W. K. MENNS.

SELF WINDING ELECTRIC CLOCK.

APPLICATION FILED JUNE 27, 1912.

1,055,776.

Patented Mar. 11, 1913.

4 SHEETS—SHEET 1.

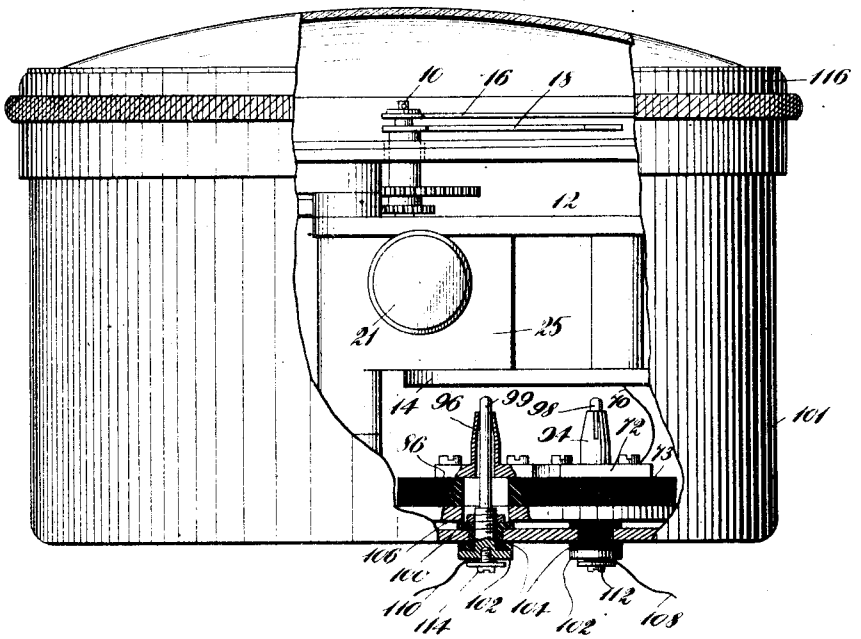

Fig. 1.

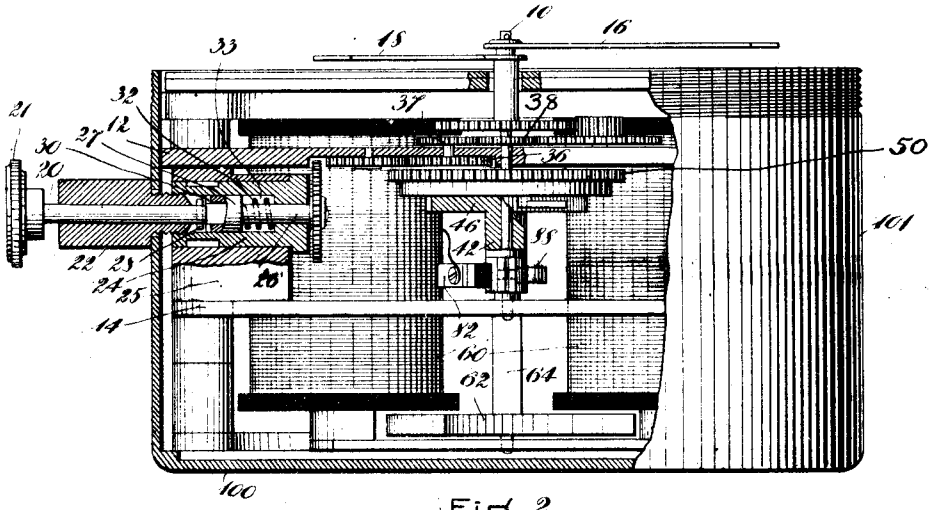

Fig. 2.

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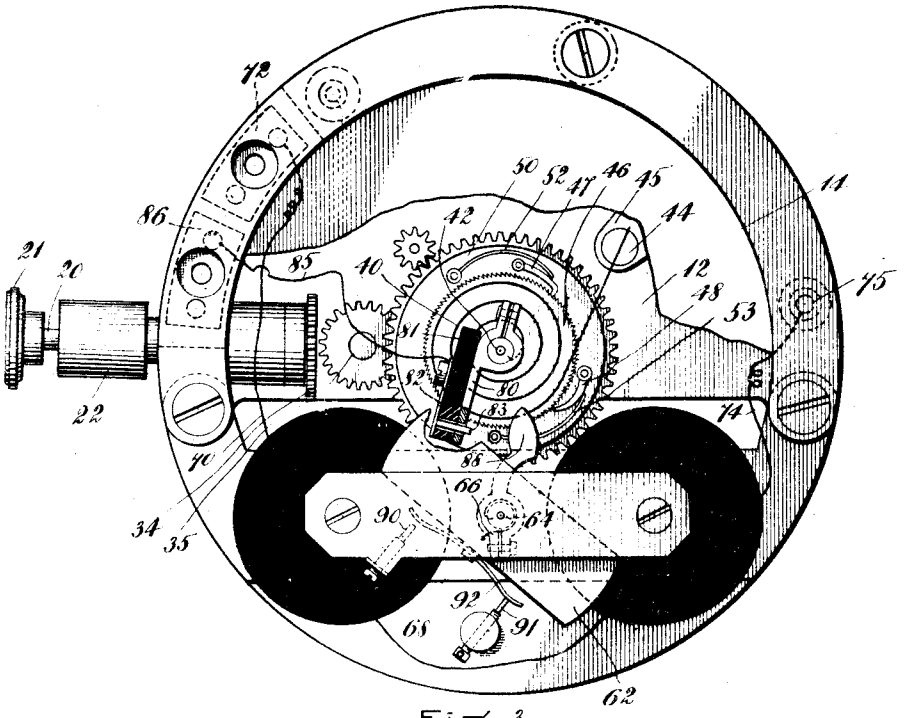

Fig. 3.

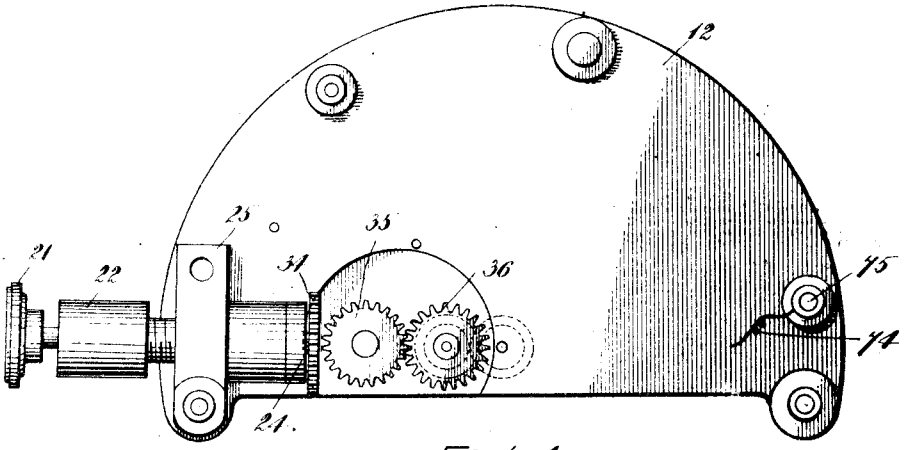

Fig. 4.

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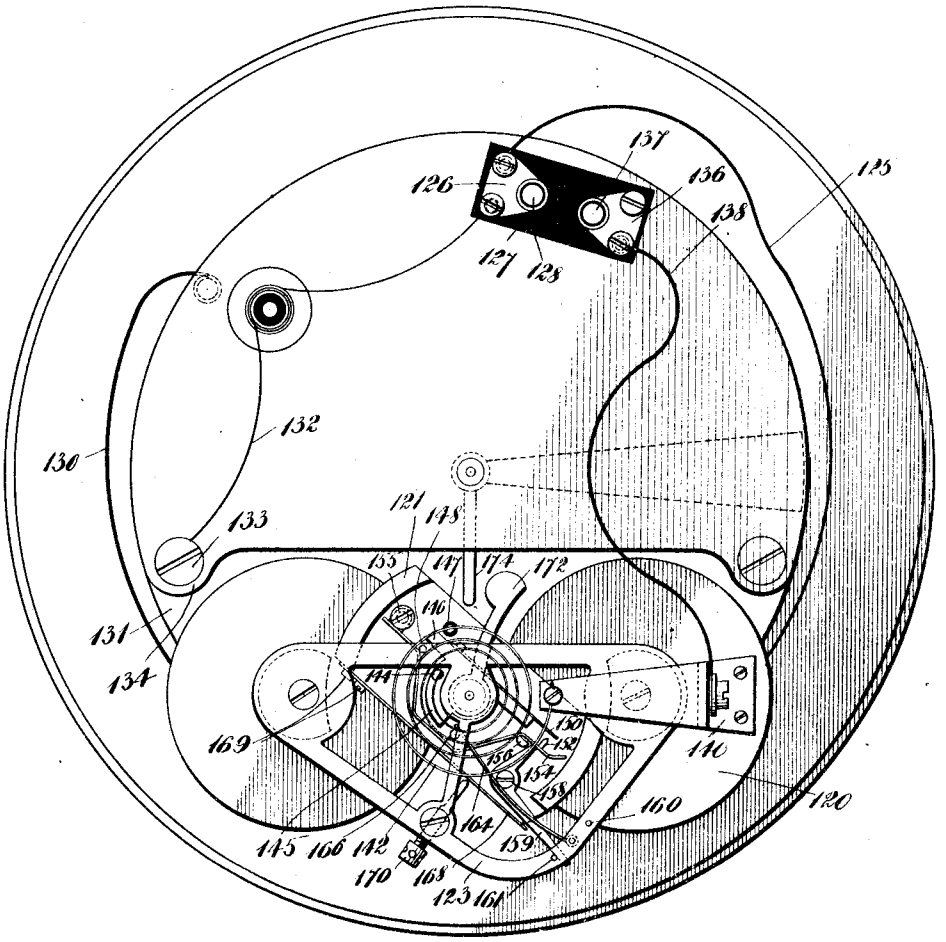

Fig. 5.

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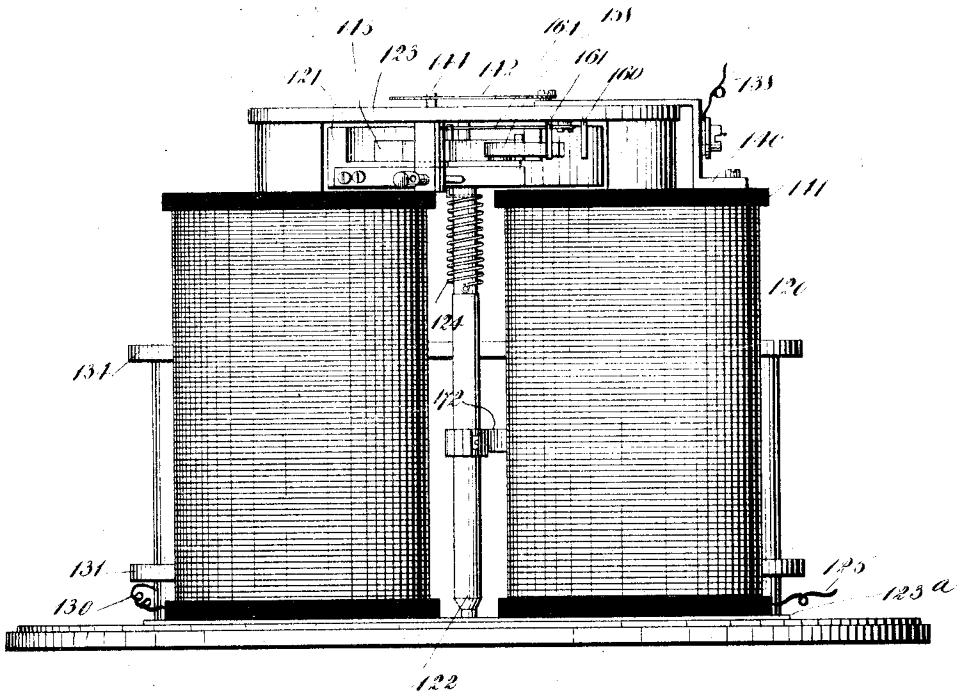

FIG. 6.

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UNITED STATES PATENT OFFICE.

WALTER K. MENNS, OF CHELSEA, MASSACHUSETTS.

SELF-WINDING ELECTRIC CLOCK.

1,055,776. Specification of Letters Patent. Patented Mar. 11, 1913.

Application filed June 27, 1912. Serial No. 706,202.

To all whom it may concern:

Be it known that I, WALTER K. MENNS, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Self-Winding Electric Clocks, of which the following is a specification.

This invention relates to an improvement in self-winding electric clocks.

The object of the invention is to provide a clock which is simple in construction and accurate, and which has advantages over other clocks as heretofore constructed.

I will describe my invention in the following specification and will point out the novel features thereof in the appended claims.

In the accompanying drawings, Figure 1 is a sectional elevation of one embodiment of the invention, with parts broken away, Fig. 2 is a sectional elevation of the same with parts broken away, as viewed from the right-hand side of Fig. 1, Fig. 3 is an inverted plan view, Fig. 4 is a similar view of the setting stem, Fig. 5 is a plan view of a modified form of the invention, and Fig. 6 is a front elevation of the same.

As illustrated in Figs. 1 to 4 of the drawings, the clock comprises a center arbor 10 journaled in suitable bearings formed in plates 12 and 14, upon which the works are mounted. The minute hand 16 is mounted to rotate with the center arbor, and the usual gearing is provided between said arbor and the hour hand 18. A setting stem is also provided, which is normally disengaged from the works but which is adapted to be pushed inward to effect an engagement with said works, a spring being provided which automatically disengages the setting stem when it is released. This stem 20 having a knob 21 is slidably and rotatably mounted in a bearing 22, which is screw threaded into a sleeve 24 carried by a block 25 mounted between the plates 12 and 14. A shaft 26 is rotatably and slidably mounted in the sleeve 24, and is provided at one end with a socket 27, which receives the inner end of the setting stem 20. The setting stem is provided with a pin 28 having its ends projecting on each side of said stem and adapted to be received in notches 30 formed upon the outer end of the socket 27, to prevent relative rotation of said stem and the shaft 26. A coiled spring 32 surrounds the shaft 26 and abuts at one end against the end of the recess 33 in the sleeve 24, and the other end of said spring abuts against the inner face of the socket 27. This spring tends normally to maintain the parts in the position shown in Fig. 2, that is, in the position in which the setting stem is inoperative or free to rotate without moving the hands. A gear 34 is fast on the shaft 26 and meshes with a gear 35 mounted upon the plate 12, when the stem 20 is pushed in to overcome the spring 32. The gear 35 meshes with a gear 36 also mounted on the plate 12, and said gear 36 is fast on the hub of the pinion 37 located on the opposite side of the plate 12. The pinion meshes with a pinion 38 on the center arbor 10. Thus by pushing the setting stem inward to bring the gears 34 and 35 into mesh, the hands 16 and 18 can be rotated to set the clock.

The clock mechanism is actuated by means of a coiled spring 40, which is fast at one end on a sleeve 42 rotatably mounted on the center arbor 10, and its other end is secured to a post 44 on an arm 45 carried by the plate 12. The sleeve 42 is formed with a disk 46 having ratchet teeth on its periphery which are adapted to be engaged by pawls 47 and 48 pivotally mounted on a gear 50, the latter being fast upon the center arbor 10. The pawls are constructed so that only one engages a ratchet tooth at a time, the end of the other being removed a half tooth from the opposing radial face of the nearest tooth. Thus one pawl is always ready to engage a tooth and with the same result as if the ratchet had twice the number of teeth. The pawls 47 and 48 are held in engagement with the ratchet 46 by springs 52 and 53, respectively. By this construction the sleeve 42 and the gear 50 move in unison in one direction under the influence of the unwinding spring 40.

The mechanism for intermittently winding up the spring 40 is constructed as follows:—An electromagnet 60 is provided, having an armature 62 fast on a shaft 64, which is normally held in the position shown in Fig. 3 by a coiled spring 66 having one end fast on said shaft, and the other end fast to a bar 68 in which one end of the shaft is journaled. One terminal of the electromagnet is connected by a conductor 70 with a plate 72 insulated from the frame of the clock by a block of insulation 73, and

the other terminal of the electromagnet is connected by a conductor 74 with the plate 12 by means of a binding post 75.

A contact-carrying arm 80 is clamped about the sleeve 42 and carries a block of insulation 81 upon which a plate 82 is mounted, said plate being provided with a contact 83 which projects through the block of insulation and also through a hole in the arm 80. The plate 82 is connected by a conductor 85 with a plate 86 insulated from the framework. The contact 83 is adapted to engage a contact arm 88 fast on the armature shaft 64 to close the circuit through the electromagnet.

The contact-carrying arm 80, being fast to the sleeve 42, is rotated by the spring 40 until the contact 83 engages the contact 88 to close the circuit through the electromagnet 60. The terminal plates 72 and 86 are connected to a suitable source of electrical energy in any desired manner, although a preferred way will be hereinafter described. When the electromagnet 60 is energized its armature 62 and the contact arm 88 are swung rapidly in a counter-clockwise direction, as viewed in Fig. 3, against the tension of the main spring 40. The spring 40 is thereby wound up again and the pawls 47 and 48 coöperate with the ratchet 46, it being understood that the usual power maintaining mechanism is connected to the gear 50 so that there may be no loss of time during the rewinding operation. In its present embodiment the interval of time elapsing between consecutive rewinding operations is three minutes. By employing such a short interval of time, the spring is kept at substantially the same tension constantly, thus insuring an even torsion and great regularity in the running of the clock.

In order to insure a quick response to the armature and prevent sticking against the stop screws 90 and 91, resilient means are provided which tend to aid the armature in its initial movement. It has been found that repeated making and breaking of the circuit causes the brass stop screws to adhere slightly to the armature. A convenient method of overcoming this difficulty is to provide a leaf spring 92, which is attached to the side of the armature 62, and has its ends curved away slightly from said side, said ends being adapted to engage the ends of the stop screws with yielding pressure. Thus when the magnet is energized the spring acts as a yielding starting device to give a slight impulse to the armature to aid it in the initial starting movement, and the spring also acts as a buffer when the armature is at the end of its stroke and engages the stop screw 90.

In order to remove the works readily from the case without dismantling the electrical connections, the plates 72 and 86 are formed with split, tubular projections or sockets 94 and 96, respectively, which extend inwardly toward the works. A pair of contact studs 98 and 99 are mounted on the back 100 of the case 101. These studs are provided with heads 102 and pass through insulating bushings 104 in the back 100, said studs being held in place by nuts 106. Conductors 108 and 110 are connected to the studs 98 and 99, respectively, by binding screws 112 and 114, said studs projecting into and effecting a good electrical contact with the split sockets 94 and 96, respectively.

The works are held in place within the case by a cover 116 screw-threaded upon the open end of the case, said works and case being provided with suitable locating apertures and pins, not shown. By this construction, after the cover 116 is unscrewed the works may be withdrawn bodily from the case, the sockets 94 and 96 sliding longitudinally along the studs 98 and 99, respectively, and becoming disengaged therefrom, while the conductors 108 and 110 remain connected to the battery or other source of electrical energy.

In the embodiment illustrated in Figs. 5 and 6 it will be understood that the clock mechanism and winding stem are the same as described above, but the electric mechanism is somewhat different. In this form an electromagnet 120 is provided, having an armature 121 loosely mounted on a shaft 122, which armature is normally held in the position shown in Fig. 5 by a coiled spring 124 having one end fast to said shaft, and the other end fast to the under side of said armature. The shaft 122 is journaled at its upper end in a frame 123 and at its lower end in a plate 123^a. One terminal of the magnet 120 is connected by a conductor 125 with a contact plate 126 mounted on a block of insulation 127, said contact plate being provided with a socket 128 adapted to receive a contact plug. The other terminal of the electromagnet 120 is connected by a conductor 130 to a plate 131 of the works. A shunt 132 is connected at one end by a screw 133 to a plate 134 of the works, and the other end of the shunt is connected to the plate 126, the purpose of this shunt being to reduce the sparking at the contacts when the magnet circuit is broken.

A contact plate 136, similar to the plate 126, is mounted on the block 127 and is also provided with a contact socket 137. A conductor 138 is connected at one end to the plate 136, and at its other end to a bracket 140 mounted on the insulated disk 141 of the magnet. A conductor 142 is connected at one end to an arm of the bracket 140, and its other end is connected to a pin 144 on a block 145, said block 145 being fast on the shaft 122 but insulated therefrom. The block 145 is provided with a projection 146,

which is adapted to move between two pins 147, 148, projecting upwardly from the armature 121. These pins limit the movement of the block 145 relative to the armature. A contact spring 150 is mounted on the side of the block 145, and this spring is adapted to be brought into engagement with a contact point 152 carried by a U-shaped spring 154 affixed to the armature 121 at 155. A stop 156 limits the backward or circuit-opening movement of said spring.

The spring 154 is normally backed by a bell crank lever 158 fulcrumed on and movable with the armature 121. The short arm of said bell crank is adapted to engage the rear face of the spring 154 immediately behind the contact point 152, and the long arm 159 of said bell crank is adapted to move between pins 160, 161 depending from the under side of the frame 123. A spring 164 is fast on the frame 123, and its free end bears against a pin 166 which projects upwardly from the armature 121. The spring 164 returns the armature to its normal position, as shown in Fig. 5. A leaf spring 168 is secured at one end to the edge of the armature by screws 169, said spring being adapted to engage a stop screw 170, and to give an initial impulse to the armature when the magnet is energized.

An arm 172 is fast on the shaft 122, and is adapted to be engaged by an arm 174, similar to the arm 80 described above and bearing a corresponding driving relation to the clock mechanism.

The operation of this form of the electric winding mechanism is as follows:—As the clock mechanism runs down the arm 174 approaches and engages the arm 172, then the two travel in engagement, thereby rotating the shaft 122 clockwise as viewed in Fig. 5. The spring 124 is thereby put under tension and the armature 121 rotated in the same direction. The block 145 is also rotated until it engages the pin 147, at which time the spring 150 engages the contact point 152 and closes the circuit through the magnet. This circuit is as follows:—The current flows from the battery to plate 136, conductor 138, bracket 140, conductor 142, block 145, springs 150, 154, armature 121 into the works, conductor 130, coils of the magnet 120, conductor 125, plate 126 to battery.

The magnet is thereby energized and the armature turned quickly counter-clockwise, thereby causing the arm 172 to actuate the arm 174 and rewind the clock mechanism. During this movement the contacts 150 and 152 remain in contact until the arm 159 of the bell crank 158 engages the pin 160, whereupon the short arm of the bell crank is moved from behind the spring 154. This frees said spring and allows it to fly back away from the spring 150, and thereby break the circuit. Thereupon the parts return to normal position by the action of the spring 164, and the arm 159 of the bell crank engages the pin 161, thereby returning the short arm to its position behind the spring 154. In this form of the device the interval of time elapsing between successive winding operations is conveniently three minutes. The breaking of the contacts is positive, and there is no tendency for them to stick together.

What I claim is:

1. An electric clock, comprising an electromagnet, a rotatably mounted shaft, an armature on said shaft, an arm fast on said shaft, a main spring, an arm actuated by said spring in one direction to engage the arm on said shaft, and connections whereby a circuit is established through the electromagnet, whereby, when said electromagnet is energized said spring actuated arm is returned to its original position.

2. An electric clock, comprising an electromagnet having a pair of coils, a rotatable shaft mounted between said coils, an armature on said shaft, an arm fast on said shaft, a spring, an arm actuated by said spring in one direction to engage the arm on said shaft, connections whereby a circuit is established through the electromagnet, and a spring carried by said armature arranged to give an initial impulse thereto in its forward movement.

3. An electric clock, comprising a spring for actuating the hands, a pair of contacts one of which is actuated in one direction by said spring, an electromagnet having a pair of coils, a shaft rotatably mounted between the coils, an armature on said shaft, an arm actuated in one direction by said spring, an arm fast on said shaft adapted to be engaged by the spring-actuated arm, and connections whereby when said contacts are brought into engagement with each other a circuit is established through the electromagnet and the spring-actuated arm is returned to its original position.

4. An electric clock, comprising a spring for actuating the hands, a pair of contacts one of which is actuated in one direction by said spring, an electromagnet having an armature rotatably mounted between its coils, an arm actuated by said magnet for returning the spring-actuated contact to normal position, and a leaf spring mounted on the side of the armature for aiding the latter at the beginning of its forward movement.

5. An electric clock, comprising a main spring, an electromagnet having a rotary armature, a yieldingly mounted contact carried by said armature, a backing member for engaging said contact, a second contact arranged to be actuated into circuit-closing

position by said main spring, and means arranged to withdraw said backing member to enable the contacts to be separated.

6. An electric clock, comprising a shaft, an electromagnet having an armature loosely mounted on said shaft, a spring connecting the armature and shaft, a pair of contacts, a driving spring controlling one of said contacts, and means operatively related to said armature for rewinding said driving spring.

7. An electric clock, comprising a main spring, a pair of contacts, one of which is controlled by said main spring and the other of which is mounted upon a spring, means acting as a support for said spring-carried contact, and means coöperating with said support to withdraw the latter to enable the contacts to be separated.

8. An electric clock, comprising an electromagnet provided with an armature, a yieldingly mounted contact carried by said armature, means for supporting said contact, a second contact arranged to be actuated into circuit closing position by the clock spring, and means coöperating with the support for said yielding contact arranged to withdraw the support to enable the contacts to be separated.

9. An electric clock, comprising an electromagnet provided with an armature, a spring contact mounted on said armature, a bell-crank lever carried by said armature and having one arm arranged to engage said contact, a contact coöperating with said spring contact and controlled in one direction by mechanism actuated in one direction by the main spring of the clock, and means arranged to engage said bell-crank when said armature is actuated, to release said spring contact.

In testimony whereof I have affixed my signature, in presence of two witnesses.

WALTER K. MENNS.

Witnesses:
W. E. McGRAW,
WILLIAM J. SPERL.