(No Model.)

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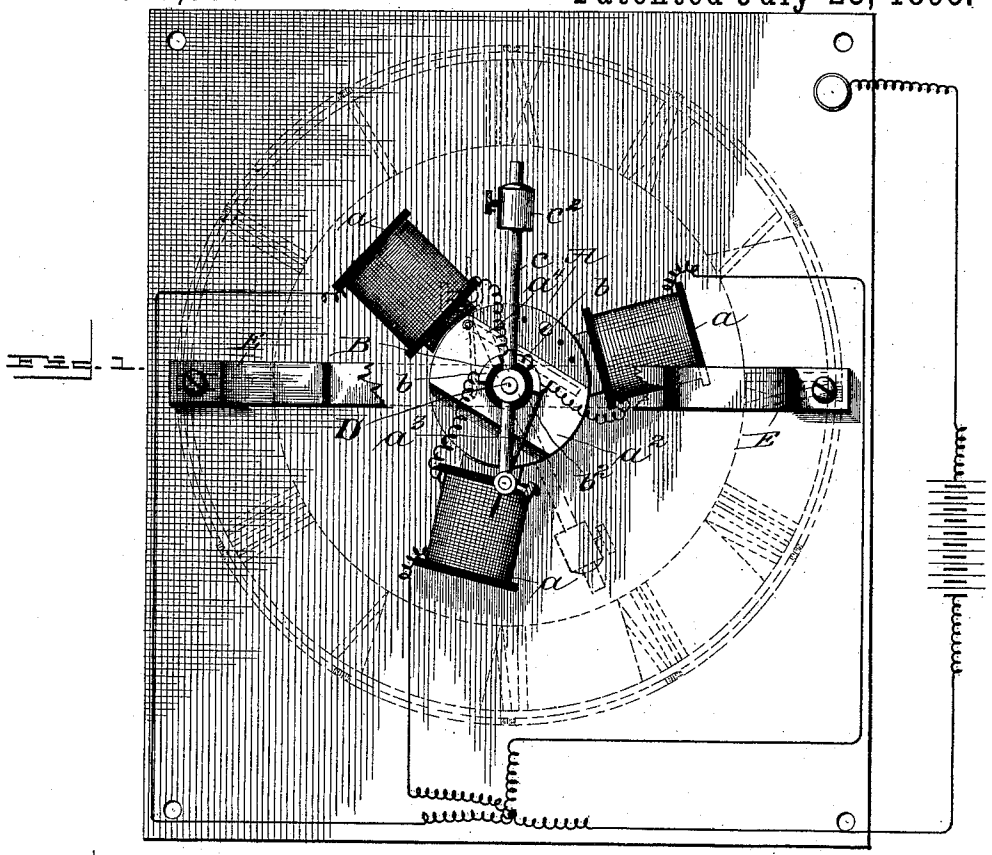
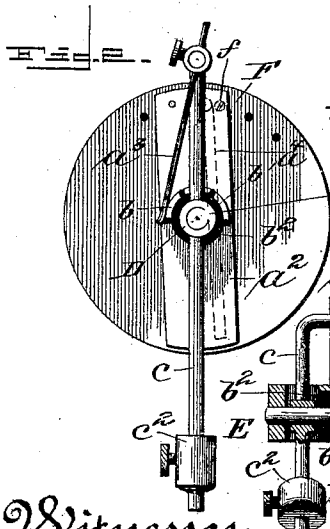
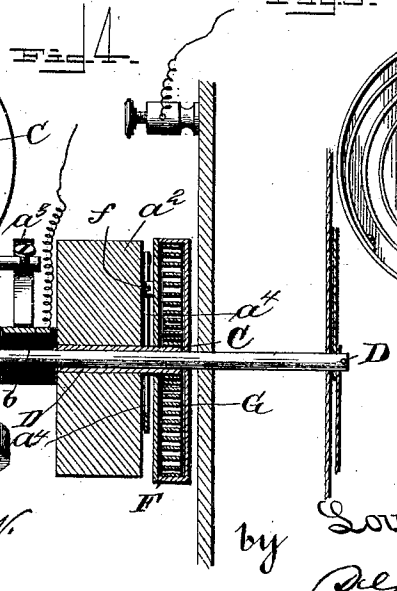
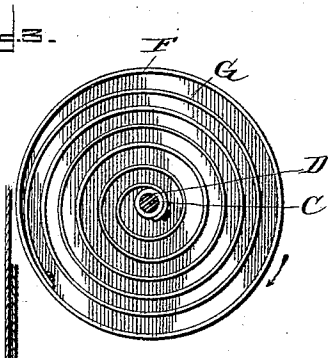
ELECTRIC CLOCK WINDING MECHANISM.

No. 543,358. Patented July 23, 1895.









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UNITED STATES PATENT OFFICE.

LOUIS H. SPELLIER, OF PHILADELPHIA, PENNSYLVANIA; HENRY TRUMBORE EXECUTOR OF SAID SPELLIER, DECEASED.

ELECTRIC CLOCK-WINDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 543,358, dated July 23, 1895.

Application filed May 28, 1891. Serial No. 394,446. (No model.)

To all whom it may concern:

Be it known that I, LOUIS H. SPELLIER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electro-mechanical Clocks; and I do hereby 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 appertains to make and use the same.

My invention relates to movements, and particularly to such as are applied to that class of electric clocks wherein the motive power of the time-indicator is a spring or weight, as distinguished from the kind in which the motive power is electricity.

The invention relates particularly to automatic means for winding such clocks electrically.

The invention differs in two particulars from clocks as heretofore constructed, namely: first, in that for the impelling power of the clock neither a weight nor a spring is separately employed, but these two instrumentalities are employed jointly and must be employed together, either being inoperative without the other; secondly, in that in winding the clock an electric motor is not relied upon to complete the action of winding, but this action, having been begun by the electric motor, is completed by a weight or momentum device.

The invention consists in the combination, with an electric motor, of a weight or momentum device to complete the movement of the parts actuated by the motor; furthermore, in the combination, with the train of a clock, of a weight or momentum device acting in conjunction with a spring to furnish the impelling power; furthermore, in the combination, with winding mechanism of a clock, of a weight or momentum device brought into action by and supplementing the action of an electric motor; furthermore, in the combination, with an electric motor having a mutilated commutator, of a weight acting to complete the movement of the parts actuated by the motor, a winding-arbor to which the weight is attached, and a spring having one end attached to the same arbor, the weight acting to furnish an abutment for this end of the spring; furthermore, in the combination, with an electric motor having a mutilated commutator, of a weight acting to complete the movement of the parts actuated by the motor and a shaft or winding-arbor to which the weight is attached, the movable part of the motor and the weight being fixed to the shaft or winding-arbor, a spring, a barrel, and an actuating-shaft for the train of the clock, the spring being attached at one end to the winding-arbor and at the other end to the barrel and the barrel being fixed upon the actuating-shaft, the mutilated commutator causing a partial winding of the spring through the movable part of the motor, further winding of the spring being carried on through the same movable part by the weight, and the weight by its gravity also then furnishing an abutment for the spring, which, at its other end pushing against the box, tends to drive it and with it the train-actuating shaft upon which it is fixed, and, finally, in the combination, with an electric motor having a mutilated commutator and a weight acting to complete the movement of the parts actuated by the motor, of a spring wound by the parts actuated by the motor and the weight, the spring having means actuated in unwinding automatically to re-establish, at a predetermined tension of the spring, electrical connection with the mutilated commutator.

The invention is capable of various applications and varied embodiment.

In the accompanying drawings, which form part of this specification and in which like letters of reference indicate corresponding parts, I have illustrated one form of embodiment of my invention.

Figure 1 is a view in elevation taken from the rear of the back plate of a clock, showing an electric motor (in this example one having stationary magnets and commutator and movable armatures and brush) composed of the usual magnets, armatures, and brush, but with a mutilated commutator—that is, a commutator the segments of which do not occupy the entire circumference, but form a sector, in the present instance composed of three segments corresponding to the number of mag-

nets, the segments being fixed upon an insulating substance, the remainder of the insulating substance forming an interval between the first segment and the last; showing, furthermore, a sleeve upon a shaft, the sleeve carrying at one side a rod or bar having an adjustable weight and at the other side the commutator-brush, the rod and its weight and the brush being displayed in different positions; showing, furthermore, the end of the train-actuating shaft to be supported in a brace; showing, furthermore, a barrel, case, or box for the actuating-spring of the clock-train, this barrel having a stop or projection to take against a movable part of the motor, in this instance the armature, at a predetermined tension of the spring, to turn the sleeve and bring the brush and the commutator into renewed contact, the stop being shown adjustable and there being a buffer-spring (shown in dotted lines) on the movable part which it is to strike to relieve concussion, and showing, finally, in dotted lines the positions of the clock-train and the markings on the dial. Fig. 2 is a view in detail, particularly showing the mutilated commutator, an armature, the sleeve carrying the brush, and the weight, the sleeve being on the train-actuating shaft, which also carries the barrel for the actuating-spring of the clock, the adjustable stop on the barrel, and, in dotted lines, the buffer-spring on the armature. Fig. 3 is a view in detail showing the spring in its barrel with the outer end attached to the barrel and the inner end to the sleeve, which sleeve is borne against in a direction contrary to the draft of the outer end of the spring, thus forming an abutment. Fig. 4 is a view in side elevation showing the train-actuating shaft and the sleeve carrying the movable part of the electric motor with the buffer-spring and the actuating-spring barrel with the stop, the parts being at the rear of the back plate of a clock, but the train-actuating shaft passing through.

The broad feature of my invention resides in employing an electric motor in conjunction with a weight or momentum device in such manner that at the end of a predetermined action of or by the electric motor the motor will automatically cease to act and a weight or momentum device will continue the work begun by the motor, and however the motor be stopped when the action is to be taken up by the weight or momentum device, whether by breaking the current by moving the brush from the commutator or the commutator from the brush, or otherwise, is immaterial. One form of apparatus by which the result can be effected is shown in the drawings; but I do not wish to limit myself to the details of construction, since it will be clear that the same can be greatly varied without departing from the spirit of my invention.

In the drawings, A indicates an electric motor, having magnets a, armatures a^2, and a brush a^3, of the usual or any suitable kind. The commutator, however, marked B differs from the usual commutator, in that instead of being of a kind in which one or more of the segments are always in contact with the brush—as, for example, one for oscillatory action between it and the brush or a circular commutator having segments upon its entire periphery—it is one having segments only on part of its periphery, the remainder being blank, so that when the brush passes beyond the segments, or before it reaches them, it is out of contact.

In the present example an electric motor has been chosen in which the electromagnets and the commutator are stationary and the armatures and the brush are movable, but it will be obvious that the other common form of electric motor may be employed in which the armatures and the brush are stationary and the commutator and magnets are movable.

The commutator B, as here shown, has three segments b (corresponding with the number of magnets) placed upon a disk b^2 of insulating substance. The three segments, therefore, with relation to the remainder of the periphery of the disk, present a sector of a circle, and there will be an interval left between the end commutator-segments.

The shaft C carries the armatures, preferably insulated from the shaft, and has fixed to it a rod or bar c, carrying an adjustable weight c^2, and at the other side the commutator-brush. If the brush and armatures were fixed and the commutator and magnets movable, the commutator, magnets, and weight-rod would be on the shaft.

The operation of the device so far would be as follows: The current entering through the brush in any suitable manner would pass to a commutator-segment, and through this its respective magnet would be energized. This magnet would then attract the armature turning the shaft and with it the brush, which would then pass to the next segment and through it energize the next magnet, and so on until the end of the last segment would be reached. At this point the weight would have been brought up and to a little beyond the perpendicular, when, by its gravity, it would turn the shaft farther, automatically breaking contact between the brush and the commutator and by its momentum continuing the motion of any parts movable by the shaft up to the work to be performed or to a point of predetermined counterbalancing resistance.

It will be obvious that instead of the weight merely carrying the brush beyond the commutator-segments it might readily be arranged at the point of falling by its momentum to lift the brush and return it toward the first segment.

The electric motor is shown at the rear of a metallic back plate of a clock, the shaft C with which it moves being a sleeve extending

nearly to the back plate and the actuating shaft or arbor D for the train extending through.

The two shafts—that is, the train-actuating shaft D, and the sleeve C—are supported at the rear end in a brace, bar, or bracket E and fixed to the train-actuating shaft D at the inner end of the sleeve-shaft C, and loose upon the sleeve-shaft is a barrel F. This barrel contains the spiral actuating-spring G of the clock, which spring is fixed at its outer end to the barrel and at its inner end to the sleeve. The operation of this part of the device will be clear. The current entering the back plate passes through the train-actuating shaft to the brush, thence to a commutator-segment when in contact, thence to the respective magnet energizing it and thence back to the battery, all as indicated in the drawings, and the sleeve is turned, first, by the electric motor, and then by the weight, and the inner end of the spiral spring being attached to the sleeve the spring is wound as the sleeve turns and the weight falls until the spring is sufficiently wound, the opposite end of the spring forming an abutment, the barrel on the actuating-shaft being prevented from turning by the train of the clock. The weight having completed the winding of the spring it will be clear that it acts as an abutment at this end of the spring to keep the spring from unwinding from its inner end. This construction gives the advantage of both spring and weight clocks to my invention, and obviates the disadvantages of either, and this with the important advantage of great simplicity of construction. Weight-clocks, reliable by reason of their uniformity of impelling power, are objectionable by reason of their bulk, while spring-clocks can be made simple and compact, but are unreliable by reason of the want of constancy of tension in expanding and the effect of changes of temperature. The combined forces of elasticity and gravity give my invention the advantages of both spring and weight clocks, for while my clock is virtually a clock impelled by the force of gravitation, yet this gravitation is imparted to a spring the tension of which during the process of gradual expansion is automatically controlled and adjusted by the ever equal pressure of the weight.

Fixed to the outer face of the barrel at any suitable place in an arc parallel with the circumference, according as action is desired after a greater or less distance of turning the barrel, is a stop *f*, and this stop projects far enough from the face to strike a part of the armature when the barrel is turned far enough. To give resiliency to the contact, a spring a^4 is fixed to the armature, and the parts are so arranged that the stop would take against this spring. The operation of this part of the invention will now be apparent. As the train-actuating shaft is borne against through the barrel by the outer end of the spring and is turned (the motion of the escapement permitting) the barrel turns in the direction of the weight, and with it the stop, which, then striking the armature, carries the sleeve farther around than it was carried by the weight and brings the brush into contact with the first segment again, when the operation is renewed from the beginning, and thus a clock will be automatically wound and the spring retained at a uniform tension.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the actuator or actuating mechanism of a clock, of an electric motor and a device supplementing the action thereof and set in motion thereby, such device continuing to wind the spring or other actuating mechanism of the clock, after the electric motor has ceased to act, substantially as set forth.

2. In a clock, an electric motor, an actuator connected with the mechanism of the clock, and a weight or momentum device attached to the actuator and adapted to break the electrical connection with the motor, substantially as described.

3. In a clock, an electric motor, an actuator for the time mechanism of the clock, and a momentum device attached to the actuator and acting to re-establish electrical connection with the motor, substantially as described.

4. The combination with a spring to be wound or set for action, of an electric-motor which sets the spring and a weight which automatically stops the action of the motor at a desired tension of the spring and starts it again at a point of relaxation of the same, substantially as described.

5. The combination with winding mechanism and time movement of a clock, of a weight brought into action by and supplementing the action of an electric motor, substantially as described.

6. The combination with an electric motor having a mutilated commutator, of a weight acting to complete the movement of the parts actuated by the motor, a winding arbor to which the weight is attached, and a spring having one end attached to the same arbor, the weight acting to furnish an abutment for this end of the spring, substantially as described.

7. The combination with an electric-motor having a mutilated commutator, of a weight acting to complete the movement of the parts actuated by the motor, and a shaft or winding arbor to which the weight is attached, the movable part of the motor, and the weight, being fixed to the shaft or winding arbor, a spring, and a box and an actuating shaft for the train of the clock, the spring being attached at one end to the winding arbor, and at the other end to the barrel, and the barrel being fixed upon the actuating shaft, the mutilated commutator causing a partial winding of the spring through the movable part of the motor, further winding of the spring being

carried on through the same movable part by the weight, and the weight by its gravity also then furnishing an abutment for the spring, which, at its other end pushing against the box, tends to drive it and with it the train actuating shaft upon which it is fixed substantially as described.

8. The combination with an electric-motor, having a mutilated commutator and a weight acting to complete the movement of the parts actuated by the motor, of a spring wound by the parts actuated by the motor, and the weight, the spring having means actuated in unwinding, to automatically re-establish, at a predetermined tension of the spring, electrical connection with the mutilated commutator, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS H. SPELLIER.

Witnesses:
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