PATENT SPECIFICATION

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Complete Accepted: Sept. 25, 1930.

COMPLETE SPECIFICATION.

Improved Means for Stopping the Clocks of Electric Clock Installations.

We, LANDIS & GYR S.A. of Hofstrasse 1, Zug, Switzerland, a body corporate organised and existing under the laws of Switzerland, 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:—

Arrangements are already known for use in electric clock installations, by means of which the secondary clocks are stopped automatically whilst the master clock is being set. Such arrangements are used in cases where the clock installation is fitted in ships or vehicles travelling between a plurality of places far apart from one another on the surface of the earth, for example, on seagoing ships, and where consequently from time to time a setting of the clock installation to the instantaneous position of the ship or vehicle relatively to the stars is usual (local time).

In the known arrangements of this kind the stoppage of the secondary clocks is effected by interrupting their circuits during the time in question.

These arrangements have the disadvantage that when employing the so-called polarised secondary clocks, which are generally used at the present time, the first current impulse occurring on the switching in again of the secondary clocks frequently does not have the correct direction, so that (with the circuit being closed every minute) the secondary clocks stop during one current impulse, i.e. one minute too long, which has for its result a displacement in respect of time in the operation of the secondary clocks relatively to the master clock, that is to say, lack of synchronisation.

This invention has for its object to obviate the disadvantage above mentioned and relates to a stopping device for electric clock installations wherein by allowing the hands of the master clock to remain at rest throughout the time of this stoppage the production of an electromotive force in the circuit of the secondary clocks is prevented.

According to this invention the train of gearing of the master clock can be disconnected for a definite period at any desired time from the means whereby the production of an electromotive force in the secondary clock circuit is controlled, such means being in operative connection with the hands of the master clock, whereby the hands of the secondary clocks move in synchronism with the ordinary hands of the master clock.

The accompanying drawings show diagrammatically and by way of example three constructional forms wherein all parts which have nothing to do with the essential feature of the invention are omitted.

Figure 1 shows the first example of construction in elevation, and

Figure 2 shows the same in plan.

Figure 3 shows the second example of construction in elevation, and

Figure 4 is again a plan thereof.

Figure 5 shows the third example of construction in elevation, and

Figure 6 again shows the same in plan.

In all three examples of construction 1 is a setting back or stopping hand, which is movable over a scale 2 having a graduation in minutes and which is driven through gear wheels 3 and a friction coupling 4 from the movement (not shown in the drawings) of the master clock. Likewise in all three examples of construction there is in common the arrangement of the hands 5, 6 of the master clock which is driven through a train 7 of three wheels from the setting back hand 1, in which arrangement the minute hand 5 of this pair of hands moves similarly and in the same direction as the setting back hand 1.

In the first form of construction the gear wheel of the train of gears 7 mounted loosely on the arbor of the setting back hand 1 is fixed to a wheel 8 having sixty teeth and a pin 9 fixed on the ratchet wheel 8 serves as an abutment for the setting back hand 1 for carrying along the hands 5, 6 during the normal operation of the clock installation. Against the toothed periphery of the ratchet wheel 8, there rests a pin 10 on one arm of a bell crank lever 11 which lever is capable of turning about the shaft 12, and is acted

upon by a spring 13.

The other arm of the bell crank lever 11, has two stop pins 14, 15, arranged at an angle relatively to one another, with which coacts the fly 16 of a pivoted inductor 17 such as is already known for producing current impulses in master clocks for the purpose of synchronously driving the connected secondary clocks. Such secondary clocks are indicated at 18.

On the arbor of the setting back hand 1 there is mounted a detent wheel 20 under the action of a friction coupling 19, in which wheel there engages a pawl 21 mounted on the ratchet wheel 8.

In the normal operation of the clock installation the setting back hand 1 carries with it both the hands 5, 6, of the master clock and also the ratchet wheel 8. In this operation by the oscillatory movement of the bell crank lever 11, the pin 10 of which slides alternately on the back of a tooth of the wheel 8, and falls into a tooth space of such wheel, by means of the fly 16 the inductor magnet swings to and fro every minute in the usual manner and consequently sends an alternating current impulse into the secondary clocks 18, which moves these clocks synchronously with the master clock.

If now the clock installation is stopped, the setting back hand 1 is moved back over the scale 2, for the corresponding time in a counter-clockwise direction in which operation the friction clutch 4 comes into action. By this means the ratchet wheel 8 is carried along under the action of the detent wheel 20 and the feed pawl 21, until the pin 10 reaches the root of the tooth on the side of which it lay during the backward movement of the setting back hand, whereupon the friction clutch 19 comes into action and the ratchet wheel 8 is stopped by the pin 10 i.e. the inductor 17 and the hands 5, 6, of the master clock are brought to rest.

The movement of the master clock then drives the setting back hand 1 alone until the time through which the clock is to be set back has expired, at which moment the hand 1 again comes to rest against pin 9 and in its further rotation brings the various hands of the installation into movement again.

In the second example of construction it is assumed that the secondary clocks 18 are driven by the current from a battery 22. Here the wheel of the train 7 mounted loosely on the arbor of the setting back hand 1 is fixed to a gear wheel 23 which drives a commutator 24. The latter has a contact 25 for each conductor of the mains supplying the secondary clocks, which contact coacts with a brush or sliding contact 26 of the said conductor and when it makes contact it connects the mains supplying the secondary clocks through the battery 22.

To the setting back hand 1 there is rigidly connected an arm 27 which carries a pin 28 and coacts with a pin 29 on the gear wheel 23.

In the gear wheel 23 there is rotatably mounted a shaft 30 on which are fixed an arm 31 and a lug 33 bent to form a stop 32. On the shaft 30 there is loosely mounted a segment piece 34 which passes between the pin 28 and the stop 32 and is acted upon by a torsion spring 35 arranged around the shaft 30.

The arm 31 is acted upon by a spring 36 and coacts by means of a pin 37 with a setting wheel 38, which wheel has sixty teeth and is fixed to one of the frame plates 39 of the master clock.

In the normal operation of the clock installation the arm 27 carries with it the gear wheel 23 by means of the pin 29, so that on the one hand the hands 5, 6 of the master clock run free, and on the other hand the commutator 24 each minute connects the battery 22 to the secondary clocks 18 at the same time reversing the polarity. The pin 37 lies outside the teeth of the setting wheel 38.

In the stoppage of the installation by the backward turning of the setting back hand 1, the gear wheel 23 remains stationary with the part connected thereto and the pin 28 slides on the curved surface of the segment piece 34 and by this means turns the arm 31 by means of the stop 32 towards the setting wheel 38, in which operation the pin 37 enters one tooth space of the setting wheel 38 and brings to rest the commutator 24 and also the hands 5, 6. The pin 37 and the commutator 24, which as follows from what has already been described makes a half revolution in a minute, are so arranged relatively to one another that when the pin lies at the bottom of a tooth space of the wheel 38, the commutator 24 assumes an intermediate position, consequently the circuit of the secondary clocks is interrupted. If at the moment of stoppage the pin 37 is within range of one side of one of the teeth of the setting wheel 38, during the turning movement of the arm 31 and of the segment piece 34 (by means of the pin 28), it slides along this side of the said tooth and by this means causes a small angular movement of the parts connected to the gear wheel 23, whereby the commutator 24 comes into an intermediate position which has for its result the interruption of the current.

The spring 35 serves for the compensation of any inaccuracies which may occur

in the angular setting of the parts 31, 34 relatively to one another.

In the third example of construction, as in the second example it is assumed that the secondary clocks which are here not shown, are driven by the current from a battery. The gear wheel of the train of gearing 7 loosely mounted on the arbor of the setting back hand 1 is rigidly connected to a gear wheel 40, which is connected through gearing 41 and 42 to a commutator 43. On the gear wheel 40 there is mounted a pin 44 which serves for carrying along with it the hands 5, 6 and the commutator during the normal operation of the clock installation.

With the gear wheel fixed on the shaft of the setting back hand 1, which gear wheel belongs to the train of gearing 3 serving for the driving of the movement of the master clock, there is in operative connection the hook shaped end 45 of one arm of a bell crank lever 46. This bell crank lever 46 is capable of turning about a shaft 47, is acted upon by a spring 48 and the likewise hook shaped end 49 of its other arm rests against the periphery of the disc 50 fixed to the commutator 43. This disc 50 has two notches 51 standing opposite to one another.

So long as the end 49 of the lever 46 rests against the periphery of the disc 50 the end 45 is out of engagement with the gear wheel 3 but when the end 49 comes into engagement with one of the notches 51, the end 45 engages in a tooth space of the wheel 3. This operation has no effect so long as the clock installation runs normally.

If the setting back hand 1 is turned back, the parts 5, 6, 7, 40, 41, 42, 43, 50 simply remain stationary provided that the end 49 at this moment lies on the periphery of the disc 50. If however the end 49 at the moment of the turning back of the setting back hand 1 or shortly before this, has fallen into one of the notches 51, the other end 45 comes into engagement with a tooth space of the wheel 3 and by this means prevents the setting back hand 1 from turning back. Thus in order to enable the clock installation in the latter case to be set back, in the setting back motion one must wait until the end 49 has come out of the notch 51 again and is resting on the periphery of the disc 50. The contacts of the commutator 43 are so arranged relatively to the notches 51 that they close the circuit in the network of the secondary clocks when the end 49 lies in one of these notches. Consequently setting back cannot take place at the moment when electromotive force is acting in the secondary clock circuit.

As appears from the above description according to the invention by suppressing the occurrence of an electromotive force in the secondary clock circuit throughout the time during which the hand of the master clock is stopped one is able to ensure that, when again switching in the secondary clocks, the first current impulse in the circuit is always in the correct direction so that there is always a synchronous operation of the secondary clocks with the hands of the master clock.

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

1. A stopping device for electric clock installations in which a series of secondary clocks are operated in synchronism with a master clock, characterised in that the train of gearing of the master clock can be disconnected for a definite period at any desired time from the means whereby the production of an electromotive force in the secondary clock circuit is controlled, such means being in operative connection with the hands of the master clock, for the purpose specified.

2. A stopping device according to Claim 1, characterised in that a setting back hand is driven from the master clock, which hand during the normal running of the clock installation carries with it the minute hand of the master clock and at the same time effects the connections in the secondary clock circuit, whereas by setting back simultaneously with the locking of the hand of the master clock the said setting back hand prevents the production of an electromotive force in the circuit of the secondary clocks.

3. A stopping device according to Claims 1 and 2, characterised in that the setting back hand in the direction of the normal running moves a ratchet wheel which actuates a lever controlling an arrangement for producing current impulses in the circuits of the secondary clocks.

4. A stopping device according to Claim 3, characterised in that the lever acts on the releasing device of an inductor serving to produce the current impulses.

5. A stopping device according to Claims 1 and 2, wherein the secondary clocks are in a battery circuit and are controlled through a commutator from the setting back hand, characterised in that the setting back hand at the commencement of the backward turning of the commutator is coupled to a stationary setting wheel in such a manner that the commutator in all cases causes the current to be interrupted in the circuit of the

secondary clocks.

6. A stopping device according to Claims 1, 2 and 5, characterised in that the setting back hand acts by means of a pin on a segment piece which is mounted on a gear wheel driving the commutator and is itself connected to a pin which coacts with the toothed periphery of the setting wheel, the whole being arranged in such a manner that in the settting back the last mentioned pin by the sliding of the first mentioned pin on the segment piece is pressed into one of the tooth spaces of the setting wheel and by this means the commutator in all cases is positioned intermediate between its closed circuit positions.

7. A stopping device according to Claims 1 and 2, wherein the secondary clocks are arranged in a battery circuit and are controlled through a commutator from the setting back hand, characterised by a detent device which prevents stopping so long as the commutator closes the secondary clock circuit.

8. A stopping device according to Claims 1, 2 and 7, characterised in that there coacts with a gear wheel effecting the drive of the setting back hand from the master clock, a bell crank lever which is controlled from a disc that bears stopping means and is rigidly connected to the commutator, the whole being arranged in such a manner that the disc holds the bell crank lever out of action on the said gear wheel so long as the current is interrupted at the commutator, but, the bell crank lever at the moment of the closure of the circuit at the commutator comes into operative connection with one of the stopping means and thereby engages with the toothed wheel in such a manner as to prevent turning back of the setting back hand.

9. The several forms of stopping devices for electric clock installations as hereinbefore described with reference to the accompanying drawings for the purpose specified.

Dated this 22nd day of November, 1929.

D. YOUNG & Co.,
11 & 12, Southampton Buildings,
London, W.C. 2,
Agents for the Applicants.

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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

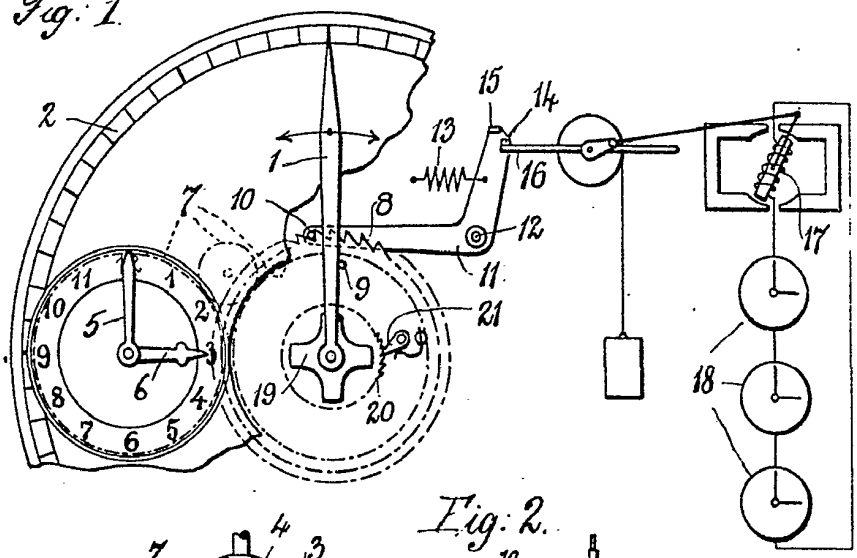


Fig. 2.

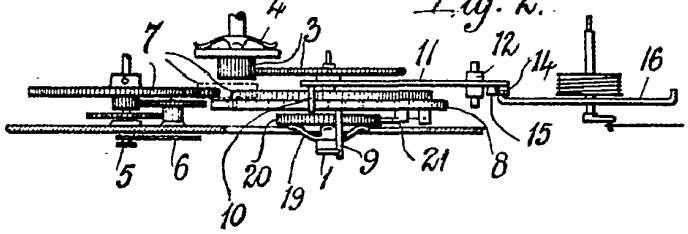


Fig. 3.

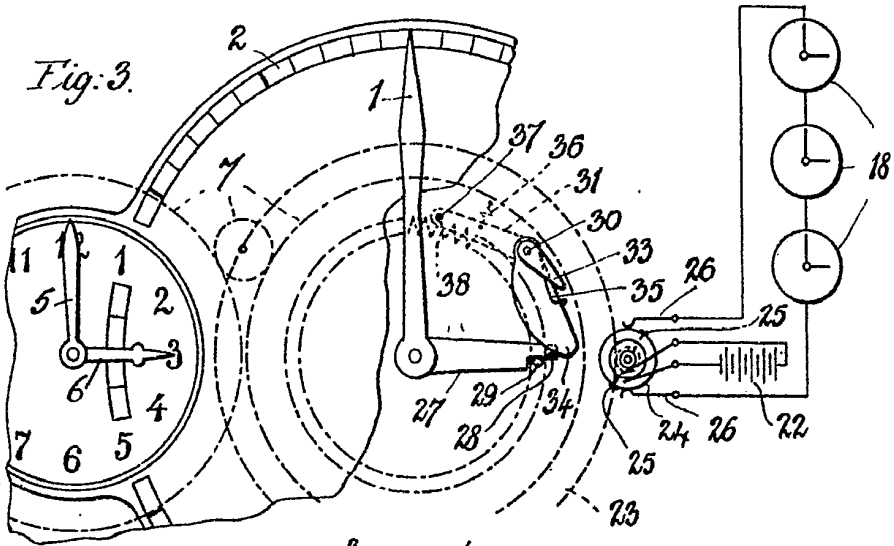


Fig. 4.

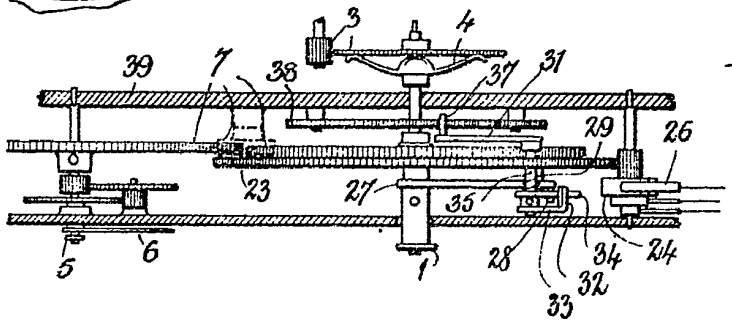
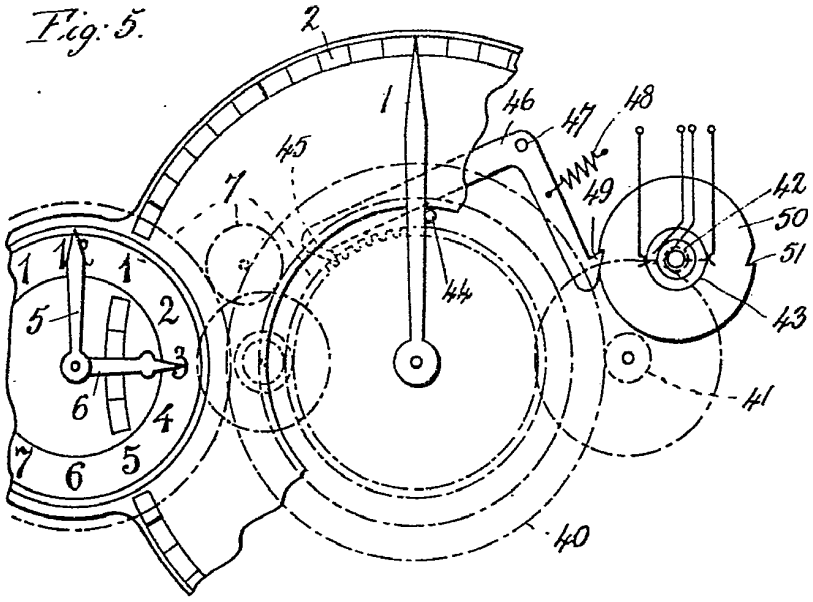


Fig: 5.



18

Fig: 6

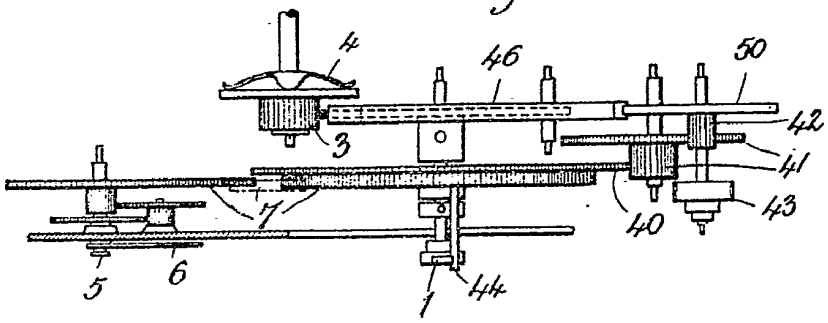


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Fig. 1

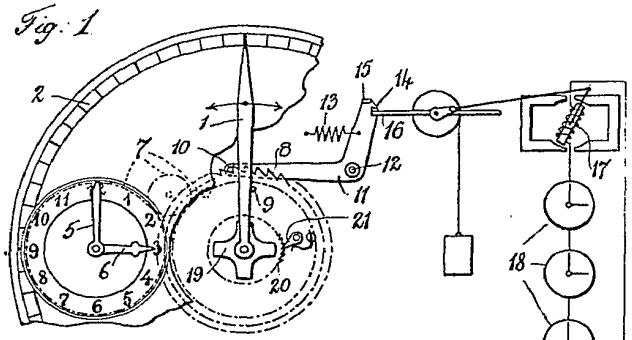


Fig. 2.

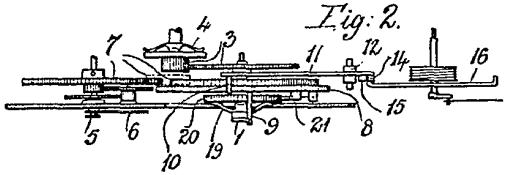


Fig. 3.

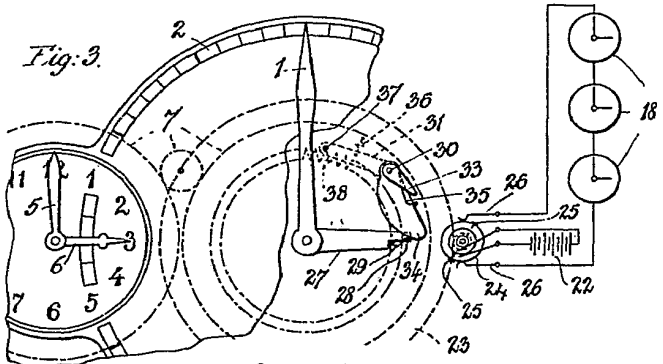


Fig. 4

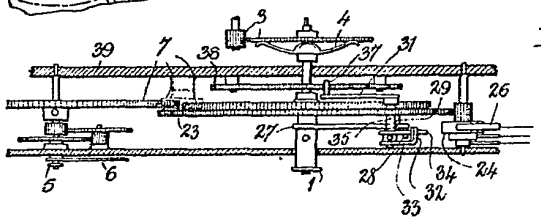


Fig. 5.

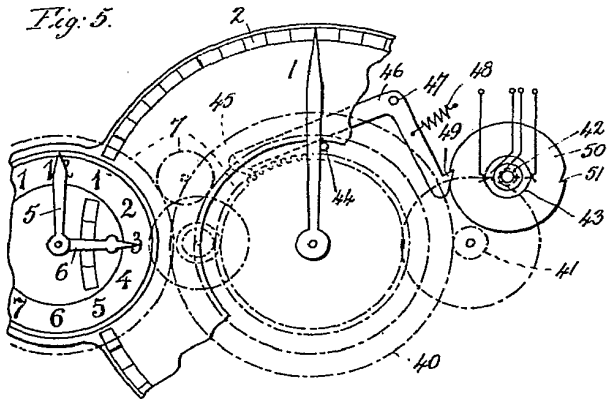
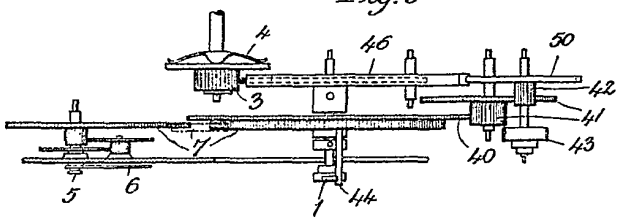


Fig. 6



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