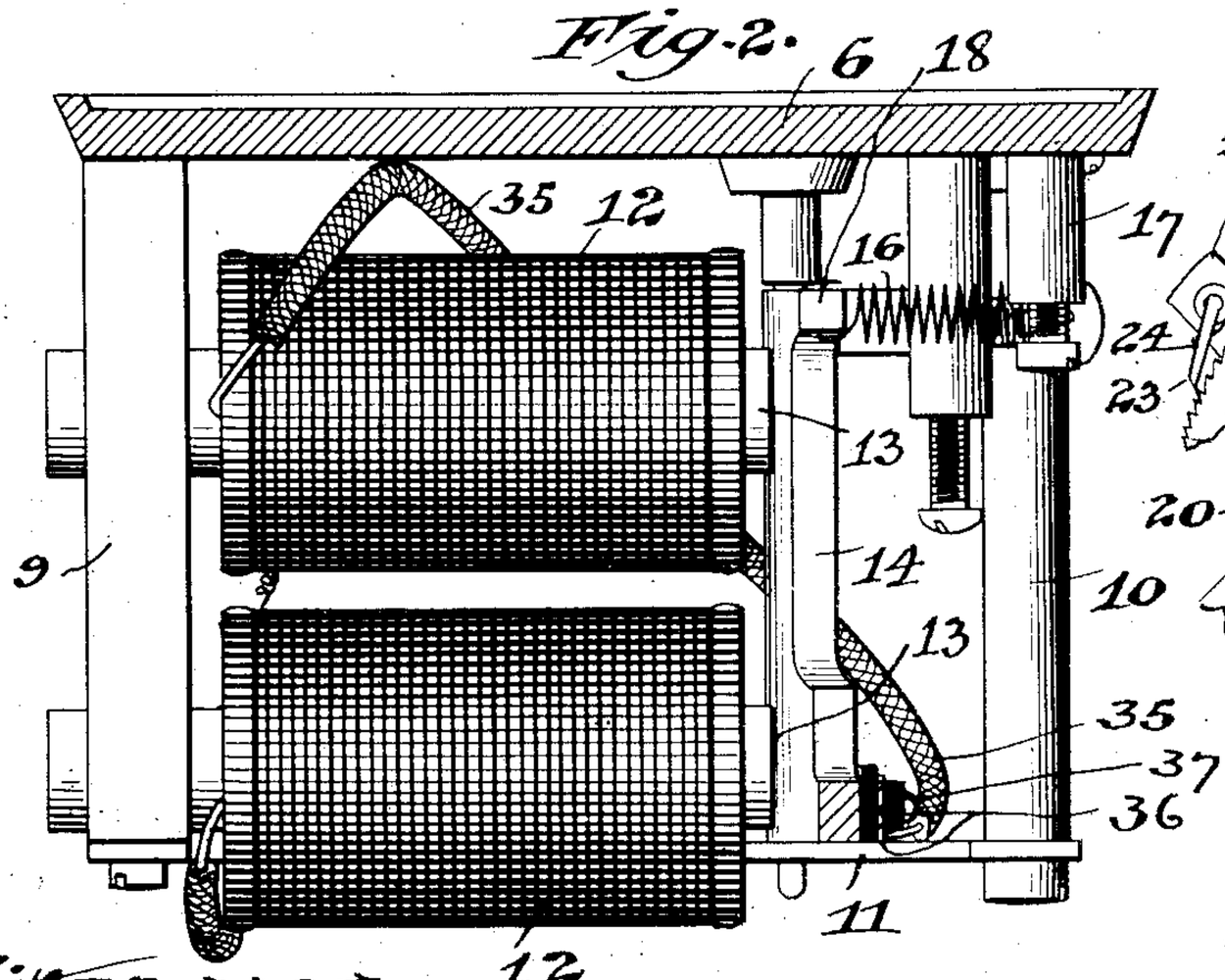
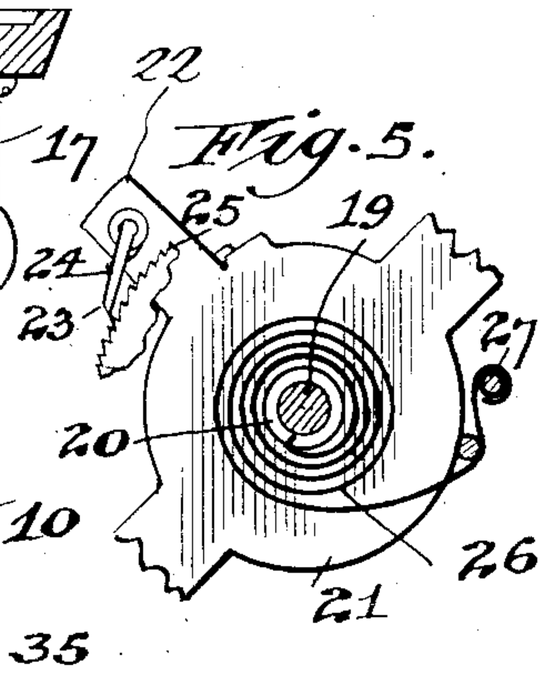


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH GRANZ, OF CHICAGO, ILLINOIS, ASSIGNOR TO TRINITY ELECTRIC CLOCK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MOTOR DEVICE FOR ELECTRIC CLOCKS.

945,716. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed January 22, 1909. Serial No. 473,730.

To all whom it may concern:

Be it known that I, JOSEPH GRANZ, a subject of the Emperor of Austria-Hungary, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Motor Devices for Electric Clocks, of which the following is a specification.

This invention relates to electric clocks, and more especially to what are known as self-winding clocks, wherein the clockwork mechanism is actuated by a spring or weight, the energy of which is periodically restored through the agency of an electromagnet and automatic mechanism for energizing the latter once every minute or at other uniform intervals. Automatic self-winding clocks of this type have gone into quite extensive use; but the present state of the art thereon leaves much to be desired in the way of simplicity and reliability of operation. This is especially true in respect to the means hitherto employed for automatically making and breaking the electric circuit through the magnet whereby the energy of the clock motor is periodically renewed or restored.

The principal object of the present invention is to provide an improved and simplified electrically actuated mechanism for periodically rewinding the motor spring of a spring-actuated clock train with certainty and reliability of action; and the mechanism whereby this object is carried out will be readily understood when considered in connection with the accompanying drawings which illustrate one practical embodiment of the invention, and in which,—

Figure 1 is a front elevational view of my improved self-winding clock mechanism. Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1, looking downwardly. Figs. 3 and 4 are detail elevational views illustrating different positions assumed by the contact devices controlling the energizing and deënergizing of the magnet. Fig. 5 is a detail elevation of the motor spring of the clock movement and the parts immediately coöperating therewith. Fig. 6 is a side elevation of the clock movement as viewed from the left of Fig. 3.

Referring to the drawings, 6 designates an upright frame-plate that may be secured to the front wall of the clock case, as by screws 7, on the upper portion of which frame-plate is mounted a frame 8 containing an ordinary clock train. Secured to the lower portion of the frame-plate 6 is a horizontal rectangular frame comprising a forwardly projecting bar 9, a forwardly projecting post 10, and a cross-bar 11 connecting the projecting ends of said bar and post. Suitably secured to and supported upon the bar 9 are the twin spools 12 of an ordinary electromagnet, the cores of which are shown at 13.

14 designates an armature that it pivoted at its ends in and between the frame-plate 6 and cross-bar 11, said armature having an upwardly extending arm 15 projecting in front of the frame carrying the clock train; said armature and its upwardly extending arm unitedly constituting in effect an armature lever. A spring 16 connected at one end to a post 17 projecting from the frame-plate 6 and at its other end connected to a short arm 18 on the armature 14 normally draws the armature lever away from the cores of the magnet.

19 designates a rigid central transverse shaft extending between the usual parallel front and rear frame-plates of the clock mechanism, and projecting rearwardly of the rear frame-plate, on the projecting end of which shaft is loosely journaled by a central hub 20 a disk 21 that has a radially projecting arm 22 in which is pivoted a pawl 23 that, in turn, is normally urged by a spring 24 into engagement with the periphery of a ratchet disk 25 also loosely mounted on the shaft 19, which ratchet disk is suitably geared, through the various gears and pinions of the clock train to the usual hour and minute arbors of the clock movement. The disk 21 is normally impelled in a direction to drive the ratchet disk 25 through its arm 22 and pawl 23 by means of a coil spring 26 (Fig. 5) the inner end of which is connected to the hub 20 of the disk 21, while its other end is secured to a pin 27 mounted in a cross-bar 28 of the frame. Preferably, and as herein shown, the disk 21 is formed with a pair of oppositely extending arms 29 carrying at their outer ends weights 30, whereby a degree of momentum is imparted to the disk 21 when thrown backwardly to rewind the spring, said disk with its weighted arms 6 constituting a tensioning device for the motor spring of the clock movement.

The magnet is, as usual in clocks of this

character, interposed in a normally open-battery circuit. The circuit wire 31 leading from one pole of the battery 50 is electrically connected by a binding screw 32 with a short conductor strip 33 screwed to but insulated from the frame-bar 11, one end of the magnet winding being connected to the other end of said conductor strip 33, as shown at 34. The other end of the magnet winding is connected by an insulated wire 35 with a contact strip 36 secured to but insulated from the upstanding arm 15 of the armature, as shown at 37. The upper end of the strip 36 is bent over the upper end of the arm, forming the contact point 38, said bent-over end of the strip being insulated from the arm, as shown at 39 and 40. The other pole of the battery is connected to the frame-bar 11 through circuit wire 41; the metallic frame-plate 6 and frame of the clock-work constituting the conductor for the current between the binding post 42 of the wire 41 and the contact point 43 carried by a laterally projecting lug 44 on the disk 21. From this it will be seen that, with the parts of the mechanism in the relative positions shown in Fig. 1, the spring 26, acting through the disk 21, arm 22, pawl 23, and ratchet disk 25, will drive the clock train until the disk 21 is rotated to a position, as shown in Fig. 3, wherein the contact 43 engages the contact 38. At the instant that these contacts come together the circuit is closed through the magnet, the armature and its arm are drawn toward the core of the magnet with a sudden quick movement, and the impulse imparted by the blow of the upper end of the arm 15 through the contacts 38 and 43 and the contact lug 44 partially rotates the disk 21 in a backward direction, rewinding the spring 26. In this action, the weights 30 carried by the arms 29 impart their momentum to the disk 21, in this way distributing the energy of the blow in point of time, and causing a backward rotation of the disk 21 to an extent depending upon the power of the blow; the pawl 23 in this way taking a fresh hold on the ratchet 25 at the limit of the backward movement of the disk. Fig. 1 shows approximately the initial driving position of the pawl 23, corresponding to the position to which it is thrown by the stroke of the arm 15. This action, of course, separates the contacts 43 and 38, again interrupting the circuit through the magnet, and thus allowing the arm 15 to be instantly drawn back to normal position under the influence of the retracting spring 16, whereupon the above-described operations are repeated.

In order to insure the deënergizing of the magnet instantly upon the conclusion of the working stroke of the armature arm as above described, I employ a device which automatically effects the separation of the contact points 38 and 43 before the weighted disk 21 has reached the limit of its backward turning movement. This device, as herein shown, consists of a screw 45 which is tapped through a transversely apertured lug 46 on the face of the disk 21; and the screw 45 is so disposed relatively to the contact 43 that, during the backward turning movement of the disk 21, the inner end or point of the screw comes into engagement with the arm 15 and, in so doing, reduces the extent of movement of the contact point 38 relatively to that of the contact point 43 so as to instantly effect a separation between said contact-points, owing to the faster rate of travel of the contact-point 43, as clearly shown in Fig. 4, wherein, during the inward stroke of the arm 15, it has met the point of the screw and been retarded so that the contact-point 43 has run in advance of the contact-point 38, thus separating the contacts and insuring the breaking of the circuit, the deenergizing of the magnet, and the retraction of the armature arm by the spring 16. This last-named device I regard as of great importance in the invention in the direction of insuring the reliability and efficiency of the mechanism, as well as preventing waste of battery power through any unnecessary prolongation of the contact.

In connection with the ratchet 25 I preferably employ a dogging pawl 47 to prevent any back drag on the ratchet resulting from the drag of the returning movement of the driving pawl 23.

I claim:

1. The combination with a spring-actuated clock movement, of an electro-magnet, a normally open battery-circuit in which said magnet is included, an armature-lever actuated in one direction by said magnet, a spring actuating said armature-lever in the opposite direction, a tensioning device for the motor spring of the clock movement also in said battery-circuit, said tensioning device being actuated by said armature-lever, and coöperating circuit contact devices carried by said tensioning device and armature-lever, respectively, substantially as described.

2. The combination with a spring-actuated clock movement, of an electro-magnet, a normally open battery-circuit in which said magnet is included, a spring-retracted armature-lever, a rotary tensioning device for the motor spring of the clock movement also in said battery-circuit, said tensioning device being actuated by the stroke of said armature-lever when the circuit is closed and the magnet energized, and coöperating circuit contact devices carried by said tensioning device and armature-lever, substantially as described.

3. The combination with a spring-actuated clock movement, of an electro-magnet,

a normally open battery-circuit in which said magnet is included, a spring-retracted armature-lever, a rotary tensioning device for the motor spring of the clock movement also in said battery-circuit, said tensioning device being actuated by the stroke of said armature-lever when the circuit is closed and the magnet energized, momentum-imparting means carried by said rotary tensioning device, and coöperating circuit contact devices carried by said tensioning device and armature-lever, respectively, substantially as described.

4. The combination with a spring-actuated clock movement, of an electro-magnet, a normally open battery-circuit in which said magnet is included, a spring-retracted armature-lever, a tensioning device for the motor spring of the clock movement also in said battery-circuit, said tensioning device being actuated by said armature-lever, cooperating circuit contact devices carried by said tensioning device and armature-lever, respectively, and a contact-breaking device brought into action during the working stroke of said armature-lever, substantially as described.

5. The combination with a clock-movement gear train, of an electro-magnet, a normally open battery-circuit in which said magnet is included, a spring-retracted armature-lever, a motor spring for said gear train, a movable tensioning device for said motor spring connected to one end of the latter also in said battery-circuit, said tensioning device being actuated by said armature-lever, coöperating circuit contact devices carried by said tensioning device and armature-lever, respectively, and a pawl and ratchet driving connection between said tensioning device and said gear train, substantially as described.

6. The combination with a clock-movement gear train, of an electro-magnet, a normally open battery-circuit in which said magnet is included, a spring-retracted armature-lever, a motor spring for said gear train, a movable tensioning device for said motor spring connected to one end of the latter also in said battery-circuit, said tensioning device being actuated by said armature-lever, coöperating circuit contact devices carried by said tensioning device and armature-lever, respectively, a pawl and ratchet driving connection between said tensioning device and said gear train, and an adjustable contact breaking device brought into action during the working stroke of said armature lever, substantially as described.

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