April 28, 1931. E. L. CARLSON 1,802,334

ELECTRIC CLOCK

Filed June 5, 1929

Fig. 1.

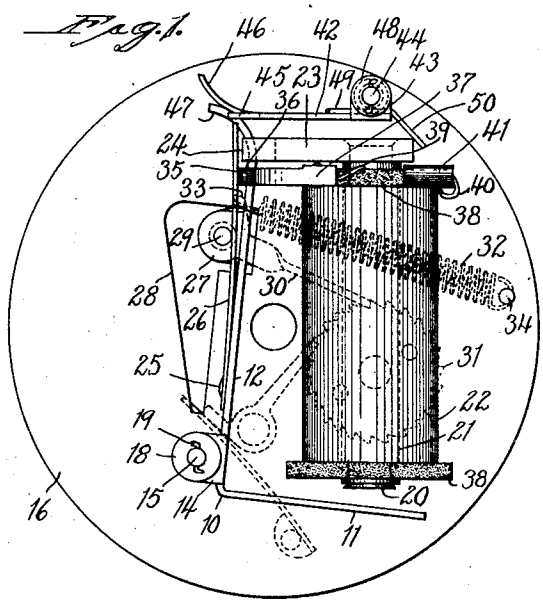


Fig. 2.

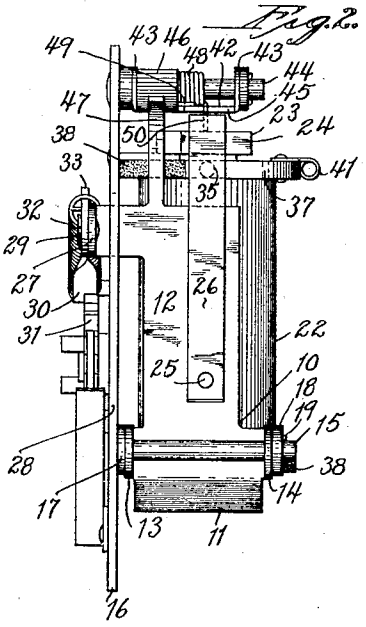


Fig. 3.

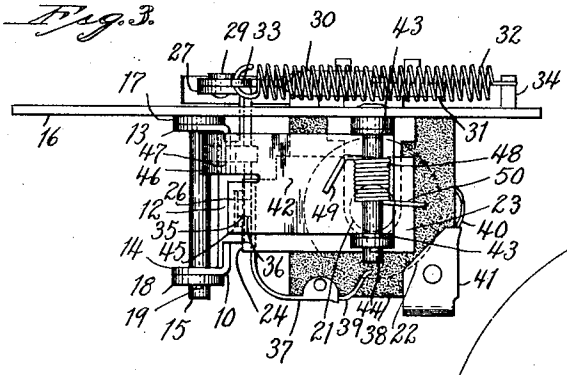


Fig. 5.

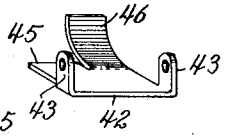


Fig. 6.

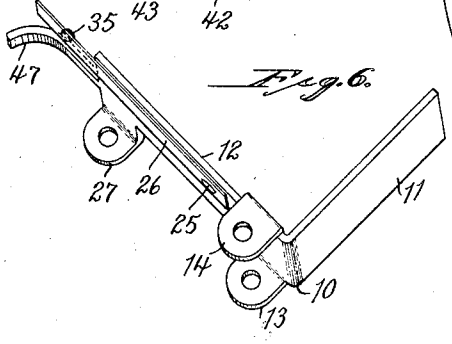
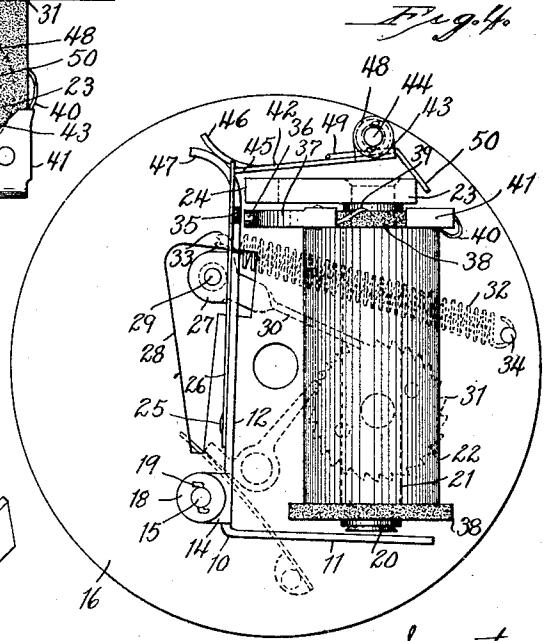


Fig. 4.



Inventor

Edof L. Carlson

by Seymour Earle & Nichols

Atty

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UNITED STATES PATENT OFFICE

ELOF L. CARLSON, OF BRISTOL, CONNECTICUT, ASSIGNOR TO THE E. INGRAHAM CO., OF BRISTOL, CONNECTICUT, A CORPORATION

ELECTRIC CLOCK

Application filed June 5, 1929. Serial No. 368,505.

This invention relates to improvement in electric clocks of the type in which the driving-spring is periodically and automatically energized and relates in particular to the means employed for controlling the closing of the circuit to effect such energization.

The object of my invention is to provide an electric clock of the type described with simple reliable and effective means for causing the contacts to close with great rapidity so that arcing is minimized.

With the above and other objects in view, my invention consists in an electric clock having certain details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

In the accompanying drawings:

Fig. 1 is a view in rear elevation of the driving-mechanism of an electric clock equipped with my improved circuit-controlling mechanism, the parts being shown in the positions due them when the contacts are in engagement for energizing the magnet;

Fig. 2 is a view thereof in side-edge elevation;

Fig. 3 is a top or plan view thereof;

Fig. 4 is a view corresponding to Fig. 1 but showing the parts in the positions due them prior to the closing of the circuit;

Fig. 5 is a detached perspective view of the contact-controlling latch; and

Fig. 6 is a corresponding view of the operating-lever.

In carrying out my invention as herein shown, I employ a substantially L-shaped operating-lever 10 folded from sheet-metal and having two arms 11 and 12 disposed at right angles with respect to each other. For the purpose of mounting the operating-lever 10 with capacity for oscillating movement I fold outward from its inner and outer edges two supporting-ears 13 and 14 respectively, both of which are perforated as clearly shown in Fig. 6, for the reception of a stud 15 projecting rearward from a disk-like assembly-plate 16. The inner ear 13 bears against a spacing-washer 17 interposed between the same and the assembly-plate 16, while the outer ear 14 bears against a retaining-collar 18 mounted upon the rear end of the stud 15 and held in place thereon by means of a bent pin 19.

The operating-lever 10 is preferably made of iron or other magnetic material and has its arm 11 extended adjacent the pole-piece 20 of the core 21 of an electro-magnet which is generally designated by the numeral 22. The end of the core 21 opposite to the pole-piece 20 has secured to it at a right angle a core-extension 23 made of iron or other magnetic material and having its outer end forming the other pole-piece 24 of the electro-magnet 22.

The arm 12 of the operating-lever 10 has secured to it by means of a rivet 25 a contact-arm 26, which is preferably made of spring steel so as to be both resilient and capable of attraction by the pole-piece 24 of the electro-magnet.

The inner edge of the arm 12 of the operating-lever 10 is formed with an offsetting-ear 27 projecting forwardly through a clearance-opening 28 in the assembly-plate 16 and has pivotally secured to it by means of a rivet 29 a driving-pawl 30, the free end of which engages the teeth of a ratchet-wheel 31 which is connected in any approved manner to the time-train (not shown) of the electric clock so as to effect the driving thereof under the urge of a helical driving-spring 32. The said spring has one end engaged with an offsetting-finger 33 of the pawl 30 and its opposite end hooked over a stud 34 projecting forward from the assembly-plate 16. The said driving-spring 32 exerts a constant effort to swing the lever 10 in a clockwise direction, as shown in Figs. 1 and 2, and therefore through the pawl 30 to rotate the ratchet-wheel 31 in the same direction.

Near its free end the contact-arm 26 has secured to it a contact-member 35 which is adapted to co-act with a normally-stationary complementary contact 36 mounted at the end of a contact-arm 37 secured to one of the two complementary fiber end-plates 38—38 of the electro-magnet 22. One end 39 of the coil of the electro-magnet is soldered to the contact-arm 37 and the other end 40 of the coil of the said electro-magnet is soldered to a terminal-

piece 41 mounted upon the fiber end-plate 38 of the magnet and is adapted to be engaged by any suitable contact-member mounted in the clock-case (not shown).

For the purpose of preventing the contact 35 from engaging the contact 36 until such time as the operating-lever 10 has swung nearly to the limit of its movement in a clockwise direction by the driving-spring 32, I employ a sheet-metal latch-member 42 having a pair of perforated ears 43—43 offsetting from the opposite edges of one of its ends and sleeved over a stud 44 projecting rearward from the assembly-plate 16. The free end of the latch 42 is formed with a detent-finger 45 normally lying in the path of the free end of the flexible contact-arm 26 so as to prevent the initial clockwise movement of the same with the operating-lever 10.

For the purpose of swinging the detent-finger 45 of the latch 42 out of the path of the contact-arm 26 when the operating-lever 10 reaches approximately the limit of its clockwise travel under the urge of the driving-spring 32, I provide the said latch with an outwardly-curved cam-finger 46 which is engaged by a reversely-curved cam-finger 47 forming an extension of the arm 12 of the said operating-lever 10.

Encircling the stud 14 and exerting a constant effort to swing the latch 42 in a direction to interpose its detent-finger 45 in the path of the contact-arm 26 is a helical torsion-spring 48 having one arm 49 resting against the outer face of the latch 42 and its other arm 50 resting against the adjacent edge of the core-extension 23.

With the parts in the positions shown in Fig. 1, the magnet 22 will be energized by current flowing from any appropriate terminal in the case through the terminal-piece 41 into the end of the coil 40, thence through the coil proper and out through the end 39, through the contact-arm 37, contact 36, contact 35, contact- arm 26 and thence back to the source of electrical energy through the operating-lever 10 and assembly-plate 16 which forms a ground.

As soon as the magnet is energized to a sufficient degree it will cause its pole-piece 20 to attract the armature-arm 11 of the operating-lever and hence swing the latter counter-clockwise with the effect of disengaging the contact 35 from the stationary contact 36 and causing the pawl 30 to ratchet back over the teeth of the ratchet-wheel 31 and secure a fresh grip thereon, and at the same time stretch and re-energize the driving-spring 32. When the operating-lever 10 has been swung counter-clockwise by the action of the electro-magnet as described, it will swing the end of the contact-arm 26 outward beyond the end of the detent-finger 45 of the latch 42 and permit the latter, under the urge of the torsion-spring 48, to swing counter-clockwise and interpose the detent-finger 45 in the path of the contact-arm 26, as shown in Fig. 4 of the drawings. The parts will now occupy the positions shown in Fig. 4.

With the circuit broken and the driving-spring 32 energized as just above described, the latter will act to swing the operating-lever 10 clockwise as the clock-movement (not shown) driven by the ratchet-wheel 31 slowly yields under the control of its escapement. As the operating-lever 10 swings clockwise, as just described, it will tend to move the contact-arm 26 so as to engage its contact 35 with the stationary-contact 36, but owing to the interposition of the detent-finger 45 of the latch 42 in the path of the free end of the said contact-arm, the latter will yield and be restrained from participating in the movement of the operating-lever (Fig. 1) until the said lever reaches the limit of its clockwise movement, at which time the cam-finger 47 will engage the cam-finger 46 and swing the latch 42 clockwise so as to remove its detent-finger 45 from the path of the end of the contact-arm 26 and permit the latter to snap from left to right with the effect of engaging the contact 35 with the contact 36 and thus closing the circuit through the magnet.

The magnetic flux initiated in the core of the magnet will act through the pole-piece 24 to attract the end of the contact-arm 26 and cause the contact 35 to more tightly engage the contact 36, with the result that a stronger current flows through the coil of the magnet and the magnetic flux builds up sufficiently to attract the armature-arm 11 of the operating-lever 10 and rock the said lever counter-clockwise to restore the parts to the position shown in Fig. 4 and again break the circuit and re-energize the driving-spring 32 for the beginning of another cycle of operation.

I claim:

1. In a driving-mechanism for electric clocks, the combination with an electro-magnet and a driving-spring; of an operating-member adapted to be moved in one direction by the said driving-spring and in the opposite direction by the said electro-magnet; a spring-arm secured at one end to the said operating-member for movement therewith; a contact carried by the said spring-arm; a latch positioned to engage the free end of the said spring-arm to releasably restrain the said contact from moving into its circuit-closing position; and latch-releasing means carried by the said operating-member and engaging the said latch for releasing the same and permitting the said contact to be moved into its circuit-closing position by the said spring-arm.

2. In a driving-mechanism for electric clocks, the combination with an electro-magnet having two complementary pole-pieces; of a driving-spring; a two-armed pivotal op-

erating-member adapted to be moved in one direction by the said driving-spring and in the opposite direction by the said electro-magnet and havng one of its arms positioned adjacent one of the pole-pieces of the said magnet; a spring-steel arm secured at one end to the other arm of the said operating-member and extended adjacent the other pole-piece of the said magnet for attraction thereby; a contact carried by the said steel arm; a latch positioned to engage the free end of the said steel arm to releasably restrain the said contact from moving into its circuit-closing position; and latch-releasing means operated by the said operating-member for releasing the said latch and permitting the said steel arm to move the said contact into its circuit-closing position.

3. In a driving-mechanism for electric clocks, the combination with an electro-magnet and a driving-spring; of an operating member adapted to be moved in one direction by the said driving-spring and in the opposite direction by the said electro-magnet; a cam-finger carried by the said operating-member; a resiliently-mounted contact also carried by the said operating-member; a latch adapted to releasably restrain the said contact from moving into its circuit-closing position and formed with a cam-finger positioned to be engaged by the cam-finger of the said operating-member; whereby the cam-finger of the said operating member will co-act with the cam-finger of the said latch to release the same and permit the said contact to move into its circuit-closing position.

4. In a driving-mechanism for electric clocks, the combination with an electro-magnet and a driving-spring; of an L-shaped operating-member pivoted between its ends and adapted to be moved in one direction by the said driving-spring and in the opposite direction by the said electro-magnet; a spring-arm secured at one end to the said operating-member; a contact carried by the said spring-arm; and a pivotal latch positioned to engage the free end of the said spring-arm to releasably restrain the said contact from moving into its circuit-closing position; and a latch-operating finger carried by the said operating-member for swinging the said latch out of the path of the said spring-arm to permit the same to move the said contact into its circuit-closing position.

In testimony whereof, I have signed this specification.

ELOF L. CARLSON.