(No Model.) 2 Sheets—Sheet 1

F. L. GREGORY.

SELF WINDING ELECTRIC CLOCK.

No. 455,532. Patented July 7, 1891.

Fig. 1

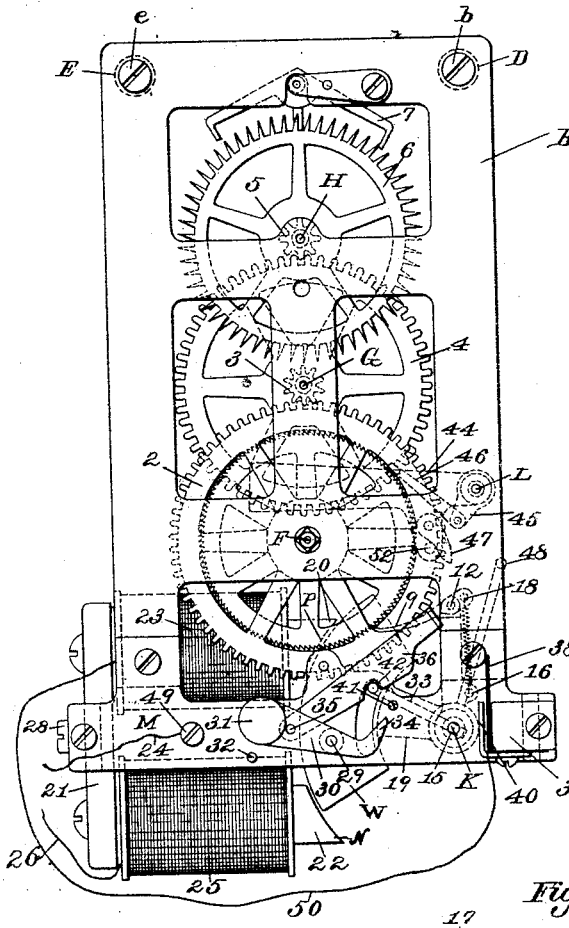


Fig. 2

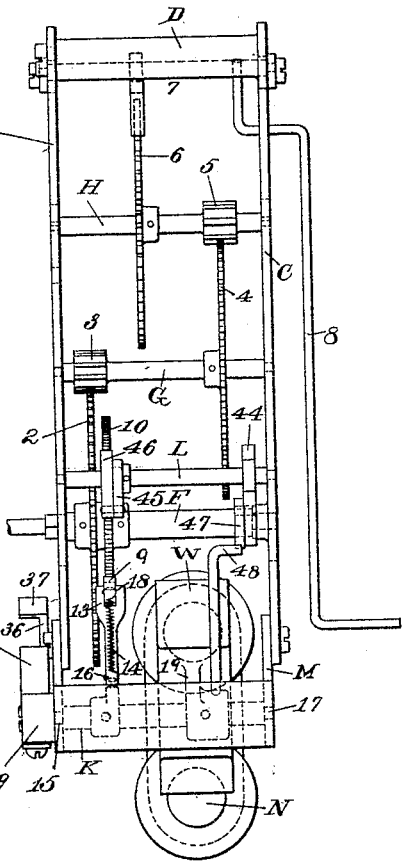
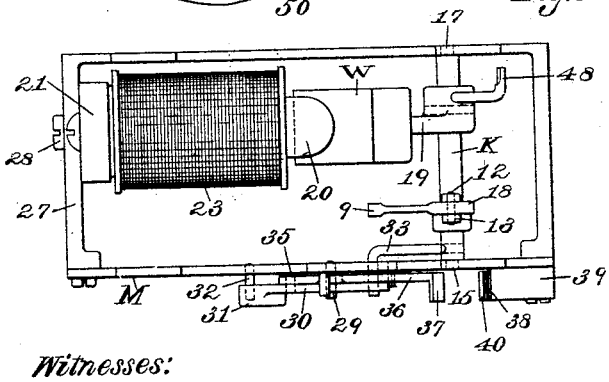


Fig. 3



Witnesses:

Henry L. Reckard.

H. Mallmer.

Inventor:

F. L. Gregory,

By his Attorney,

F. A. Richards.

(No Model.) 2 Sheets—Sheet 2.

F. L. GREGORY.

SELF WINDING ELECTRIC CLOCK.

No. 455,532. Patented July 7, 1891.

Fig. 4

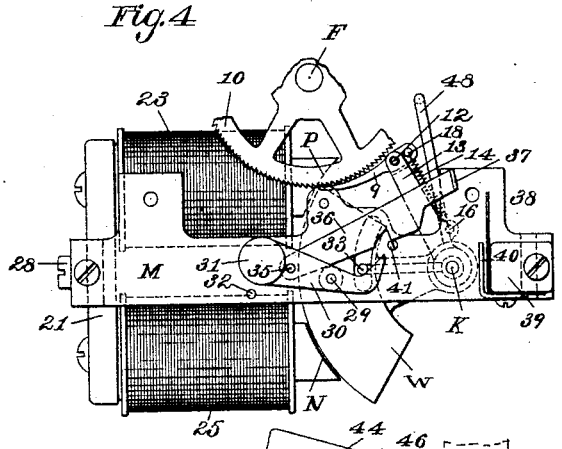


Fig. 5

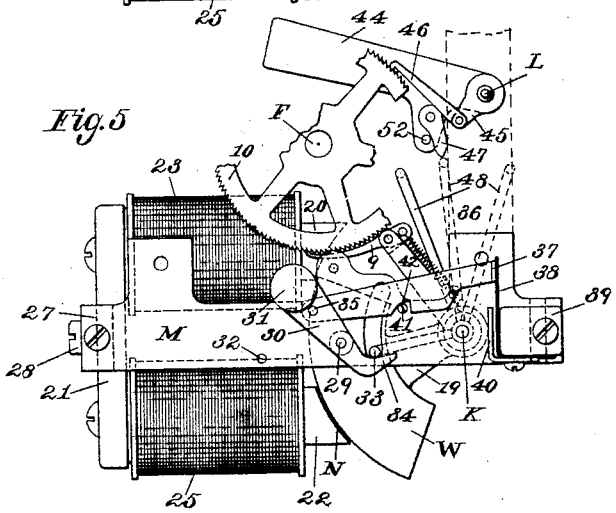


Fig. 8

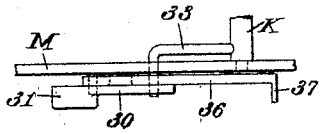


Fig. 6

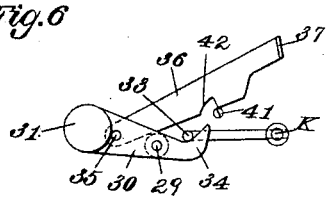
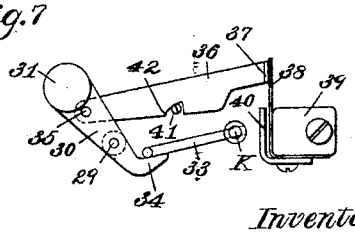


Fig. 7



Witnesses:

Henry L. Reckard.

H. Mallmer.

Inventor:

F. L. Gregory,

By his Attorney

F. W. Richards

UNITED STATES PATENT OFFICE.

FRED LEON GREGORY, OF NIAGARA FALLS, ASSIGNOR OF ONE-HALF TO JOHN G. RICH, OF AUBURN, NEW YORK.

SELF-WINDING ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 455,532, dated July 7, 1891.

Application filed April 2, 1891. Serial No. 387,368. (No model.)

To all whom it may concern:

Be it known that I, FRED LEON GREGORY, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

This invention relates to electrically-actuated clocks, the object of the invention being an improved mechanism whereby the clock-wheels are weight-actuated, and whereby the said weight is automatically lifted for continuing indefinitely the operation of the clock-work.

Referring to the drawings accompanying and forming a part of this specification, Figure 1 is a front elevation of a clock-movement and electrical device for actuating the clock-work. Fig. 2 is a side elevation of the same as seen from the right hand in Fig. 1. Fig. 3 is a plan view of the "magnet-frame" and the mechanism carried thereby. Figs. 4 and 5 are similar to a portion of Fig. 1, illustrating the operation of the weight and the electrical devices for actuating the same. Figs. 6 and 7 are front views similar to portions of Figs. 1, 4, and 5, illustrating the operation of the circuit-breaking apparatus. Fig. 8 is a plan view of said apparatus drawn in projection with Fig. 7.

Similar characters designate like parts in all the figures.

The clock-movement is carried by the usual front frame B and back frame C, these frames being connected together by pillars D and E and screws *b* and *e*. The train of gearing consists, as usual, of the wheel 2, carried on the shaft or arbor F and meshing with the pinion 3 of the intermediate shaft or arbor G, both of these shafts being journaled, as usual, in the middle portions of the said front and back plates or frames. The large intermediate gear 4 on the shaft G meshes with the pinion 5 of the escapement-shaft H, this shaft carrying the escapement-wheel 6, which is acted upon by the usual pallet 7, supported in the usual manner and provided with the crutch-wire 8. On the aforesaid shaft F, which is the main shaft of the train of gearing, there is a ratchet-wheel 10, through which the train is actuated by a pawl engaging the teeth of said ratchet-wheel, as will be understood from the drawings. Said pawl 9 is pivoted at 12 to the upper end of the arm 13 of a rocker-shaft K, that is journaled at 15 and 17 (see Fig. 3) in the magnet-frame M. A light spring 14 is connected to said arm at 16 and to the said pawl at 18 for normally holding the point of the pawl in engagement with the ratchet-wheel. The clock-actuating weight W is carried by an arm 19, that is fixed on said shaft, as will be understood by comparison of the several figures of drawings. Said weight W is also an armature, and is segmental in form, swinging close to the poles P and N of the magnet, which consists of the cores 20 and 22, the connecting-piece 21, and the coils 23 and 25 on said cores, respectively. Electricity is supplied to the coils 23 and 25 through the wires 50 and 26, respectively, in the usual manner. The magnet is supported in place by attaching the connecting-bar 21 thereof to the end bar 27 of the frame M, as shown in Figs. 1 and 3, where the screw 28 is for the purpose of holding said parts in place. The winding of the magnet is such that on supplying the current of electricity thereto the weight W is raised from its position in Fig. 5 to its position in Fig. 1, thus retracting the pawl a considerable distance backward from the notches of the aforesaid ratchet-wheel 10, as illustrated in said figures.

The electrical circuit of the magnet consists of the two terminals 24 and 26, one of which 26 leads directly to the spool 25, while the other one 24 is connected at 49 to the metallic frame M, on which the switch is mounted. Connection is made with the other spool 23 through the wire 50, which leads to the contact point or spring 38. When the switch is thrown into engagement with said contact-point, as shown in Figs. 5 and 7, the electrical circuit is thereby completed and the magnet-poles energized for raising the main weight W.

For making and breaking the circuit for the purpose of operating the weight a circuit-breaker or switch mechanism of the "locking" variety is provided, which locking-switch is or may be constructed as follows: The weighted lever 30 is pivoted to the magnet-frame at 29 and has a weight 31 at the

left-hand end thereof, whereby the lever is held normally in the position shown in Figs. 4 and 6, the downward movement thereof being limited by a suitable stop, as 32. The weighted lever 30 is raised by the arm 33, which is fixed to the weight-shaft and engages the right-hand end 34 of the weighted lever. When the weight descends from its position in Fig. 1 to its position in Fig. 5, said pin 33 strikes said lever and swings it upwardly, as shown in Figs. 5 and 7. The circuit-breaker 36 is pivotally attached at one end thereof to said weighted lever at 35, and at the other end thereof is fitted—as, for instance, by the forward bend 37—to contact with the spring 38, which is carried by the magnet-frame and suitably insulated therefrom, being supported on an intermediate block 39 of insulating material. A suitable guard, as 40, is provided to prevent accidental bending of said spring.

In the magnet-frame there is a fixed catch or stop 41, which is fitted to engage with the detent-notch 42 in the circuit-breaker. When this circuit-breaker stands on said hook, as in Figs. 5 and 7, the contact end 37 engages the spring-contact maker 38, as shown in Figs. 5 and 7, the electrical circuit being by this means completed through the magnets. These draw up the weight from the position shown in Fig. 5 to that shown in Fig. 1. As said weight moves up, the arm 33 thereof strikes said contact-maker and lifts the same off said catch, as indicated in Fig. 1, when the aforesaid weighted lever 30 immediately draws the contact-maker back to the position shown in Fig. 1, thereby breaking the current and allowing the weight to fall, bringing the aforesaid pawl into engagement with the ratchet-wheel 10, and thus driving the clock mechanism during the descending movement of said weight.

As a means for continuing the operation of the clock mechanism during the rising of the main weight W, I provide an accessory actuating device, which is retracted or set for operation by the descending main weight. For this purpose the shaft L is provided, having thereon the accessory weight 44 and carrying also on the arm 45 thereof the pawl 46, engaging with the aforesaid ratchet-wheel 10. The weight-arm on said shaft carries a pawl 47, adapted to be actuated by the arm 48 of the aforesaid main-weight shaft K on the descent of the main weight, the movement of said latch 47 being limited by the stop 52. Said arm moves toward the left hand in Fig. 1, thereby engaging the said pawl, as indicated by dotted lines. Having raised said weight-arm 44 some distance, the shaft-arm 48 passes the point of the pawl 47, when the accessory weight 44 is thrown upon the clock mechanism. It should be understood in this connection that the weight-arm 44 is of relatively small power, and is adapted to actuate the clock only during a very brief time. The weight 44 being small, it detracts but little from the effectiveness of the main weight. The main weight in descending lifts the accessory weight from the position shown in dotted lines in Fig. 1 to the position shown in Fig. 5, and on its upward movement the main-weight arm 48 strikes the pawl 47, which gives way to allow the arm to pass in a well-known manner.

The general operation of the mechanism may be described as follows: Let us suppose that suitable connection has been made with the usual batteries by means of the wires 24 and 26 and that the parts of the mechanism are in the positions shown in Fig. 1. The power of the weight W now tends to turn the shaft K in its bearings, and through said shaft, the arm 13, and pawl 9, carried by said arm, to turn the ratchet-wheel 10, and thereby rotate the shaft F for actuating the usual train of wheels, and thus operate the clock in a well-known manner. During the downward movement of the weight W and the turning of the shaft K the arm 48 of said shaft engages the pawl 47, and on the further turning of said shaft the accessory weight 44 is raised through the medium of said arm and pawl. During the first period of the falling movement of the weight W the circuit-breaker or switch-arm 36 rests on the arm 33 of the shaft K and descends with said arm until it comes in contact with the catch 41, as shown in Figs. 4 and 6. The weight continuing its downward movement, the arm 33 engages the end 34 of the weighted lever 30, causing said lever to turn on its pivot and force the circuit-breaker toward the left hand until the notch 42 thereof allows said circuit-breaker to suddenly fall, when the end 37 thereof suddenly comes in contact with the spring 38, as shown in Figs. 5 and 7, and thus completes the electrical circuit. The electrical circuit having been thus completed, the weight W is quickly raised by means of the attraction of the magnet to the position shown in Fig. 1, and during the rapid upward movement of said weight the arm 33 lifts the circuit breaker, the electric circuit is broken, and the weight immediately begins to descend, as before, the pawl 9 having in the meantime re-engaged the ratchet-wheel 10. As soon as the arm 48 has passed off from the end of the pawl 47 the power of the weight 44 is added to that of the main weight, through the medium of the pawl 46, which engages the ratchet-wheel 10, as hereinbefore set forth, and during the return movement of the main weight the said accessory weight operates the mechanism, thus "bridging over" the period between the successive downward movements of the main weight.

Having thus described my invention, I claim—

1. In an electric-clock-actuating mechanism, the combination, with the clock-movement having a ratchet-wheel and with an electro-magnet and its electrical circuit, of the vibratory rock-shaft carrying the clock-actuating weight in proximity to the poles of the magnet and having a pawl engaging

the ratchet-wheel to actuate the clock-movement on the descent of said weight, and a locking-switch, substantially as described, actuated by the descending weight to close the circuit for raising the weight, substantially as described.

2. In an electric-clock-actuating mechanism, the combination with the clock-movement having a ratchet-wheel and with the electro-magnet and its electrical circuit, of the vibratory clock-actuating weight in proximity to the poles of the magnet and having a pawl engaging the ratchet-wheel to actuate the clock-movement on the descent of the weight, the contact-point, the switch-arm supported substantially as described, means for locking said arm in engagement with the contact-point, and a switch-actuating arm carried by the weight and engaging said switch-arm to unlock the same on the upward stroke of said weight, substantially as described.

3. In an electric-clock-actuating mechanism, the combination, with the clock-movement having a ratchet-wheel, of the rock-shaft carrying the clock-actuating weight and carrying a pawl engaging the ratchet-wheel, said shaft having the switch-actuating arm, the electro-magnet and its electrical circuit, and a switch mechanism in said circuit, comprising the weighted lever 30, the switch-arm 36, and the contact-point, substantially as described.

4. In an electric-clock-actuating mechanism, the combination, with the electro-magnet and its armature connected to actuate the clock-movement, of the contact-point, the fixed catch 41, the lever 30, pivotally supported on the clock-frame, the switch-arm 36, pivoted to said lever and having the notch engaging said fixed catch and constructed to contact with said contact-point when engaging said catch, and the switch-actuating arm carried by the armature between said lever and switch-arm, said switch-actuating arm operating the lever to throw the switch-arm into engagement with the contact-point and said fixed catch on the descent of the armature and to unlock the switch-arm from said catch on the raising of the armature, substantially as described.

5. In an electric-clock-actuating mechanism, the combination, with the clock-movement and with the electro-magnet and its electrical circuit, of the vibratory rock-shaft carrying the main weight in proximity to the poles of the magnet and having a pawl engaging the ratchet-wheel to actuate the clock-movement on the descent of the main weight, an auxiliary weight supported substantially as described and having a pawl engaging the ratchet-wheel, and an arm carried by the main weight and engaging the auxiliary weight to lift the same during the descending stroke of the main weight, and means for closing and interrupting the electrical circuit on the descent and raising, respectively, of the main weight, substantially as described.

6. In a clock-actuating mechanism, the combination, with the clock-movement having the ratchet-wheel, of the main weight having a pawl engaging said wheel, the smaller auxiliary weight having a pawl engaging said wheel and having the latch, the auxiliary-weight-actuating arm carried by the main weight and engaging said latch for lifting the auxiliary weight during the descending stroke of the main weight, and means for raising the descended main weight, whereby the auxiliary weight operates for actuating the clock-movement during the raising of the main weight, substantially as described.

7. In a clock-actuating mechanism, the combination, with the clock-movement having a ratchet-wheel, of the rock-shaft carrying the main weight and having the pawl engaging the ratchet-wheel and the arm 48, and the auxiliary-weight shaft carrying the auxiliary weight and having the pawl engaging the ratchet-wheel, the latch 47, and the latch-stop 52, said arm 48 engaging the latch to lift the auxiliary weight during the descent of the main weight, substantially as described.

FRED LEON GREGORY.

Witnesses:
FRANK E. BURTON,
LEWIS E. SCHUMACHER.