

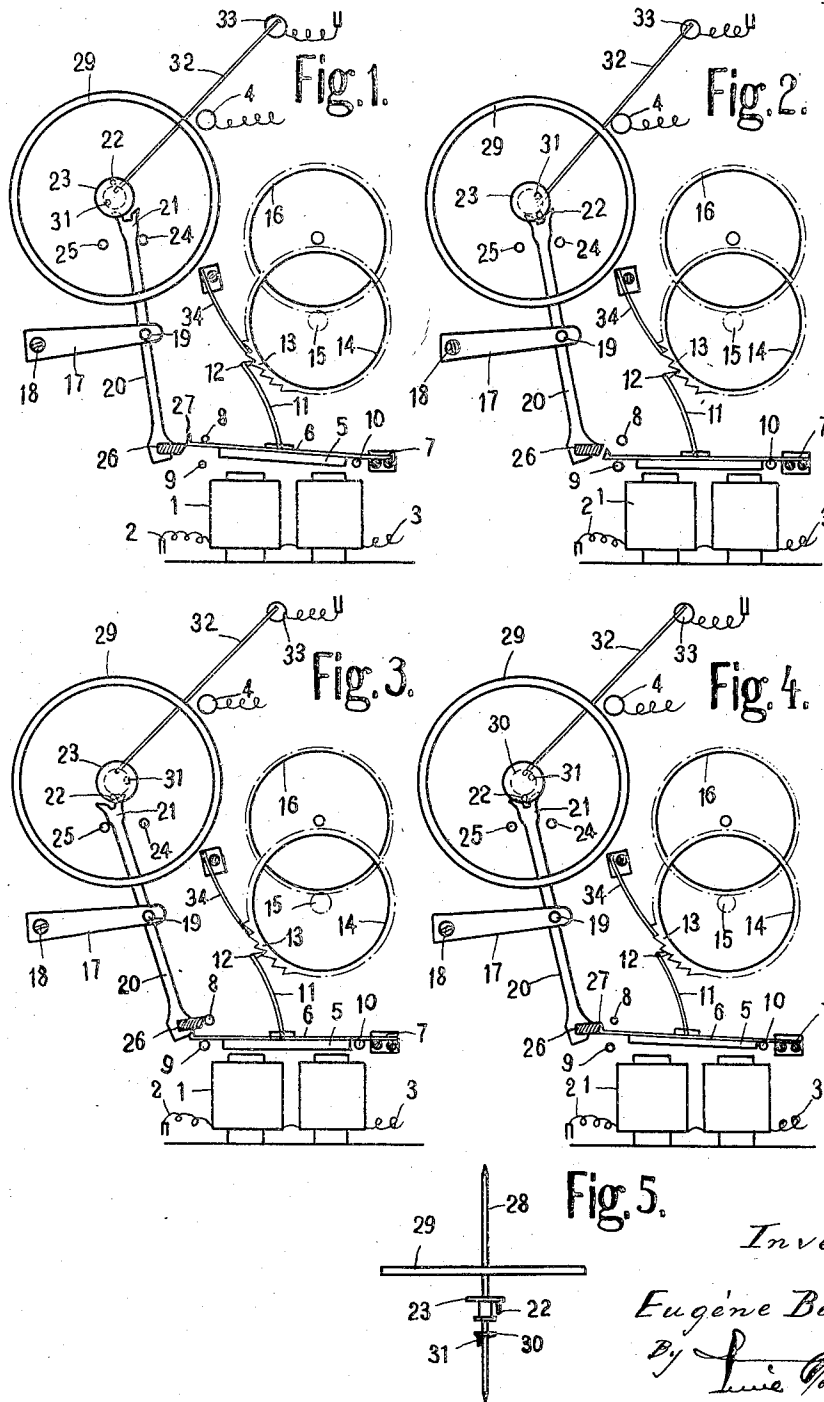
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E. BUTTICAZ

ELECTRICAL CLOCKWORK

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Inventor:

Eugène Buttica

By *Luis P. Pinheiro*
Attorney.

UNITED STATES PATENT OFFICE.

EUGÈNE BUTTICAZ, OF CORCELLES, SWITZERLAND.

ELECTRICAL CLOCKWORK.

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The present invention relates to a clock-work especially designed for motor cars including an electro-magnet the armature of which operates directly the hands of the clock. This clock-work differs from those hitherto known in that the armature of said magnet keeps going a regulating device which controls the period of the oscillations of said armature.

The armature of this electro-magnet preferably cooperates with a lever escapement having at least one pallet stone in order to keep the balance wheel going.

The annexed drawing represents one working example of an electric clock-work according to the present invention. Figures 1, 2, 3 and 4 thereof are plan views showing different positions of the operative parts.

Fig. 5 is a detail view of the balance shaft. An electro-magnet 1 is electrically connected by a wire 2 to one terminal of a source of current and a wire 3 leads to a contact 4 for a purpose explained hereafter. This electro-magnet has a soft-iron armature 5 attached to a plate spring 6 held by a support 7 arranged on the plate of the clock.

The throw of the armature is limited by banking pins 8 and 9 and a further banking pin 10 is provided on the plate in proximity to the support 7 for the purpose of increasing the tension of spring 6 for a given position of the armature. This armature carries a light plate spring 11 having a tooth 12 engaged with the teeth 13 of a ratchet 14. This wheel 14 is rigidly connected with a pinion 15 gearing with a third wheel 16 which moves the hands of the clock by means of a center wheel not shown.

A strap 17 fastened by means of a screw 18 to the plate carries perpendicularly to the plate a stud 19 which forms the pivot of the pallet 20 of the regulator. This pallet is shaped to have at one end the usual fork 21 adapted to cooperate with a pin 22 fast on a disk 23 while a safety pin fastened to another disk prevents disk 23 from overrunning. The banking pins of the pallet are designated 24 and 25. The pallet 20 is provided at its other end with a single pallet stone 26 shaped so as to cooperate with a tooth 27 at the end of plate spring 6 in the same way that the pallet stone of the usual lever arm of an escapement cooperates with the escape wheel.

A disk 30 is secured to the axle 28 of the

balance 29 and is provided with a pin 31 for cooperation with a plate spring 32. This spring is supported by a stud 33 fixed to the clock plate and said stud has connected to it the other terminal of the electric circuit wherein the source of current and the electro-magnet 1 are included.

Another plate spring 34 engages with the teeth of ratchet 14 so as to prevent any return movement of the same.

The working of the clock-work represented is as follows: In the position shown in Fig. 1 the circuit is interrupted and the balance 29 is at rest. After having imparted to this balance an impulse in a clockwise direction pin 31 engages with the plate spring 32, and moves the latter into contact with the contact 4 at the very moment when the pin 22 is between the prongs of fork 21 whereby the circuit of the electro-magnet is closed. The armature 5 will be attracted and spring 6 be bent and moved until it contacts with banking pin thus turning the ratchet one tooth. This is the position of parts in Fig. 2.

The balance continues to oscillate and pin 22 will swing the pallet fork further to the left. At the moment when pin 22 leaves the fork 21, spring 32 snaps from beneath pin 31 and causes an instantaneous opening of the circuit and a complete release of the balance. The latter continues its clockwise movement; and since the armature 6 is released, tooth 27 will strike and bear against the pallet stone 26 in the same way as a tooth of a pallet wheel would act. This position is given in Fig. 3.

The balance spring (unillustrated) having now consumed the impulse received by the balance wheel, the return oscillation of the wheel will begin and introduces pin 22 again between the prongs of the fork in an anti-clockwise direction so as to return the pallet 20 and to cause tooth 27 to glide over the bevelled face of the pallet stone. This movement of tooth 27 gives to the balance the required new impulse for its further movement because the tension of spring 6 momentarily increased by pin 10 acts on the balance by means of fork 21. This position is represented in Fig. 4.

When the pin 31 meets with plate spring 32 during the said return movement of the balance, this spring will be bent to the other side and the circuit will not be closed there-

by. Then the spring 32 will snap off said pin so that when the pallet again bears on pin 24 the parts will have again assumed the position according to Fig. 1, with the difference that the unillustrated spiral spring of the balance is now bent and needs no further impulse, so that it will return the balance and cause the play of the parts to be repeated.

It must be remarked that none of the parts of this regulator are included in the circuit, and that the power transmitted at each second half-oscillation of the balance is constant owing to the always-uniform bending of spring 6 which is independent of any variation of voltage of the source of electricity; also the balance, not being connected to the gears of the movement, is not influenced by any frictional conditions or other changes. Said parts are, therefore, perfectly free to move and are not influenced by resistances, as is ordinarily the case in other clocks. This feature is very important for the regulating facilities of the clock-work.

The opening of the circuit by the action of spring 32 and of contact 4 is instantaneous and the sparking will be reduced to a minimum. But any traces of such sparking could be avoided by inserting a condenser.

The pallet 20 could be provided with a plurality of pallet stones and the armature of the electro-magnet could by suitable means work alternately on those stones. Then it would be possible by means of a great number of contacts to give an impulse to the pallet at each swinging of the balance.

I claim as my invention:

1. In an electric clock, the combination, with a regulator comprising a balance wheel and a pallet; of an electro-magnet provided with an armature; a spring disposed to maintain the armature uplifted; means controlled by the armature through the pallet and the tension of the spring for keeping the balance wheel going; and means dependent on the regulator for maintaining the period of the oscillations of the armature.

2. In an electric clock, the combination of an electro-magnet provided with an armature, a balance, a forked pallet for regulating the balance, a pallet-stone at the end of the pallet, and a catch operated by the armature for engagement with the pallet-stone to impart an impulse to said pallet.

3. In an electric clock, the combination of an electro-magnet provided with an armature; a spring disposed to maintain the armature in uplifted position; a bevelled catch located adjacent the end of said armature and uplifted by the action of the spring; a balance; and a regulator comprising a pallet provided with a stone having a bevelled face which is adapted to be engaged by the uplifted catch in order to re-

ceive an impulse depending solely on the tension of said spring.

4. In an electric clock, the combination of an electro-magnet provided with an armature; a balance wheel; a pallet having a stone at the end thereof; a catch at the end of the armature adapted to engage the pallet stone; a pair of spaced contacts; an electric circuit wherein the two contacts and the magnet are included; and means operated by the balance wheel for bridging said contacts and thereby closing the circuit after every two throws of the pallet.

5. In an electric clock of the kind described, and in combination, an electro-magnet provided with an armature, a balance, a forked pallet, a pallet stone at the end of said pallet, a catch at the end of said armature adapted to engage said pallet stone, a blade spring extended from one terminal of the electric circuit of the electro-magnet, a contact banking pin constituting the other terminal, a disc rigidly connected with the hub of said balance, one pin adapted to engage said blade spring in order to establish contact and to close the circuit of the electro-magnet at the end of two throws of the pallet.

6. An electric clock, according to claim 3, in which the spring is associated directly with the armature, and the catch is provided on the end of the spring.

7. In an electric clock, the combination, with a regulator comprising a balance wheel having a pin associated therewith, and a pallet having a fork for coaction with the said pin; of an electro-magnet provided with an armature; a spring disposed to maintain the armature uplifted; means controlled by the armature through the pallet fork and pin and the tension of the spring for keeping the balance wheel going; and means dependent on the regulator for maintaining the period of the oscillations of the armature.

8. In an electric clock, the combination, with a regulator comprising a balance wheel and a pallet; of an electro-magnet provided with an armature; means controlled by the armature through the pallet for keeping the balance wheel going; a normally-open circuit wherein the magnet is included; and means controlled by the balance wheel for periodically closing said circuit.

9. In an electric clock, the combination, with a regulator; of an electro-magnet provided with an armature; a normally-open electric circuit wherein the magnet is included; a spring normally holding the armature uplifted and adapted to be flexed when the circuit is closed; means dependent on said armature and spring for keeping the regulator going; and means dependent on the regulator for periodically closing said circuit.

10. In an electric clock, the combination, with a regulator; of an electro-magnet provided with an armature; a pawl carried by the armature; a gear engaged by said pawl and rotating the cannon pinion of the clock for transmitting the movements of the armature to said pinion; means controlled by the armature for keeping the regulator going; and means dependent on the regulator for maintaining the period of the oscillations of the armature. 10

In testimony whereof I affix my signature.

EUGÈNE BUTTICAZ.