P. MANSEL.

ELECTRIC CLOCK.

APPLICATION FILED APR. 4, 1918.

1,373,517.

Patented Apr. 5, 1921.

2 SHEETS—SHEET 1.

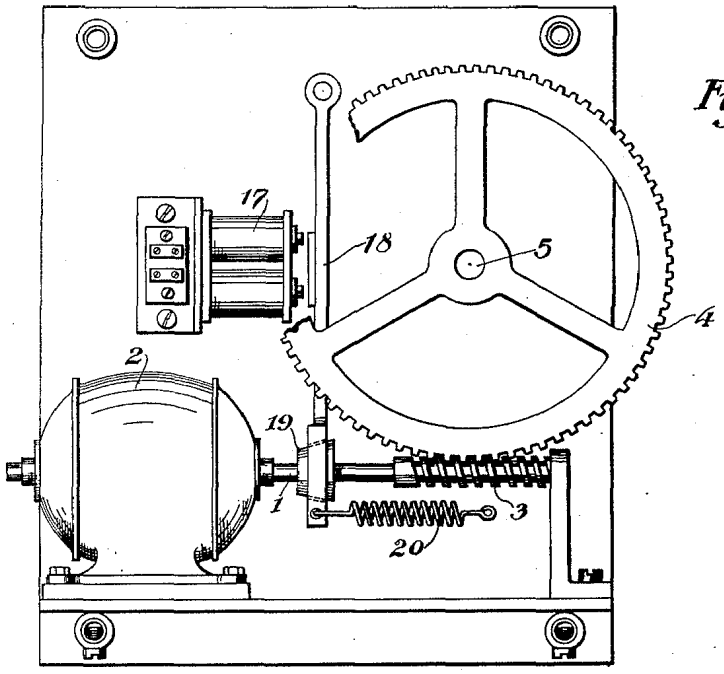

Fig. 1

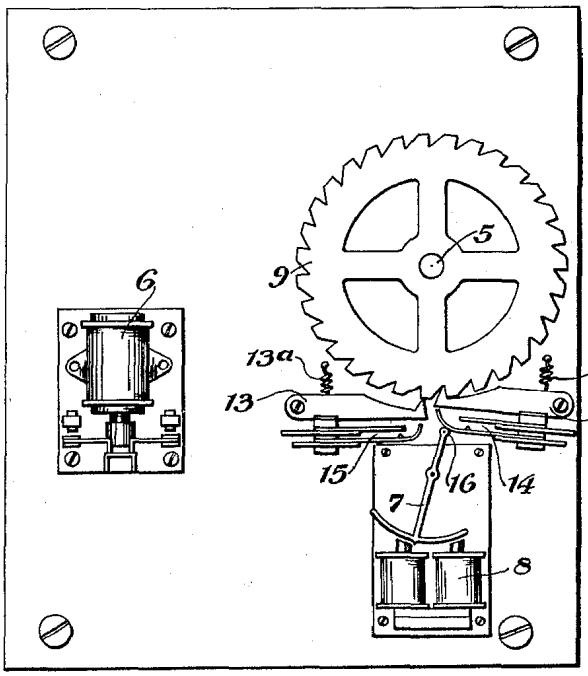

Fig. 2

Inventor
Paul Mansel
by Knight Bros
attorneys

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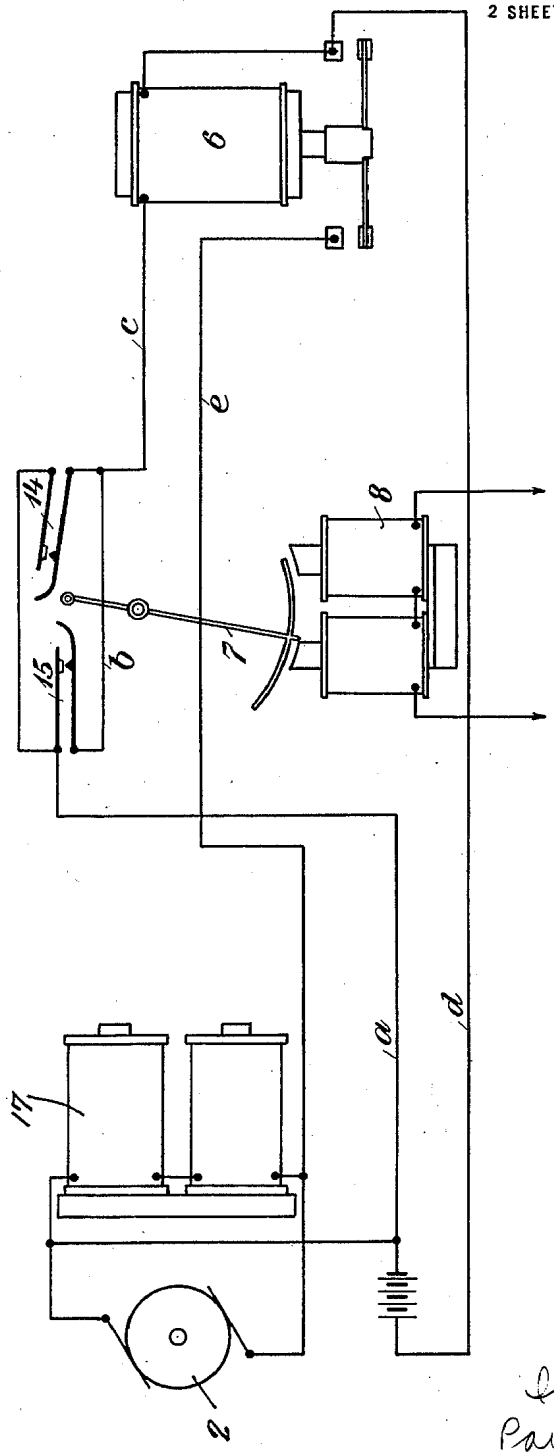

Fig. 3

Inventor
Paul Mansel
By Thos. G. Dobbs
His Attys

UNITED STATES PATENT OFFICE.

PAUL MANSEL, OF CHARLOTTENBURG, NEAR BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, AKTIENGESELLSCHAFT, OF SIEMENSSTADT, GERMANY, A CORPORATION OF GERMANY.

ELECTRIC CLOCK.

1,373,517. Specification of Letters Patent. Patented Apr. 5, 1921.

Application filed April 4, 1918. Serial No. 226,792.

To all whom it may concern:

Be it known that I, PAUL MANSEL, a German citizen, residing at Charlottenburg, near Berlin, Germany, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

My invention relates to electric clocks, and more especially to secondary clocks located in towers or the like and provided with weighty hands. The particular object of my invention is to provide a clock of this type of superior efficiency and reliability.

As is well known to those skilled in the art, secondary clocks can be fed with very little current, for the reason that the sensitive contacts connected with the main clock will not stand heavy current loads. For this reason the dial gear of a secondary clock must work easily and the clock must be mounted in a place where it is protected against the influence of wind, shocks, etc.

In order to be able to run clocks having heavy dial gear, which do not receive much care and which are not well protected against influences from the exterior, such as for instance tower clocks, after the manner of secondary clocks, it has been proposed to drive the dial gear by means of a continuously running motor, merely the controlling of this motor being effected from the central station by means of the well known clock current. To this end, whenever the contact in the main clock circuit is closed, an electromagnet is excited or cut out, the armature of which then causes the motor to be started and a ratchet wheel to rotate so as to move the minute hand by means of a train of gear wheels.

The present invention provides a special contact device for throwing in the motor when the contact in the central station or main clock circuit is closed; and for throwing out the motor as soon as the clock hand has been moved to the required degree, regardless of whether the contact in the central station still remains closed or not.

In the drawings affixed to this specification and forming part thereof the preferred form of a secondary clock, according to the present invention is illustrated, Figure 1 being an elevation of the minute hand driving device, while Fig. 2 is an elevation of the switch gear serving to control the motor. Fig. 3 is a diagram showing the connections.

Upon the shaft 1 of the motor 2 driving the minute hand there is fixed a worm 3 in gear with a wheel 4 on the minute hand arbor. The switch gear serving to control the motor 2 consists of two pairs 14, 15 of contact springs fastened to pawls 12 and 13. Springs 12^a, 13^a serve to hold said pawls against a toothed ratchet wheel 9 on the minute hand arbor 5. The pairs of contact springs are further actuated by a switch gear 7, 8 of the well known pendulum armature type, said gear being operated by the flow of current when the contact in the central station or main clock circuit is closed. The pendulum 7 carries at its upper end a roller 16 of insulating material, adapted to engage one of each pair of the contact springs whenever these latter are in a predetermined position. 6 is a floor relay serving to start the motor, 17 is a relay serving to open the motor brake 18 which is normally pressed by means of a spring 20 against a brake disk 19 on the motor shaft.

The operation of this device is as follows: The pendulum switch gear 7, 8 connected with the central station is excited every minute in such a manner as to cause the armature to swing once either to the left or to the right. If in the position shown in Fig. 2 the armature 7 is caused by the closing of the central contact to swing to the right it will engage one of the pair of contact springs 15 and close the contact between the springs. Thereupon a circuit is closed from the battery over wire *a*, contact springs 15, wire *c*, relay 6 and wire *d* back to the battery. The relay 6 being now excited will attract its armature, whereupon the circuit is now closed over the armature of relay 6 and wire *e* to the motor and the brake relay 17. Now this latter relay attracts its armature, thereby throwing out the brake lever 18, whereby the motor is free to rotate the minute hand arbor. After this arbor has rotated through an angle corresponding to one minute on the face of the clock and has carried the minute hand into its correct position, a notch on the ratchet wheel 9 which has rotated along with the minute hand will be opposite pawl 13, and

a projection provided on said pawl will now enter the said notch due to the action of spring 13ª. The pair of contact springs 15 is thereby caused to move away from the pendulum armature 7 and the contact between the two springs 15 is opened. The floor relay 6 and the brake relay 17 are thereby thrown out of operation, the motor feed is stopped and the brake lever is thrown in, the motor being thereby stopped immediately. Thus the minute hand will rest in its correct position independent of the duration of the closing of the contact in the central station, since the motor circuit is broken as soon as the minute hand has moved to the required degree, the notches in wheel 9 determining this degree.

While the motor was running and the ratchet wheel was rotating, the secondary pawl 12 moved up the back of a ratchet tooth and is now prepared for the next rotation of the minute hand arbor. When the contact in the central station is closed again, the lever 7 will swing back to the left and close the contact between the pair of springs 14. Then the current exciting the floor relay 6 and the brake relay 17 will flow through this pair of contact springs, and the other parts will operate in the manner described above.

I claim:

1. In a secondary clock, in combination, a minute hand arbor, an electromotor adapted to drive said arbor, a ratchet wheel on said arbor, pawls in engagement with said ratchet wheel, a main clock electric circuit, switch gear actuated by said main clock circuit, and two pairs of contact springs fixed to said pawls and coöperating with said wheel and said switch gear to open and close the motor circuit.

2. In a secondary clock in combination, a minute hand arbor, an electromotor adapted to drive said arbor, a ratchet wheel on said arbor, an alternating current pendulum switch gear connected with the main clock and two pairs of contact springs cooperating with said wheel and switch gear in opening and closing the motor circuit.

3. In a secondary clock in combination, a minute hand arbor, an electromotor adapted to drive said arbor, a ratchet wheel on said arbor, an alternating current pendulum switch gear connected with the main clock contact, two pairs of contact springs between said pendulum switch and said wheel, pawls connected with said springs and notches in said wheel opposite said pawls.

4. In a secondary clock, in combination, a minute hand arbor, an electromotor adapted to drive said arbor, a ratchet wheel on said arbor, two pawls adapted to engage said ratchet wheel, a pair of spring contacts secured to each pawl and connected in an open circuit, a relay in said circuit for said motor, and switch gear adapted to periodically bring a pair of said contacts into engagement with each other to close said circuit.

5. In a secondary clock, in combination, a minute hand arbor, an electromotor adapted to drive said arbor, a ratchet wheel on said arbor, a pawl adapted to engage said ratchet wheel, spring contacts secured to said pawl and connected in an open circuit including said motor, and switch gear coöperating with said wheel and said pawl to open and close said contacts.

6. In a secondary clock, in combination, a minute hand arbor, an electromotor adapted to drive said arbor, a ratchet wheel on said arbor, two pawls adapted to engage said ratchet wheel, a pair of spring contacts secured to each pawl and connected in an open circuit, a brake for said motor normally in braking position, a relay in said circuit for said motor and said brake, and switch gear adapted to periodically bring a pair of said contacts into engagement with each other to close said circuit and thereby move said brake out of braking position and actuate said motor.

In testimony whereof I affix my signature.

PAUL MANSEL.