(No Model.)

A. W. GRAY.

ELECTRIC CLOCK ESCAPEMENT.

No. 274,445. Patented Mar. 20, 1883.

Fig. 2.

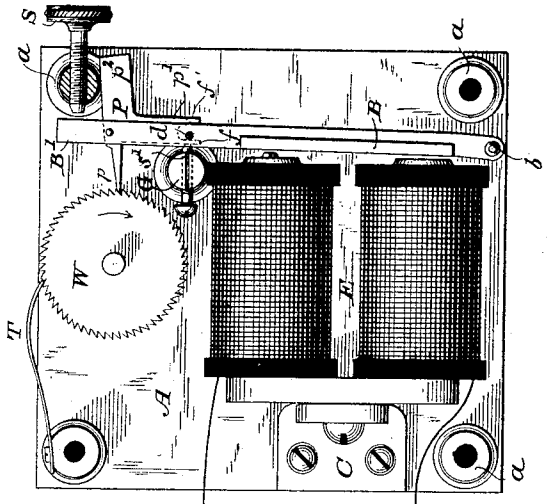
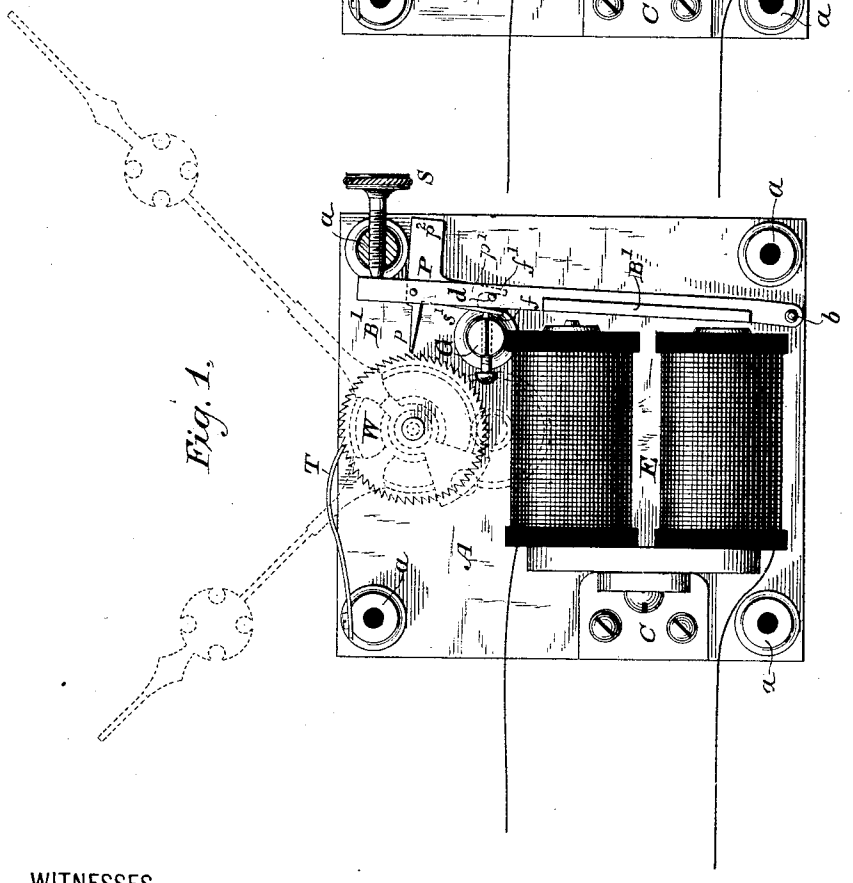


Fig. 1.



WITNESSES

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UNITED STATES PATENT OFFICE.

ADELBERT W. GRAY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE TIME TELEGRAPH COMPANY, OF SAME PLACE.

ELECTRIC-CLOCK ESCAPEMENT.

SPECIFICATION forming part of Letters Patent No. 274,445, dated March 20, 1883.

Application filed January 2, 1883. (No model.)

To all whom it may concern:

Be it known that I, ADELBERT W. GRAY, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Electro-Magnetic Escapements for Clocks and other Purposes, of which the following is a specification.

My invention relates to the actuating or propelling mechanism, whereby an intermittent progressive movement is imparted by the armature of an electro-magnet to a toothed wheel—as, for example, in the case of electric time-pieces which are operated by means of successive electrical impulses transmitted at regular intervals through an electric circuit in which the time-piece is included—by means of circuit closing or breaking mechanism governed by a standard time-piece, or regulator, or other suitable means.

The object of my invention is to provide a method of propelling an electric time-piece or other like mechanism by a comparatively small expenditure of electro-magnetic power, and also to insure the accurate working of said mechanism.

My invention consists in the construction and arrangement of a pawl for propelling a ratchet-wheel by the action of an electro-magnet and armature, or by other suitable means, hereinafter more particularly described, and claimed at the end of this specification.

In the accompanying drawings, Figure 1 is a view in elevation of my invention as applied to an electric clock, the armature being drawn away from the electro-magnet; and Fig. 2 is a similar view, showing the armature when attracted by said electro-magnet.

In the figures, A is a supporting frame or plate, having posts *a a a a* for connecting it with a similar plate in front of the electro-magnet, the latter plate not being shown in the drawings.

E is an electro-magnet, secured to the plate A by means of the angular metallic piece C, preferably of non-magnetic metal. A soft-iron armature, B, is carried upon a lever B′, pivoted at *b* to the supporting-frame A. The movement of this lever away from the electro-magnet E is limited by an adjustable screw, S, mounted upon one of the posts, *a*. The armature-lever B′, is slotted or forked at its free end, and within or between the two prongs thus formed is loosely pivoted an L-shaped lever, P. One arm, *p*, of this lever extends into proximity to the periphery of a toothed wheel, W, and constitutes a pawl adapted to engage the same, when carried forward in a radial direction with reference to the wheel, under the influence of the attraction exerted by the electro-magnet E upon the armature B. The remaining arm *p′*, of the lever P normally extends in a direction approximately parallel with the armature-lever B′, being held in that position through the influence of a counterpoise or extension, p^2, for which a spring may be substituted, if preferred. When, however, the arm is carried forward by the movement of the lever, it impinges upon the adjustable stop *s′*, carried in a support, G, extending from the frame A. A further movement of the armature-lever B′ toward the poles of the magnets will thereupon cause the extremity of the arm or pawl *p* to be carried downward in a direction tangential to the wheel W, and at right angles to its original direction. For the purpose of limiting the movements of the L-shaped lever P the lower extremity of the arm *p′*, is provided with two fingers or prongs, *f* and *f″*, between which extends a stop, *d*, rigidly affixed to the armature-leve B′.

When the electro-magnet E is not vitalized the armature B is held away from its poles by means of a suitable retractile spring, (not shown,) or by gravity, as indicated in Fig. 1. The weight p^2 at the same time causes the prong *f″* to rest against the detent *d*, thereby maintaining the arm or pawl *p* in its upward position. When, however, an electric current or impulse is transmitted through the electro-magnet E, the armature B will be attracted toward the poles of the electro-magnet, causing the armature-lever B′ to advance and the extremity of the pawl *p* to enter in a radial direction one of the spaces between the teeth of the wheel W, as shown in Fig. 2. In the course of the forward movement of the armature-lever B′, and immediately after the pawl has entered one of the spaces in the periphery of the wheel, the arm *p′* is brought into con-

tact with the end of the screw *s'*. The extremity of the pawl *p* is thereupon forced downward in a tangential direction in the manner already described, thereby causing the wheel W to be advanced through the space occupied by one tooth. When the armature is released at the termination of the impulse the armature-lever B' and the L-shaped lever P will resume their normal positions; but the wheel W will be retained in its new position by means of a suitable dog or click, T, adapted to engage its successive teeth in a well-known manner.

It will be evident from the foregoing description that by transmitting a series of successive impulses through the electro-magnet E at proper intervals an intermittent advance movement may be imparted to the wheel W, and by means of a proper system of time-distributing wheels—such as shown in dotted lines in the drawings—the hands of a time-piece may be moved in front of a dial and the correct time indicated in the usual manner.

It will be obvious that the electro-magnet may, if desired, be situated upon the opposite side of the armature from that shown in the drawings, the armature being so mounted as to be drawn away from the poles of the electro-magnet when the latter is not vitalized by means of gravity or other retracting force, and thereby causing the extremity of the pawl to normally rest within one of the indentations between the teeth of the wheel. By this reverse arrangement of the electro-magnet and armature the latter withdraws the pawl from the toothed wheel when attracted by the electro-magnet, and the successive engagements of the pawl with the toothed wheel is caused by a series of interruptions in the current.

I do not desire to limit myself to the employment of my invention in connection with a time-piece merely, as it is evident that it may be adapted to many other devices in which a ratchet-wheel propelled by a pawl is employed, especially when the power is derived from an electro-magnet.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of a toothed wheel, a pawl for propelling said wheel, and mechanism, substantially such as described, for first moving said pawl in a radial direction into engagement with the teeth of said wheel, and thereafter in a tangential direction to impart to said wheel progressive movement upon its axis.

2. The combination, substantially as hereinbefore set forth, with a toothed wheel, of an armature, an electro-magnet for moving said armature, a pawl pivoted to said armature, and constructed to engage the successive teeth of said wheel when said lever is actuated in one direction, an arm connected with said pawl, and a contact against which said arm is caused to impinge when said pawl has engaged said teeth, thereby causing said pawl to turn upon its pivot during the further advance of said lever and to actuate said wheel.

3. The combination, substantially as hereinbefore set forth, of a toothed wheel, an armature, an electro-magnet for moving said armature, a pawl pivoted to said armature, an arm attached to said pawl, means, substantially such as described, for turning said pawl upon its pivot by means of said arm, and a stop for limiting the movements of said arm with reference to said armature-lever.

4. The combination, substantially as hereinbefore set forth, with a toothed wheel, of a pivoted pawl, means for causing said pawl to engage the successive teeth of said wheel, an arm attached to said pawl, a stop against which said arm is caused to impinge when said pawl engages any one of said teeth, thereby communicating a rotary movement to said wheel through said pawl, and a counterpoise normally opposing said arm to said stop.

In testimony whereof I have hereunto subscribed my name this 30th day of December, A. D. 1882.

ADELBERT W. GRAY.

Witnesses:
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MILLER C. EARL.