PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Striking Mechanism for Electric Clocks.

I, MAURICE PHILIPPE FAVRE-BULLE, of 59, Boulevard Beausejour, Paris, in the Department of the Seine and Republic of France, a citizen of the French Republic, 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 has for its object to provide a striking mechanism adapted to all types of electric clocks. It consists essentially in a motor device, for instance, an electro-magnet whose armature is carried by the hammer of a striking mechanism mounted on the end of a flexible strip fixed to the frame. The shank of this hammer carries the pawl which actuates a ratchet wheel having 90 teeth, that is to say, as many teeth as times the hammer must strike during a complete revolution of the hour hand around the clock dial. A second wheel is fixed to the said ratchet wheel and bears on its periphery stopping teeth which are suitably spaced apart and allow the hammer to strike the desired number of blows at each hour and each half hour.

A rocking lever is adapted to engage in the teeth of this second wheel in such a manner as to prevent its rotation; its other end bears upon a cam of suitable shape fixed on the minute hand arbor.

When the wheel rotates the hammer can make a contact in the circuit of the electromagnet, and the striking mechanism comes into operation. In order that this mechanism shall strike its blows regularly one after the other, the rocking hammer is provided with a retarding device consisting of a metronome pendulum whose period of oscillation is very much greater than that of the hammer. This pendulum makes with the hammer a contact which is both mechanical and electric, the electric contact being arranged in series with the first contact hereinbefore mentioned. This first contact is broken and consequently the striking mechanism no longer operates, immediately the wheel with stopping teeth is stopped by the lever actuated by the hour hand.

A constructional form of this invention is illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a view of the general arrangement of the apparatus, and

Figures 2, 3 and 4 illustrate the stopping device carried by the rocking lever in its successive various positions.

On the arbor 1 of the minute hand rotating in the direction of the arrow, there is mounted a cam 2 which is symmetric as regards its axis and has two rounded parts 3, 3^1 and two opposite flat surfaces 4, 4^1 corresponding to the hours and half hours.

A lever 5 capable of rocking on an axle 6 terminates in a bevelled portion 7 which bears upon the periphery of the cam 2. The long arm of this lever is continually being pulled upwards by a suitably arranged spring 8. At its other end the lever 5 carries a small cylinder 9 having as its axis the rocking axle 6 of the lever. This cylinder is split diametrally along a slot 10 (Figures 2, 3 and 4).

One of the front edges of this slot has a notch 11 which is oblique in relation to the generatrices of the cylinder.

On the axle 12, parallel to the axle 1, there is mounted a ratchet wheel 13 having cut on its periphery ninety teeth spaced at equal distances apart. On the same axle 12 there is fixed a second wheel 14 having on its periphery teeth 15 spaced apart in such a manner that the desired number of blows of the striking mechanism shall be given at each hour and at each half hour, the spaces between the teeth corresponding to the periods during which the striking mechanism

operates. Thus, for instance, the group of three teeth 15, which in Figure 1 is situated opposite the lever 5, corresponds to 12.30 p.m., 1 o'clock and 1.30 p.m. These teeth 15 come into engagement with the end of the lever 5. On a block 16 fixed to the clock frame there is suspended by means of a flexible strip 17 a striking hammer 18 terminating in a ball 19. This hammer carries a pawl 20 adapted to engage with the teeth of the wheel 13 and to move this wheel forwards at each movement of the hammer 18. The rearward movement of the wheel 13 is prevented by a suitably pivoted counter-pawl 21.

Facing the weight 19 of the hammer 18 there is arranged a gong 22. Two stops 23 and 24 limit the swings of the hammer 18 to either side. This hammer carries laterally a mass of soft iron 25 constituting the armature 26 mounted in a circuit 27 of the electric battery 28. In this circuit there is arranged a contact with a second contact piece 30 carried on the end of a flexible contacting strip 31 fixed to the hammer 18. At the side of the hammer 18 there is arranged a metronome pendulum 32 rocking on an axle 33 and carrying at its lower part the weight 34 and at its upper part another weight 35 which is vertically adjustable. The mass 34 carries a contact piece 36 adapted to make contact with a second contact piece 37 carried by an elastic strip 38 which is likewise fixed to the hammer 18.

Around the axle 33 there is arranged a flexible contacting strip 39 connected to one end of the winding of the electro-magnet 26. It will thus be seen that the two contacts 29, 30 and 36, 37 are situated in series in the circuit 27. It is to be understood that the various parts hereinbefore mentioned are suitably insulated electrically from one another. The operation of this apparatus is as follows:—

When the bevel 7 of the lever 5 is bearing upon the rounded portions 3 and 3^1 of the cam 2, the lever 5 turns on its axle 6 (position shown in Figure 3) and one of the teeth 15 of the wheel 14 strikes against one of the sides of the slot 10. The wheel 14 is thus prevented from rotating. The hammer 18 is pulled by the position of the spring strip 17 which is suitably tensioned towards the left of the figure, and the pawl 20 has a tendency to push the wheel 13, but the latter is held by reason of the stoppage of the wheel 14, and the contact piece 30 does not meet the contact piece 29. The circuit is open and the striking mechanism is not operating. When the left hand end of the lever 5 meets one of the flat surfaces 4 or 4^1 it will drop suddenly down on to the bottom of the recess thus formed owing to the pull of the spring 8. Immediately, the tooth 15 of the wheel 14, which was stopped by the edge of the slot 10, escapes (Figure 4), this escape being facilitated by the notch 11 hereinbefore mentioned. The wheel 14 is thus free to rotate until the following tooth meets the end of the lever 5, (position shown in Figure 2). Thus one tooth, and only one tooth, of the wheel 14 escapes at a time. After the wheel 14 has rotated the hammer 18 continuing its swing towards the left-hand of the figure, makes contact between the contact pieces 29 and 30. The pendulum 32 pressing the contact piece 36 against the contact piece 37, the circuit 27 is closed, the electromagnet 26 is energised, the armature 25 is attracted and the hammer 18 strikes the gong. At this moment the pendulum 32 owing to its inertia is driven forwards and contact is broken at 36, 37. The hammer 18 and the pendulum 32 swing, each according to its proper period. Contact will be made and consequently the hammer will strike a blow each time the contacts 29, 30 and 36, 37 are made simultaneously.

At each swing of the pendulum towards the left hand, the pawl 20 moves the wheel 13 forwards one tooth in the direction of the arrow F, and this movement will continue until the wheel 14 shall have been again stopped by the lever 5. At this moment, as has already been stated, the movement of the hammer 18 towards the left hand is insufficient to make contact at 29, 30 and consequently the striking mechanism will cease to operate.

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. Striking mechanism for electric clocks comprising a motor device, for instance an electro-magnet whose armature is carried by the hammer of the striking mechanism, characterised by the feature that this hammer actuates, through the medium of a pawl, a ratchet wheel having 90 teeth, fixed to a second wheel having on its periphery teeth that are suitably spaced and can strike against the end of a rocking lever actuated by a cam fixed to the minute hour hand arbor; at the instant when the striking mechanism is intended to come into operation this lever falls into a recess in the cam and allows one tooth, but only one tooth, of the second wheel to escape, thereby

allowing the hammer to make a contact that closes the circuit of the electromagnet and causes the striking mechanism to come into operation; this hammer in its swings coming into mechanical and electrical contact with a pendulum whose period of oscillation is much higher than that of the hammer in such a manner as to allow the striking mechanism to operate one stroke after the other.

2. Striking mechanism for electric clocks, according to Claim 1 wherein the rocking lever carries near one of its ends a small cylinder whose axis coincides with the rocking axis of the lever, this cylinder being split diametrally at its upper part in such a manner as to form a slot against the edges of which the stopping teeth of the wheel can strike.

3. The improved striking mechanism for electric clocks constructed, arranged and operating substantially as hereinbefore described and as illustrated by the accompanying drawings.

Dated the 2nd day of August, 1923.

MARKS & CLERK.

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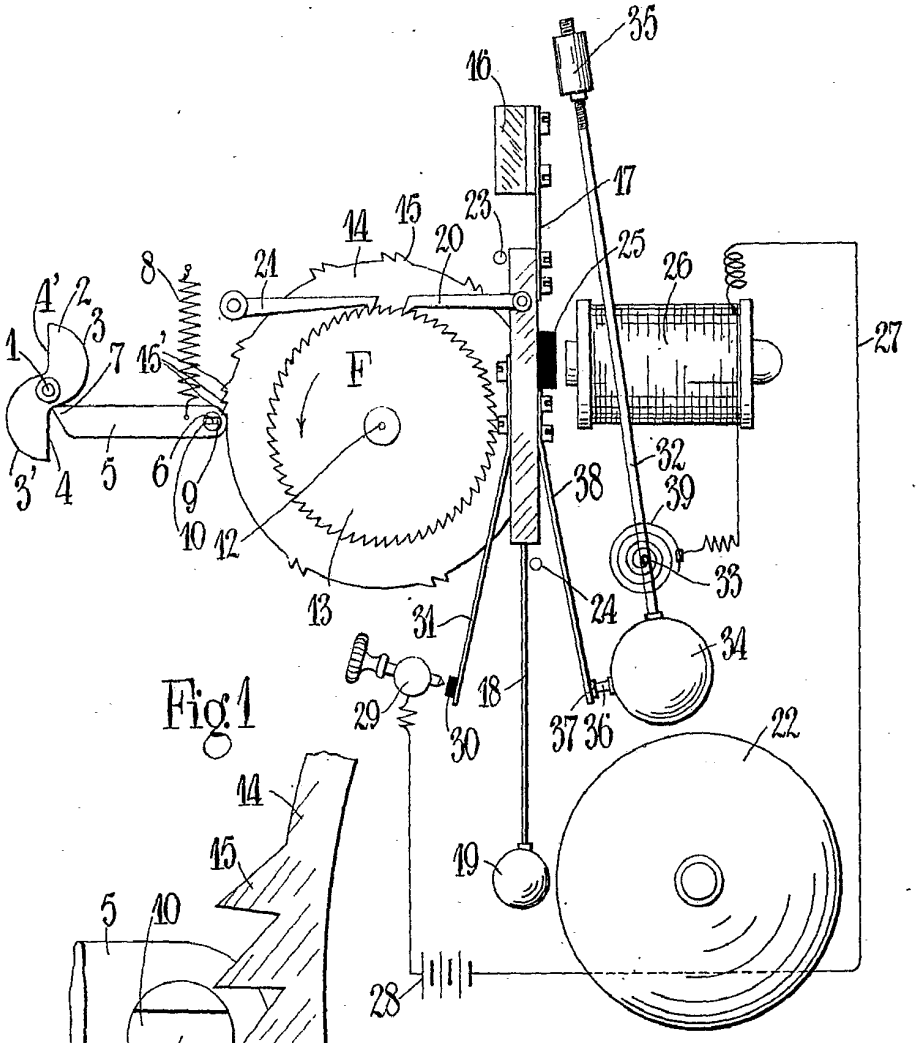

Fig. 1

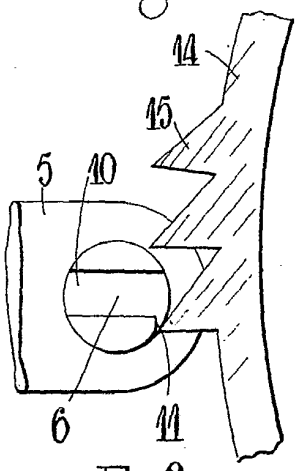

Fig. 2

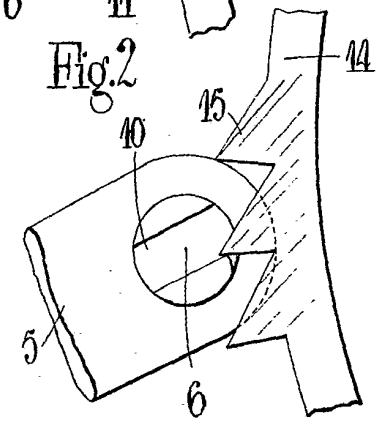

Fig. 3

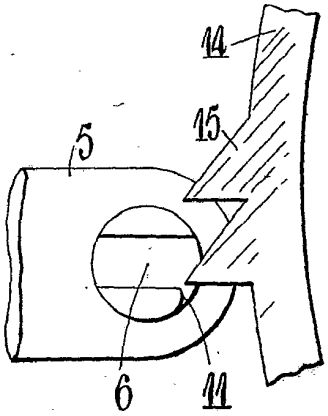

Fig. 4

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