June 15, 1937. A. STRAHM 2,084,226

ELECTRIC CLOCK

Filed April 2, 1936

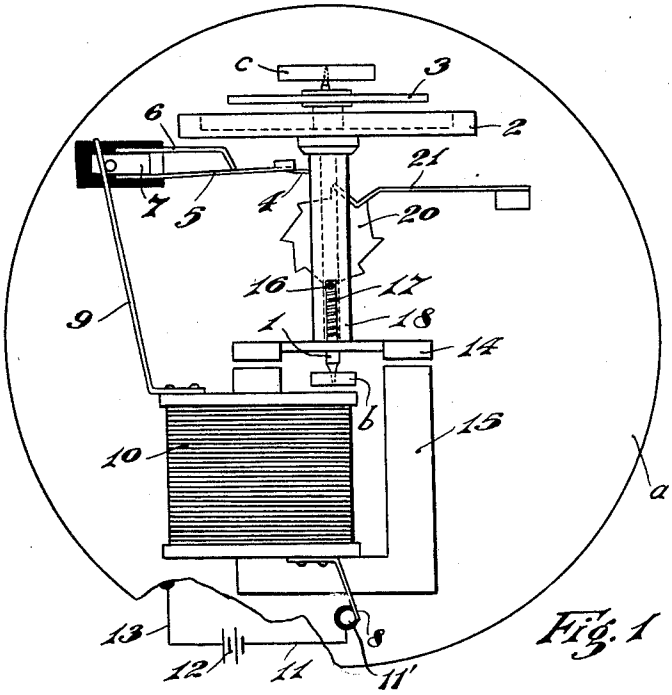

Fig. 1

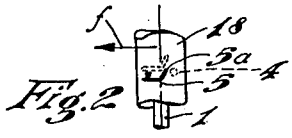

Fig. 2

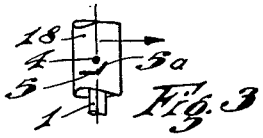

Fig. 3

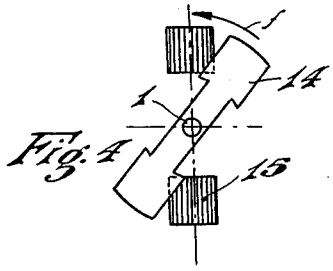

Fig. 4

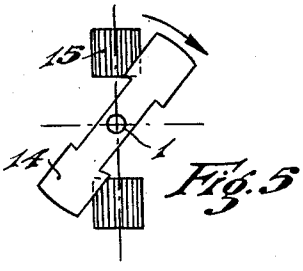

Fig. 5

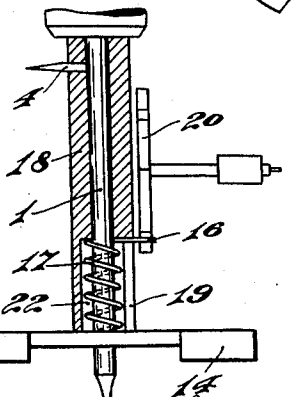

Fig. 6

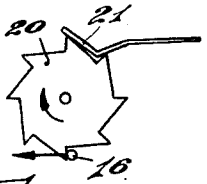

Fig. 7

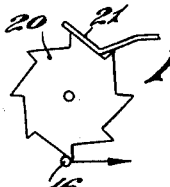

Fig. 8

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ELECTRIC CLOCK

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Application April 2, 1936, Serial No. 72,420
In Switzerland August 6, 1935

2 Claims. (Cl. 58—28)

This invention relates to electric clocks of the type in which the clock movement is driven by electromagnetic means entertaining the motion of an oscillatable regulating member.

It is an object of the invention to provide an electric clock of this type with a driving device and a circuit interrupting device capable of being actuated by a small electric power source over a long period of time. In order to obtain this result, it is necessary that the oscillatable regulating member be very easily movable, that is to say that actuation of the switch and driving of the time train requires only a slight effort of the oscillating member so that a minimum electromagnetic force of very short duration will be sufficient for actuating the clock movement.

The accompanying drawing shows a preferred practical embodiment of the invention.

Figure 1 is a plan view on the clock movement plate carrying the driving and regulating mechanism.

Figures 2 and 3 show two different positions of the cooperating stationary and movable contact members of the circuit of the electromagnet.

Figures 4 and 5 show two positions of the driving armature.

Figure 6 is a partial section along the shaft of the regulating member showing the transmission of movement to the clockwork train.

Figures 7 and 8 show the coacting driving member and wheel in two different positions of operation.

On the movement plate *a* is mounted a spindle 1 in two bearings *b* and *c*. This spindle carries a balance wheel 2 coacting with a spiral spring 3, and an armature 14 of an electromagnet having a coil 10 and a core 15. A source of electric current which may be constituted by a small electric cell is connected by a conductor 13 to the mass, and by a conductor 11 to a binding post 11' insulatedly mounted on the plate *a* and making contact with one terminal 8 of the coil 10, the terminal 9 of the coil being connected with an insulated contact block 7 carrying a resilient contact blade 5 the free end of which is bent to form an angle as shown in Figs. 2 and 3. A second spring blade 6 carried by the contact block 7 bears on the blade 5 to increase the pressure tending to yieldingly hold the blade 5 in its normal horizontal position. The end of the blade 5 coacts with a contact pin 4 carried by the spindle 1 which is in electric contact with the mass.

A sleeve 18 is forced upon the spindle 1 and is provided with a recess 22 at its lower end to form a lodgment for a weak spring 17 coiled about the spindle 1 and having an end 16 projecting out of the sleeve 18 across a longitudinal slit 19 provided in the sleeve. The armature 14 which is secured to the spindle 1 closes the recessed end of the sleeve 18 and serves as bearing surface for the spring 17. The end 16 of the spring cooperates with a wheel 20 having ratchet teeth and disposed in a plane extending parallel to the axis of the spindle 1. This wheel forms the first mobile member of the clock time train. A holding spring pawl 21 prevents backward rotation of the wheel 20.

When the spindle 1 oscillates in the direction indicated by the arrow *f* in Figs. 2 and 4, the pin 4 of the spindle will abut against the lower face of the bent up inclined portion 5*a* of the blade 5. The blade end is pushed upwardly by the pin, and since the spring 6 is still bearing on the blade, a good contact pressure will be obtained while the pin 4 passes along the lower face of the blade 5. The following electrical circuit of the coil 12 is now established: Binding post 11', conductor 8, coil 10, conductor 9, contact block 7, blade 5, pin 4, spindle 1, bearings *b* and *c*, plate *a*, conductor 13. The coil 10 is energized and an impulse imparted to the armature 14 which, in the moment of closure of the circuit, is in the position shown in Fig. 2. The armature then oscillates in the direction of the arrow *f* and tensions the spiral spring 3. On the return oscillation of the spindle 1 and armature 14, as shown in Figs. 3 and 5, the pin 14 passes above the blade 5 and just slightly touches the end of the inclined portion 5*a* the upper face of which may be coated with an insulating material to prevent electric contact between the pin and the blade on the return oscillation.

During oscillation of the spindle 1, the spring 17 turns with the spindle and the sleeve 18, and in one direction of rotation, as indicated in Fig. 7, the spring end 16 abuts against the radial face of a ratchet tooth of the wheel 20 and imparts a movement of rotation to the wheel until it falls off from the tooth. On the return oscillation, shown in Fig. 8, the spring end 16 slides along the inclined back face of a tooth. As the pawl 21 holds the wheel 20 against return movement, the spring 17 yields, the slit 19 permitting the spring end 16 to move downwardly to pass over a tooth. The spring end 16 thus imparts a step by step movement to the wheel 20.

I claim:—

1. In an electric clock having an oscillatable spindle carrying the armature of an electromag-

net and a balance wheel, a helicoidal spring wound about said spindle and mounted for oscillation with the spindle, one end of said spring projecting laterally of the spindle and being capable of yielding in axial direction, and a wheel having ratchet teeth coacting with said laterally projecting spring end whereby upon oscillation of the spindle and spring in one direction the spring end abuts against a radial face of a ratchet tooth to impart a movement of rotation to said wheel, and upon oscillation of the spindle and spring in opposite direction the spring end slides over the inclined back face of the next following ratchet tooth and yields in axial direction to engage with the radial face of said tooth.

2. In an electric clock, a motor driven oscillatory spindle, a sleeve surrounding the spindle and mounted for oscillation therewith, a helicoidal spring wound about the spindle internally of said sleeve, said sleeve being provided with an axially extending slit, the spring having one end thereof extending laterally of the spindle across said slit in the sleeve to cause oscillation of the spring with the spindle and to permit yielding of the spring end in axial direction, and a wheel provided with ratchet teeth disposed in a plane parallel with the axis of the spindle and in proximity to the spindle to coact with said spring end whereby said oscillating spring end imparts a step by step movement of rotation to said ratchet wheel.

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