N° 4889 A.D. 1911

(*Under International Convention.*)

Date claimed for Patent under Patents and Designs Act, 1907, being date of first Foreign Application (in France), 1st Mar., 1910

Date of Application (in the United Kingdom), 27th Feb., 1911

At the expiration of twelve months from the date of the first Foreign Application, the provision of Section 91 (3) (a) of the Patents and Designs Act, 1907, as to inspection of Specification, became operative

Accepted, 25th Jan., 1912

COMPLETE SPECIFICATION.

Improvements in Electric Clocks.

I, CHARLES FÉRY, of 42, rue Lhomond, Paris, France, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electric clocks of the kind in which an impulse is imparted by means of a spring to the controlling member, a pendulum or balance wheel, during each swing or semi-vibration thereof, the amplitude of the impulse being independent of the voltage of the driving battery of an associated electrical device employed for restituting the energy expended in imparting the impulse, it consists in improved construction whereby the controlling member receives the impulse immediately after it has passed the middle point of each swing, and swings freely during the remaining portions thereof.

Examples of the invention are shown in the accompanying drawings in which the two figs. represent diagrammatically different constructions according to the invention, in Fig. 1 the controlling member is a pendulum and in Fig. 2 a balance wheel.

In Fig. 1 the pendulum A suspended at O has above its bob M a small roller *a* which, when the pendulum is passing the middle point of its swing and is in a vertical position, bears against a finger *b* carried by the spring lever H, which normally rests against the stop *v*. When the pendulum passes its vertical position the spring is displaced by the roller *a* which comes into contact with the finger *b*. The end *q* of the spring H is thus brought against the end *s* of the armature D of an electromagnet E. The attraction of the armature bends the spring H upwardly thereby causing the finger *b* to bear upwardly against the roller *a* on the pendulum, giving rise to a tangential component which imparts energy to the pendulum tending to push it upwardly after it has passed its vertical position, so that the pendulum which has performed work in displacing the spring receives more energy than that which is expended for the purpose, after it has passed its vertical position. As soon as the pendulum has passed the vertical position the pendulum becomes free of the finger *b*, the circuit is broken and the spring returns to its normal position against stop *v*.

The same events occur as the pendulum returns through its vertical position,

[*Price 8d.*]

so that the pendulum receives an impulse at each half oscillation without suffering any ineffective blow.

Instead of the electromagnet E there may be used an electromagnet, with a core of magnetic steel, and iron core or a magnet attracted by a solenoid or any other equivalent device.

The armature D may control a clockwork, for instance by means of a pawl correlated with it driving a ratchet wheel *k* held from revolution in the opposite direction by a suitable detent.

If the invention is to be applied for transmitting indications of time, an electric contact may be mounted on the escape wheel which performs its revolution in one minute.

If the invention is to be used for actuating synchronised receivers, a supplementary electric contact may be mounted on the lever H which moves every second or fraction of a second according to the length of the pendulum. No clockwork is required in this case.

In Fig. 2, which is a plan, the invention is applied to the control of a balance wheel having a spiral spring, and which may be employed for instance, in an electric chronometer which may be used as a self-controlled clock or as a transmitter for controlling electric receivers.

The pivot of the balance wheel A carries in a plane above or below that of the wheel, a projection or a small roller *a* balanced by a weight J; as the roller passes the dead point (the position of equilibrium) it bears against the spring I and thus closes the circuit of an electromagnet E. The spring I being put in tension by the roller *a* gives rise to a tangential force adapted to maintain the oscillation of the balance wheel A. In this manner the full oscillation of 360° (180° on each side of the dead point) which is necessary for the satisfactory working of the system, may be obtained. The armature D of the electromagnet which drives the system controls the clockwork or distributes current through a device not shown. The balance wheel A carries two weights u, u^1 which can be fixed in position by means of screws to vary the effective lengths t, u and t^1, u^1.

Instead of the roller carried by the rectilinear pendulum or the balance wheel, there may be used if desirable a jewel, such as an agate, ruby or sapphire, or a piece of polished steel or the like cut to a convex profile; but this arrangement entails more friction.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an electric clock of the character referred to, the construction, wherein the controlling member, a pendulum or a balance wheel, receives the impulse immediately after it has passed the middle point of each swing and swings freely during the remaining portions thereof.

2. In an electric clock as claimed in Claim 1, the construction wherein a roller on the controlling member bears against the spring which, when it has been bent by the controlling member and has closed an electric circuit so as to energise an electromagnet, is bent in the opposite direction by the action of the energised magnet, and thus imparts the impulse to the controlling member.

3. In the construction claimed in Claim 2, the modification wherein the roller carried by the controlling member, whether a pendulum or balance wheel, is replaced by a member of hard stone or steel, substantially as described.

4. In an electric clock as claimed in Claims 2 and 3 actuating the escape wheel of the clockwork for moving the hands of the clock, by a pawl carried by a rod operated by the electric magnet, substantially as described.

5. In combination with the construction claimed in the preceding claims, means for electrically transmitting at a distance indications of time comprising an electric contact placed on an escape wheel forming part of the clockwork for

actuating the hands, and adapted to close periodically an electric circuit for the transmission of an impulse, substantially as described.

6. In combination with the constructions claimed in Claims 1—4 means for actuating synchronised receivers comprising a supplementary contact on the spring lever, which beats each second or a fraction of a second according to the length of the controlling pendulum, substantially as described.

7. In the constructions claimed in Claims 1—6 the arrangement of the driving magnet or the like between the pendulum or the balance wheel, and the clock-work for moving the hands, substantially as described.

Dated this 27th day of February, 1911.

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Fig. 1

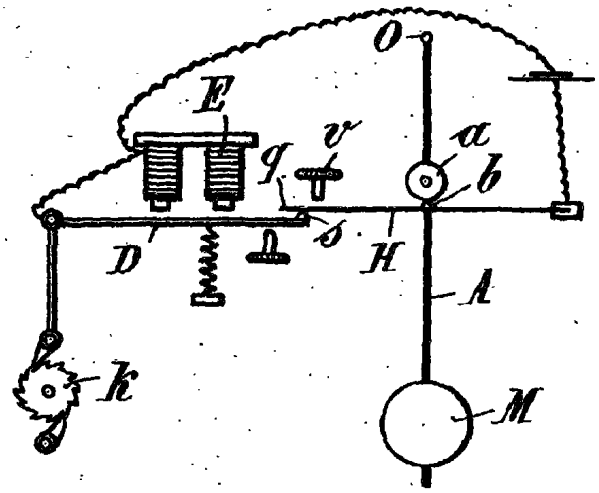
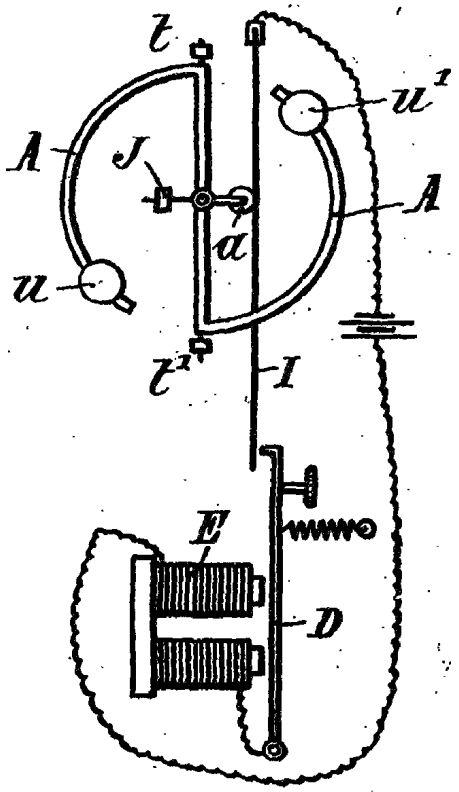


Fig. 2



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