UNITED STATES PATENT OFFICE.

CHESTER H. POND, OF BROOKLYN, NEW YORK.

SECONDARY ELECTRIC-CLOCK MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 327,897, dated October 6, 1885.

Application filed January 14, 1885. Serial No. 152,842. (No model.)

To all whom it may concern:

Be it known that I, CHESTER H. POND, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

My invention relates to the class of electric clocks which are designed to be actuated by electric currents or impulses automatically transmitted thereto from a central regulator.

The object of my invention is to provide an efficient secondary electric-clock movement which will operate reliably, and which shall complete each forward movement of the hand occasioned by the electric impulses uninterruptedly while the operations of the actuated device are silent.

In carrying out the invention the driving-wheel of the secondary clock-movement is constructed with radial teeth, and these are engaged by a driving-pawl of peculiar construction. Each time this pawl is actuated by a current transmitted to the secondary clock the wheel is advanced a distance corresponding to one tooth. The pawl consists of an arm driven to and fro in the direction of its length by the movements of the armature-lever of an electro-magnet. There is formed within this arm a narrow opening through which projects a flexible spring or supplementary arm. This spring engages a tooth of the wheel when it is driven forward, causing the tooth to ride upon the spring through the opening in the arm. During the subsequent movement of the arm in the opposite direction the tooth is thus caused to pass above the upper surface of the arm, instead of falling back through the opening. In this manner each movement of the armature causes the wheel to advance a predetermined distance, and it is retained in this advance position by a suitable retaining-pawl. The armature-lever of the electro-magnet is carried upon an armature which is pivoted upon an axis parallel to the line of the poles of the electro-magnet. Normally the armature is retained at one side of the electro-magnet by a suitable spring, and it is drawn into a position above the same when the magnet is vitalized. It does not, however, come into contact with the poles of the magnet, neither is it arrested by a contact-stop, for the reason that it will be prevented from passing beyond the poles of the magnet by the attraction of the magnet itself.

Armatures presenting a greater width of surface than the poles of the magnet to which they are applied, have been employed in electric-clock movements; but for the purposes of this invention it is necessary that the edge of the armature presented should be of less sectional area than the poles to which it is presented that it may be caused to stop more quickly and certainly when moved by the attraction of the magnet.

In the accompanying drawings, Figure 1 is a front elevation, and Fig. 2 a side view of the clock-movement. Figs. 3 and 4 illustrate the construction of the driving-pawl.

Referring to the drawings, A represents the driving-wheel of a secondary clock-movement, and A′ the intermediate mechanism for causing the hands to move with the required relative rapidity. For the purpose of driving the wheel A an electro-magnet, B, is employed. This electro-magnet is designed to be included in a main-line circuit, which is equipped with a transmitting device actuated by a central regulator, or in any other convenient manner. The electro-magnet B is provided with an armature, *b*, upon which there is carried a lever, C. The armature is pivoted at points *c c* in such a manner that it will move in the arc of a circle toward and away from the poles of the electro-magnet, the edge of the armature being presented thereto. The armature and its lever are normally retained in the position shown in Figs. 1 and 2, away from the poles of the magnet, by means of a spring, *d*, applied to the armature-lever. When, however, the electro-magnet is vitalized, the armature will be drawn into the position shown in dotted lines and caused to stop directly above the poles of the magnet by the attraction which the latter exerts. The advance movement of the armature-lever therefore requires no limiting-stop, but it will stop in its advanced position each time the electro-magnet is vitalized. A suitable limiting-stop, *e*, is applied to the lever, however, for regulating its movements in the opposite direction, and this stop is preferably pro-

vided with a cushion or pad, e', for rendering the movements of the armature-lever as silent as possible.

Upon the lever there is carried an extension, F, which lies in a direction parallel with the axis of the driving-wheel A, or at right angles to the teeth of this wheel. This extension is flanged, and has an aperture, f', formed in the flange, and through this aperture there extends an arm, f^2. The extension F extends into such proximity to the wheel A that one of the teeth a will be engaged by the arm f^2 when the armature-lever is drawn into its forward position. The end of the arm f^2 turns downward a sufficient distance to insure its passing under the tooth and causing the wheel to be gradually moved forward, so that the tooth itself rides upon the spring passing through the aperture f' to the upper surface of the extension F. The return movement of the armature-lever is designed to cause the tooth, which has thus been passed through the opening f', to pass along the upper surface of the extension F, while a second tooth, a, will be brought into position to be engaged by the next succeeding forward movement of the lever. This may be permitted by constructing the arm f^2 of resilient material, so that it will bend upward slightly as the armature-lever is pushed backward, thus permitting it to pass by the second tooth a; but, preferably, it is pivoted at a point, f^3, to the extension F, and a supplemental spring, g, is employed for normally pressing the arm f^2 down, and the succeeding tooth, by striking against the arm, presses it upward against the resilience of the spring g.

For the purpose of insuring that the tooth which has thus been carried to the upper side of the extension F shall not return through the opening f', a retaining-pawl, g', is applied to the wheel A and this pawl engages the successive teeth of the same.

It will be observed that any retrograde movement of the driving-wheel A is effectually prevented by this organization; also that the complete forward movement of the clock mechanism is obtained at the beginning of each impulse—that is to say, before the return movement of the armature-lever—thus affording a much more desirable clock-movement than those in which the advance is made partially during the forward movement of the lever and partially during its retrograde movement. At the same time the movements of the mechanism are silent—another very desirable feature in secondary clock-movements.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, with the driving-wheel of an electric clock, of an electro-magnet, its armature and armature-lever for actuating the same, which armature is supported from an axis parallel to and presents a surface of less width than the polar extremities of the electro-magnet and moves in an arc of a circle tangent to the line of said poles.

2. The combination, substantially as hereinbefore set forth, with the driving-wheel of a clock-movement, of an electro-magnet, its armature presenting a polar surface of less width than the poles and moving in an arc tangent to the line of the poles of said electro-magnet, and a driving-pawl for said driving-wheel moving in a direction at right angles to the teeth of the same.

3. The combination, substantially as hereinbefore set forth, with the driving-wheel of an electric clock, of an electro-magnet, its armature and armature-lever, and a driving-pawl consisting of an arm actuated by said armature-lever and having formed therein an opening through which extends an arm whereby a tooth of said wheel is engaged by each movement of the same in a given direction, substantially as described.

4. The combination, substantially as hereinbefore set forth, of an electro-magnet, its armature and armature-lever, the driving-wheel of a clock-movement, and a pawl for engaging the same, which pawl consists of an arm having formed therein an opening, and an arm extending beneath said opening, which, when driven in one direction, advances a tooth of said wheel to and through said opening, and when driven in the opposite direction permits a tooth to pass beneath the spring, substantially as described.

5. The combination, substantially as hereinbefore set forth, of the electro-magnet, its armature-lever, the extension F, having the opening f' and the arm f^2 and the spring g, and the driving-wheel A, organized substantially as described.

In testimony whereof I have hereunto subscribed my name, this 31st day of December, A. D. 1884.

CHESTER H. POND.

Witnesses:
DANL. W. EDGECOMB,
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(No Model.)

C. H. POND.

SECONDARY ELECTRIC CLOCK MOVEMENT.

No. 327,897. Patented Oct. 6, 1885.

Fig. 1.

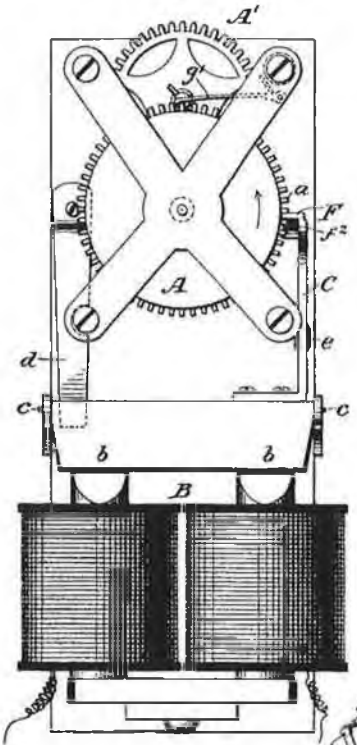


Fig. 2.

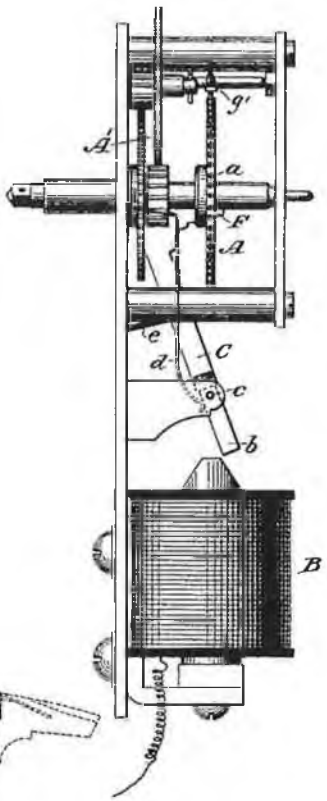


Fig. 3.

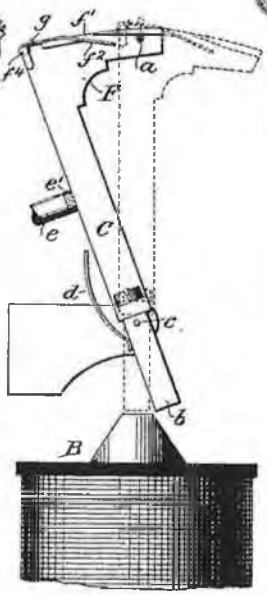
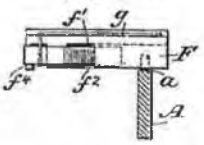


Fig. 4.



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