(No Model.)

M. MacKELLAR & G. D. WEAVER.

ELECTRIC SELF WINDING CLOCK.

No. 479,520. Patented July 26, 1892.

Fig. 1.

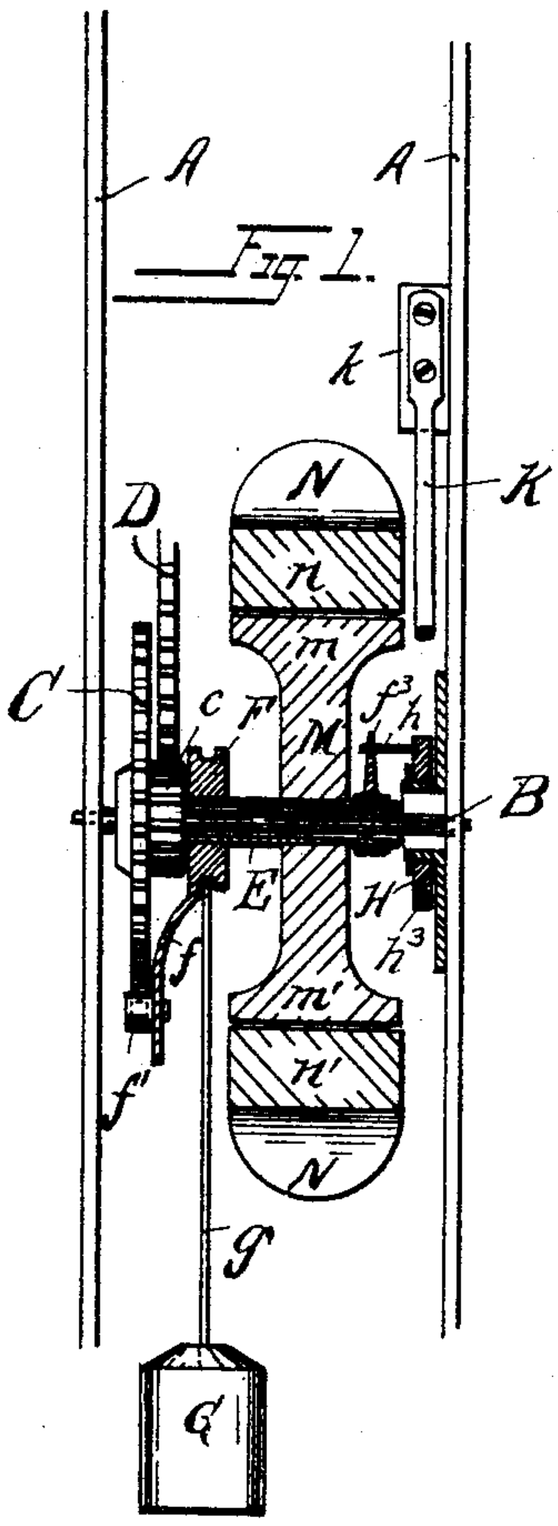


Fig. 2.

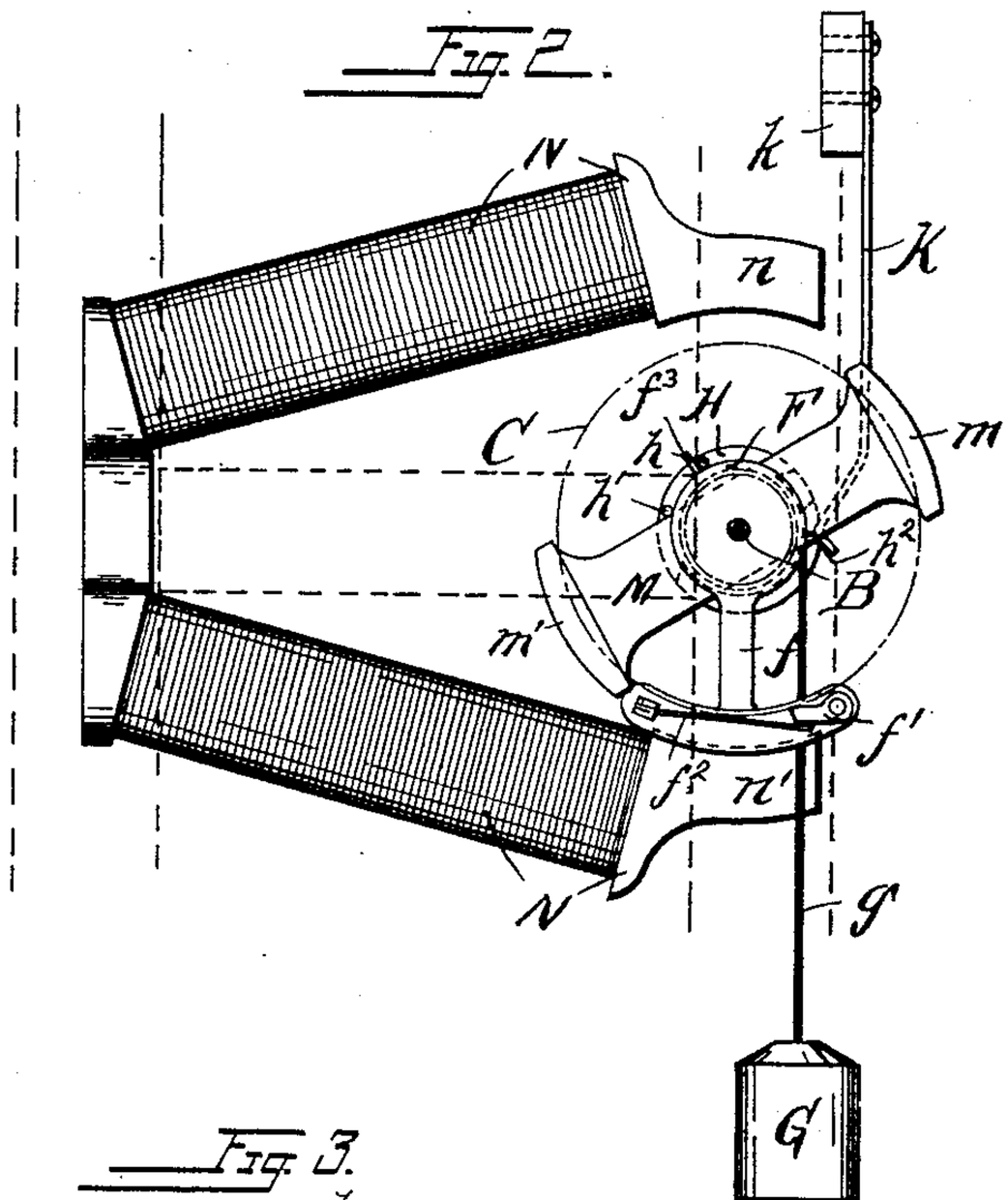
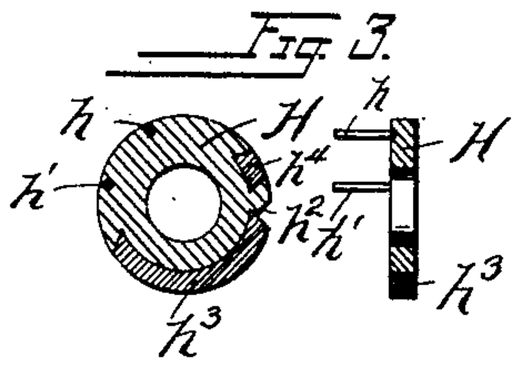


Fig. 3.



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By their Attorney

UNITED STATES PATENT OFFICE.

MALCOLM MACKELLAR AND GEORGE D. WEAVER, OF READING, PENNSYLVANIA.

ELECTRIC SELF-WINDING CLOCK.

SPECIFICATION forming part of Letters Patent No. 479,520, dated July 26, 1892.

Application filed August 12, 1891. Serial No. 402,421. (No model.)

To all whom it may concern:

Be it known that we, MALCOLM MACKELLAR, a British subject, and GEORGE D. WEAVER, a citizen of the United States, residing at Reading, in the county of Berks, State of Pennsylvania, have invented certain Improvements in Electric Winding Mechanisms for Clocks, of which the following is a specification.

The main object of this invention is to provide an electric mechanism for automatically renewing the actuating-power of a clock at regular short intervals and with a minimum tax upon the battery and which at the same time will be simple and economical in construction and applicable without material change to ordinary clock-movements; also, to incur the least possible liability of getting out of order.

The invention is fully described in connection with the accompanying drawings, and is specificially pointed out in the claims.

Figure 1 is a side elevation, partly in section, and Fig. 2 a similar front elevation, of a portion of a clock mechanism with our automatic apparatus applied thereto. Fig. 3 is a separate view of the circuit-closer.

A A represent the front and rear frame-plates of a clock-movement, and B one of the fast-running arbors journaled at either end in said frame-plates and provided with a pinion *c* and a ratchet-wheel C, both of which are fixed on the arbor. The pinion *c* meshes with a wheel D of the clock-train. Loosely surrounding the arbor B is a sleeve E, to which is secured the pulley F, from which the actuating-weight G of the clock is suspended by means of a cord *g*. An arm *f* from the pulley carries a pawl *f'*, which is pressed into engagement with the toothed edge of the ratchet-wheel C by means of a light spring f^2. An armature M is also rigidly secured to the sleeve E, with which it turns, thus swinging its opposite ends *m* and *m'* concentrically around the axis of the arbor.

N N represents an electro-magnet of horseshoe form, secured to the clock-frame and having its respective poles *n* and *n'* so arranged with respect to the armature M that the poles of the latter in swinging around the axis B will pass in close proximity to the poles of the magnet, but can never come in actual contact therewith.

A disk-shaped circuit-closer H is loosely mounted on a fixed sleeve on the bottom plate of the clock-frame, so as to turn around the axis of arbor B. A portion of its rim is insulated, as shown at h^3 and h^4, and a V-shaped notch h^2, terminating in the metal part of the disk, is provided to receive the contact-spring K in closing the circuit, as will be hereinafter described. The spring K is secured through the medium of an insulated block *k* to the bottom frame-plate of the clock. The circuit-closer is turned automatically by the sleeve E by means of a pin f^3, which projects radially from the latter and engages pins or projections *h* and *h'* on the face of the disk H, the latter pins being separated somewhat, however, so as to permit a limited movement of the sleeve and armature without moving the disk.

The connections are made between the electro-magnet and a suitable battery in such a manner that the circuit is open when the spring K rests upon the insulated portion of the circuit-closer disk H and closed when the same rests in the notch h^2, one wire from the magnet being connected to the clock-frame with which the contact-disk is in electrical connection, the other wire to the battery, and the spring K to the other battery-wire. The operation is then as follows: The weight G, through the medium of pulley F, pawl *f'*, ratchet-wheel C, and pinion *c*, actuates the clock mechanism in the usual manner until the running down of the weight has turned the armature to about the position shown in Fig. 2. By this time the circuit-closer H has been turned by the sleeve-pin f^3 pushing upon the pin *h* so far that the V-shaped end *k'* of the spring K, which has been riding upon the insulated edge h^3, drops with a firm pressure, owing to the tension of the spring from the latter into the notch h^2, thus closing the circuit and insuring very little resistance at the contact-point. The armature instantaneously turns in the field of the magnet, thus winding up the weight G and moving the pawl *f'* around the ratchet-wheel to a new point of engagement. As the armature

turns toward the magnet-poles the circuit-closer remains stationary, with the contact-spring K firmly pressed on the metal part of the notch, thus maintaining the current and the resulting pull upon the armature, while the sleeve-pin f^3 moves around into contact with the disk-pin h', which it touches slightly before the armature has reached its central position between the poles of the magnet. The movement of the circuit-closer, when the swinging armature brings the sleeve-pin f^3 in contact with the disk-pin h, immediately lifts the end k' of the spring K onto the insulating-rim h^3, thus opening the circuit and permitting the momentum of the armature to carry its ends past the magnet-poles until all its stored energy has been utilized in raising up the actuating-weight.

The insulating portion h^4 of the rim of the circuit-closer acts as a safety cut-off for the battery when the latter has run down, so as to be incapable of magnetizing sufficiently to turn the armature and raise the weight. In such case the continued descent of the weight turns the circuit-closer beyond its normal limit of movement, thus lifting the end k' of the contact-spring K onto the insulating portion h^4 and reopening the circuit, in which condition it will remain when the clock stops, and the battery will thus be untaxed until renewed. As we have applied our invention this automatic raising of the actuating-weight takes place in about every five minutes; but the interval may evidently be varied as desired. The use of the battery is only momentary, although the current, as already explained, is maintained during a considerable portion of the armature movement instead of being cut off as soon as it starts moving, as is the case with an ordinary make-and-break contact. The peculiar form and arrangement of the armature and magnet also avoids any strain or wear upon the supporting-arbor. There is no objectionable shock or noise produced by the action, inasmuch as all the energy developed is taken up in raising the actuating-weight instead of being lost in a sudden stoppage against the magnet-poles. The turning of the armature beyond the magnet-poles, due to the momentum acquired while attracted in the field of the magnet, more than doubles the effect of the battery-power used, besides preventing all objectionable shock or noise.

The mechanism is simple, compact, and inexpensive, and is applicable and easily attached to ordinary clock-movements without necessitating any material change in them.

Having thus described our invention, we do not purpose limiting ourselves to the exact construction shown; but

What we claim is—

1. In an electric actuating mechanism for clocks, the combination, with the clock-train and the electro-magnet, of the oscillating armature loosely mounted upon one of the train-arbors and attached directly to the actuating-weight and through a pawl-and-ratchet connection to the clock-train, and means for automatically making and breaking the circuit, all arranged and adapted to operate substantially as set forth.

2. The combination, with a clock-movement, of an electric actuating mechanism consisting of electro-magnet N N, armature M, carrying pulley F and pawl f' and loosely mounted on the arbor of ratchet-wheel C, circuit-closer H, with projections h and h' engaging a projection of the armature, as described, and a contact-spring K, all arranged and adapted to operate substantially as set forth.

3. In an electric actuating mechanism, substantially as described, the circuit-closer H, having insulations h^3 and h^4 with intermediate contact-surface h^2, in combination with the contact-spring K and means for automatically moving the circuit-closer, substantially as and for the purpose set forth.

4. In an electric actuating mechanism, substantially as described, the circuit-closer H, having a notch h^2 depressed below the insulated face of the circuit-closer, in combination with a contact-spring having an end k' adapted to firmly engage said notch, whereby perfect contact is secured and the movement of the circuit-closer retarded.

In testimony whereof we affix our signatures in presence of two witnesses.

MALCOLM MACKELLAR.
GEORGE D. WEAVER.

Witnesses:
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