

Feb. 22, 1938.

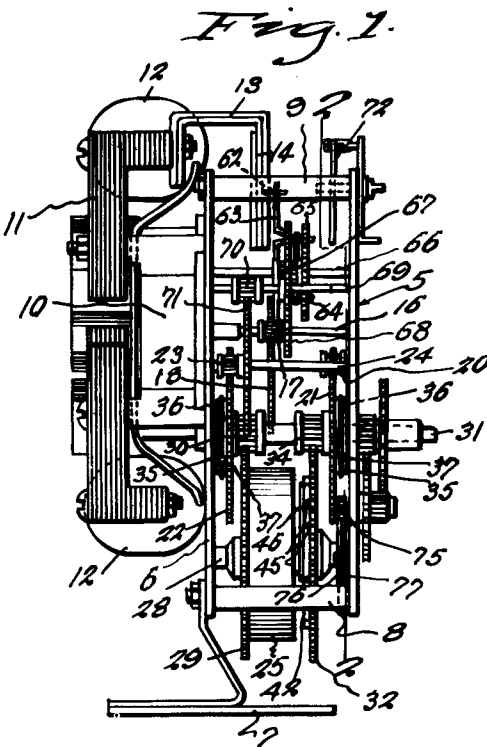
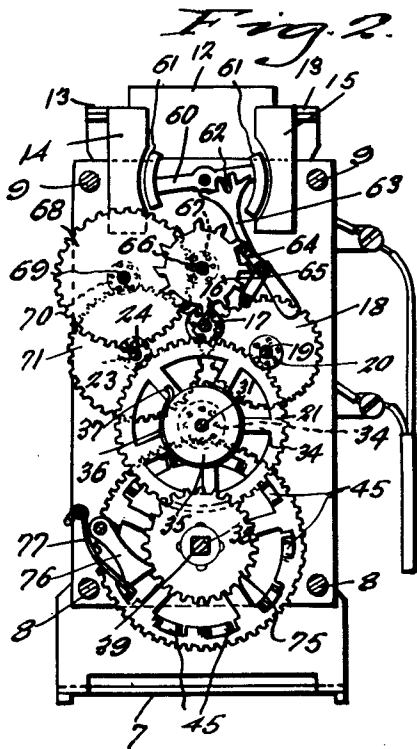
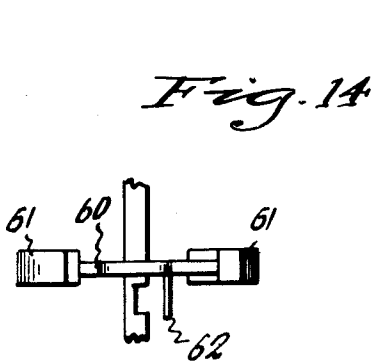
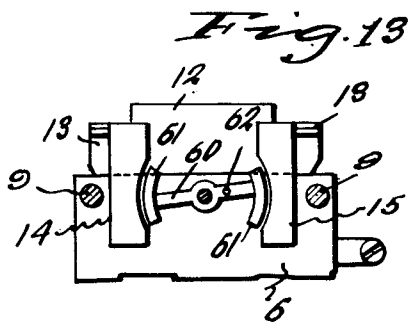
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2,108,931

ELECTRIC CLOCK MECHANISM

Filed Aug. 7, 1935

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 3.

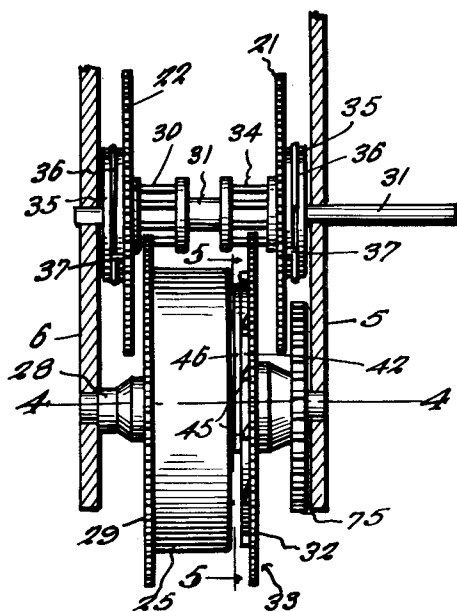


Fig. 4.

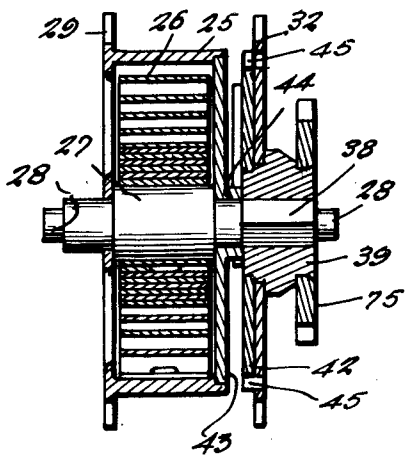


Fig. 5.

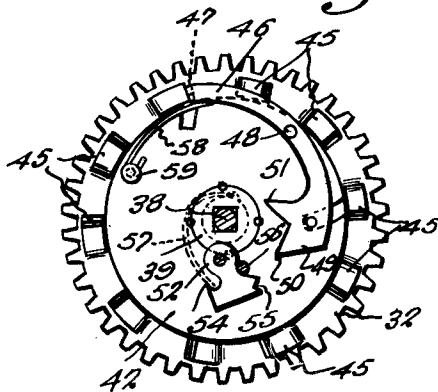


Fig. 6.

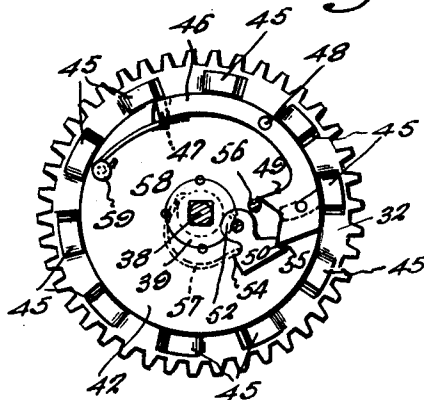
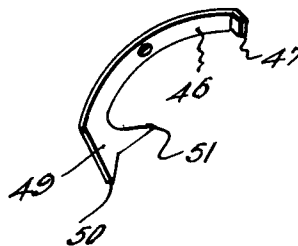


Fig. 7.



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3 Sheets-Sheet 3

Fig. 10.

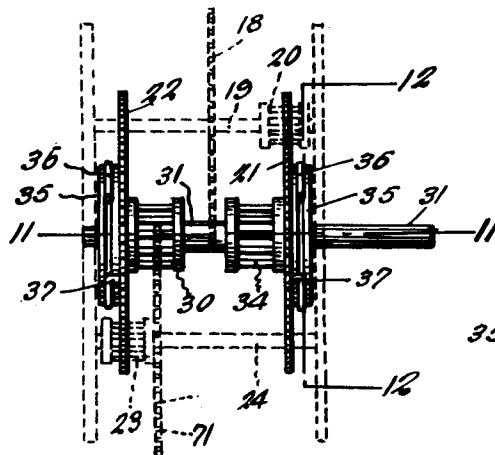


Fig. 11

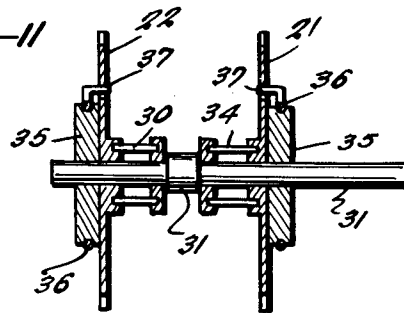


Fig. 12.

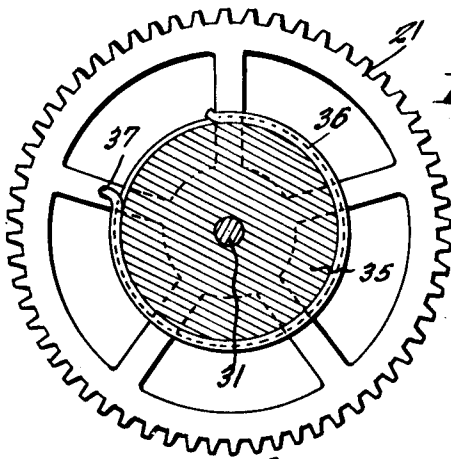


Fig. 8.

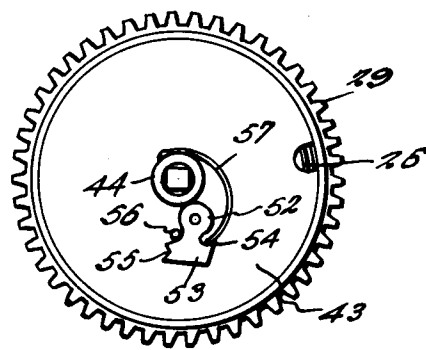
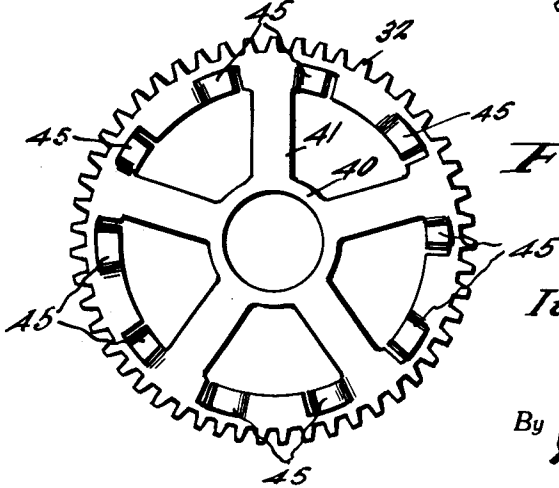


Fig. 9.



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UNITED STATES PATENT OFFICE

2,108,931

ELECTRIC CLOCK MECHANISM

Ivan Trepanier, Waterbury, Conn.

Application August 7, 1935, Serial No. 35,186

3 Claims. (Cl. 58—26)

This invention appertains to new uses and improvements in electric clock movements.

The principal object of the present invention is to provide an improved clock mechanism of the electric type wherein the balance wheel is locked against actuation when the power to the motor becomes interrupted.

Another important object of the invention is to provide novel clock means wherein the spring motor and electric motor are independently connected in driving relation to the time shaft.

Another important object of the invention is to provide improved main spring lock.

Various other important objects and advantages of the invention will become apparent to the reader of the following specification.

In the drawings:—

Figure 1 represents a side elevational view of the clock mechanism.

Figure 2 represents a vertical sectional view taken substantially on line 2—2 of Figure 1.

Figure 3 represents a fragmentary enlarged vertical sectional view taken through the main spring and associated mechanism.

Figure 4 is a diametrical sectional view through the main spring and the lock device therefor.

Figure 5 is a vertical sectional view taken substantially on line 5—5 of Figure 3, showing the main spring lock in locked position.

Figure 6 represents a view similar to Figure 5, showing the locking mechanism in unlocking position.

Figure 7 represents a perspective view of the latch of the main spring lock shown in Figures 5 and 6.

Figure 8 is an elevational view of the spring unit shown in Figure 4 with the lock mechanism removed.

Figure 9 represents an elevational view of the ratchet gear shown in Figures 5 and 6 removed from the latch plate.

Figure 10 is an elevational view, with its associated parts shown in dotted lines, of the clutch for the time shaft.

Figure 11 is a sectional view taken substantially on line 11—11 of Figure 10.

Figure 12 represents a sectional view (enlarged) taken substantially on line 12—12 of Figure 10.

Figure 13 represents a fragmentary detailed sectional view showing the balance wheel and its relationship to the field extension.

Figure 14 represents a fragmentary top plan

view of the balance wheel showing a pin thereon for engagement with the pallet fork.

Referring to the drawings, wherein like numerals designate like parts, it can be seen that numerals 5—6 represent side plates of the frame, between which the majority of the mechanism is located. Numeral 7 represents a supporting bracket which is secured to the lower spacing bolts 8 at the lower corners of the plate 5—6. Upper spacing bolts 9 are provided between the upper corners of the plate 5—6. Secured from the outside of the plate 6 is the motor 10 having the upper and lower field 11 with winding 12 thereon. The upper field 11 is provided with a pair of laterally extending arms 13 which dip down in front of the plate 6 to form auxiliary fields 14—15.

The motor 10 is provided with the drive shaft 16 which has the pinion gear 17 thereon. This pinion 17 connects with the gear 18 on the shaft 19 which carries the pinion 20 and this pinion 20 in turn connects with the center gear 21, which is driven by the electric motor. 22 (see Fig. 1) is the other center gear which meshes with the pinion 23 on the shaft 24 on substantially the same level as the shaft 19.

As can be seen in Fig. 3, 25 represents the drum housing which contains the spring 26, one end of which is attached to the inside of the drum while the other is connected to the enlarged portion 27 of the shaft 28. The ends of this shaft 28 are journaled in the plates 5—6. The spring housing 25 has the gear 29 thereon which meshes with the pinion 30 which rotates with the aforementioned gear 22 on the time shaft 31. The ring gear 32 of the lock device, herein referred to by numeral 33 in Figure 3, meshes with the pinion 34 which rotates with the other center gear 21 on the time shaft 31.

As can be seen in Figure 2, each of these center gears 21—22 is provided with spokes 34 and adjacent each of these wheels is clutch means in the form of a circumferentially grooved drum 35 fixed to shaft 30, said clutch means having a split spring wire ring 36 therein, with one end of the spring bent laterally and engaged into an opening of one of the spokes 34.

It will be observed in Figure 3 that when the spring 26 is driving the time shaft 31 by way of its gear 29 and the pinion 30, the gear 21 will be held against rotation; and on the other hand, when the mechanism is being driven by the electric motor shaft 16 by way of the gear 21, there will be no action of the pinion 30 with respect

to the spring 29, because when the electric motor is in operation the balance wheel 61 is under the influence of the magnetized auxiliary portions 14—15 of the motor field as is thought to be apparent.

Now referring more particularly to the lock mechanism shown in Figures 4, 5 and 6, it can be seen that the shaft 28 adjacent the housing 25 is provided with a squared portion 38 on which the hub 39 is fitted so as to rotate with the shaft 28. The gear 32 (Figure 9), which is provided with a hub portion 40 and spokes 41, rotates on the hub 39 while the latch plate 42 is suitably secured to the hub 39. The adjacent end of the spring housing 25 is provided with a fixed closure plate 43 which, as shown in Figures 4 and 8, is provided with a tubular spacer 44 which spaces the hub 39 from the spring housing.

Referring again to the gear 32, it can be seen that the gear is formed at points inwardly of the teeth thereof to provide ratchet teeth 45 with which the arc-shaped latch 46 is engaged. This latch 46 is provided with a laterally disposed lug 47 at one end and is rockably supported by its end 48 on the latch plate 42 at its intermediate point. The latch 46 is provided with a laterally disposed head portion 49 having a pair of diverged teeth 50—51 formed thereon.

On the outside of the closure plate 43 or the spring housing 25 is located a small rockable block 52 provided with a head portion 53 comprising a shoulder 54 at one end and a notched end portion 55. A pin 56 is located in a manner on the plate 43 so as to rotate laterally in the path of the latch head 49. A strip spring 57 is secured at one end to the spacing collar 44 on the closure plate 43 and bears at its opposite end against the shoulder 54 of the rockable block 52. A wire spring 58 anchored to plate 42 at one end as at 59 impinges against the lug end of the latch 46 so as to normally tend to urge the same outwardly in the direction of the ratchet teeth 45.

It can now be seen, that in order to release the gear 32 from the main spring 26, latch plate 42 in rotating with the shaft 28 ultimately results in the engagement of the tooth 51 with the pin 56, which results in engagement of the prong 50 thereof with the notched end 55 of the block 52 so as to hold the latch in a retracted position out of the path of the lug 45. Thus the gear 32 is free after the spring has been sufficiently wound due to the drag of the clutch means. In this connection it will be appreciated that the drive connection between gear 32 and the main-spring 25 is resumed for rewinding the main-spring when the electric motor again goes into operation. This re-engagement is effected in the following manner: as closure plate 43 turns with the drum 25 in response to the action of the spring 26 and in a clockwise direction (see Figure 6) block 50 remains in engagement with the latch 46 as shown in Figure 6 due to the action of the spring 57 on said block, until pin 56 moving with plate 43 engages block 50, at which time the latter against the action of spring 57 is rotated in a clockwise direction and out of engagement with the latch 46 so that the free end of the latter under action of spring 58 swings outwardly into the path of the ratchet teeth 45 and is ultimately engaged by one of said teeth whereby the drive connection between gear 32 and latch plate 42 is effected for winding the spring 26.

Referring now to the means for retaining the balance wheel when the motor is in operation

and releasing the same automatically, it can be seen in Figure 2, that the balance wheel 60 is provided with the arc-shaped wheel 61—61 in electromagnetic relation with respect to the auxiliary portions 14—15 of the motor field. This balance wheel 60 carries a pin 62 engageable with the fingers of the pallet fork 63, which fork, of course, is provided with the usual pallets 64 for coaction with the escapement wheel 65 located on the shaft 66. This shaft 66 is provided with pinions 67 which mesh with the gear at 68 on the shaft 69 and this shaft 69 is in turn provided with a pinion 70 meshing with gear 71 fixed to a pinion 23 meshing with the aforementioned gear 22.

The arrangement is such that when the balance wheel 60 has been stopped by the energy of the fields 14—15 the pin 62 will be well to one side of the line of centers of the balance wheel and pallet fork shafts to insure starting of the escapement mechanism on current failure. Thus, it can be seen that when the motor de-energized, the balance wheel 60 will be released so that, without any hesitation, the wheel will commence to oscillate and regulate in the usual manner the expenditure of the main spring tension.

To prevent retrograde movement of the shaft 28 during the winding of the spring 26 there is suitably mounted on the hub 39 a ratchet wheel 75 with which is cooperable a pivoted dog 76 urged into engagement with the teeth of the wheel 75 through the medium of the spring 77.

The operation of the device may be briefly explained as follows:

Normally the clock is driven by the electric motor. However, in the event the circuit, for any reason, through the electric motor is interrupted the spring motor goes into operation and will continue to operate until such time as the circuit through the electric motor is again complete when, as previously explained, the spring motor will go out of action and the electric motor take up the work of running the clock.

In this connection it will be apparent that when the electric motor is in operation the spring motor is held inactive by the magnetism of the electric clock, balance wheel 61 being held inactive by reason of the fact that the auxiliary fields 14—15 will remain energized as long as the electric motor is in operation. Upon de-energization of the fields 14—15 the balance wheel 61 is free and begins to oscillate and, as above stated, regulate in the usual manner the expenditure of the main spring tension.

While the foregoing specification sets forth the invention in specific terms, it is to be understood that numerous changes in the shape, size and material may be resorted to without departing from the spirit and scope of the invention as claimed hereinafter.

Having thus described the invention, what is claimed as new is:—

1. In an electric clock including a field structure; a balance wheel of magnetizable material, a pair of inverted U-shaped pole pieces, each of the said inverted U-shaped pole pieces having one of their leg portions secured to the field structure and the remaining leg portion disposed along opposite side portions of the balance wheel and in magnetic relation with respect thereto.

2. In an electric clock including a field structure; a balance wheel of magnetizable material, a pair of inverted U-shaped pole pieces, each of the said inverted U-shaped pole pieces having

one of their leg portions secured to the field structure and the remaining leg portion disposed along opposite side portions of the balance wheel and in magnetic relation with respect thereto, the last-mentioned leg portions of the pole pieces being provided at their opposed side edges with arcuate cut out portions in which the balance wheel operates.

3. In an electric clock including a field structure; a balance wheel of magnetizable material, a pair of inverted U-shaped pole pieces, each of the said inverted U-shaped pole pieces having

one of their leg portions secured to the field structure and the remaining leg portion disposed along opposite side portions of the balance wheel and in magnetic relation with respect thereto, the last-mentioned leg portions of the pole pieces being provided at their opposed side edges with arcuate cut out portions in which the balance wheel operates, said last-mentioned leg portions of the pole pieces being of multi-ply construction.

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10