Nov. 7, 1933. R. L. TWEEDALE 1,934,387

ELECTRIC ALARM CLOCK

Filed March 2, 1931

Fig. 1.

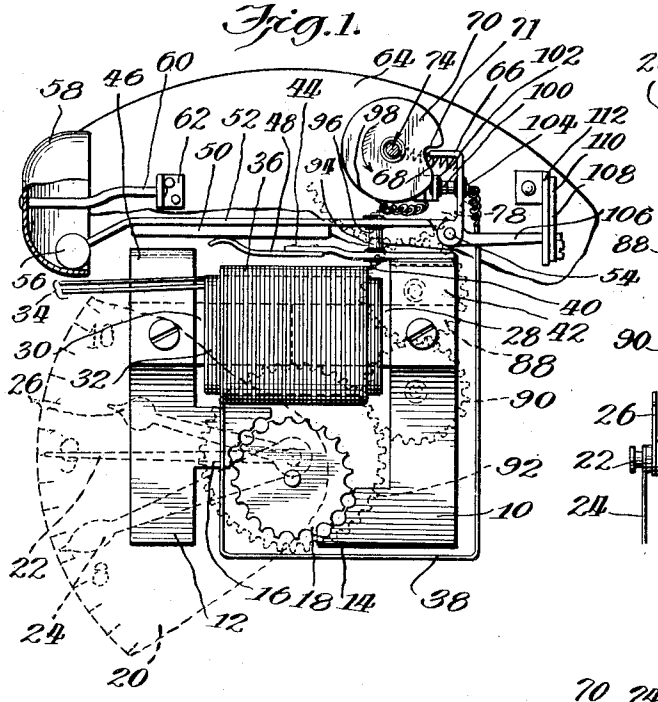


Fig. 2.

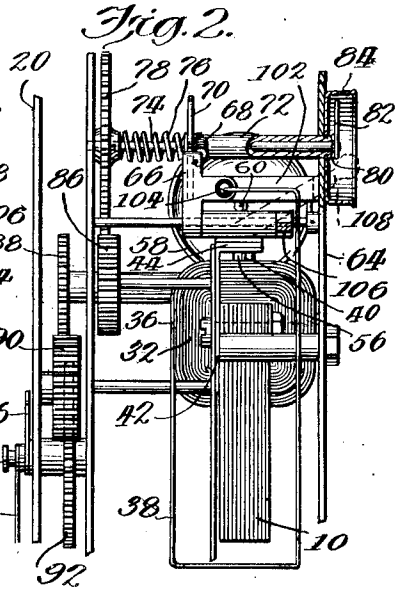
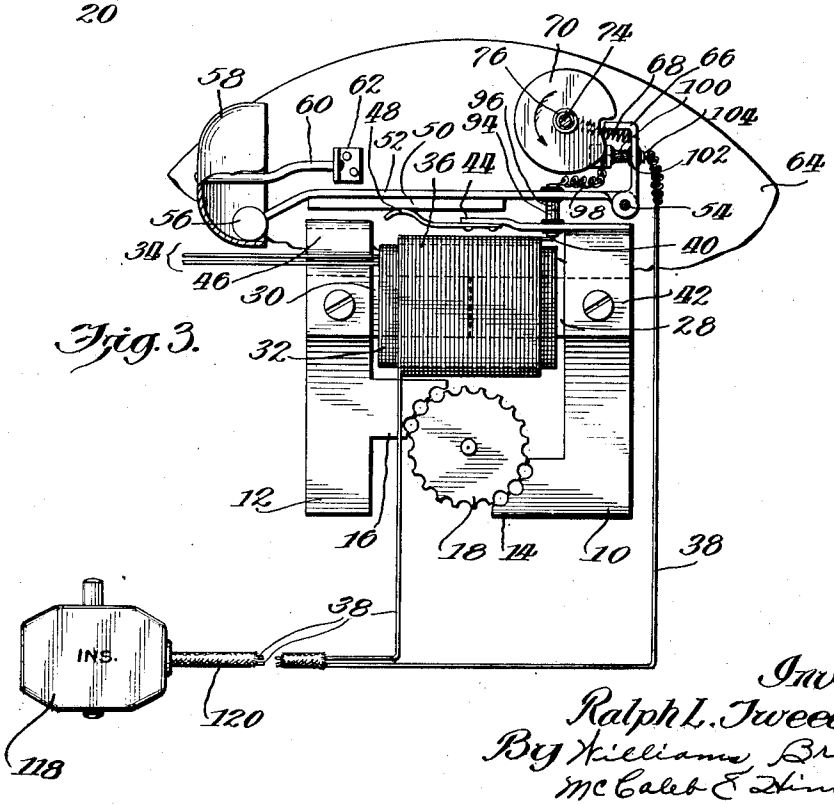


Fig. 3.



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ELECTRIC ALARM CLOCK

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4 Claims. (Cl. 58—19)

My invention relates generally to alarm clocks, and more particularly to improved alarm mechanisms for alternating current electric clocks.

It is an object of my invention to provide an alarm mechanism for A. C. electric clocks which is actuated by the magnetic flux generated by the field of the electric motor.

A further object is to provide an improved alarm mechanism for electric clocks which is simple in construction, may be economically manufactured, and readily applied for operation in conjunction with an electric clock.

Other objects will appear from the following description, reference being had to the accompanying drawing, in which

Figure 1 is an elevation of the alarm mechanism of the clock;

Figure 2 is a side elevation thereof; and

Figure 3 is a fragmentary elevation of a modified form of alarm mechanism.

The mechanism shown in Figs. 1 and 2 is illustrated as applied to an alternating current synchronous clock, comprising laminated field pieces 10 and 12 having poles 14 and 16, respectively, formed thereon. A toothed rotor 18 is rotatably mounted so as to have its teeth cooperable with the teeth of the pole pieces 14, 16, and is connected by the usual speed reducing gearing to drive the hands of the clock. The gearing may be of any desired construction, such, for example, as shown in the patent to Laurens Hammond, No. 1,719,805, granted July 2, 1929. A portion of the face of the clock is illustrated at 20, the second, minute and hour hands being designated 22, 24 and 26, respectively. The field pieces 10 and 12 have inwardly projecting portions 28 and 30, respectively, which together form a core for a coil 32, which is adapted to be supplied with alternating current of regulated frequency through conductors 34. A secondary coil 36 of relatively heavy wire is wound over the coil 32, and has conductors 38 and 40 connected to the ends thereof. The field piece 10 has an angle clip 42 secured thereto, this clip having a horizontally projecting portion 44. An angle clip 46 is similarly secured to the field piece 12.

A leaf spring 48 is secured to the end of the projection 44 and normally tends to move an armature 50 a short distance upward from the position in which it is shown in Fig. 1. The armature 50 is carried by a clapper arm 52, which is pivoted on a shaft 54 and at its free extremity carries a clapper 56 cooperable with a bell 58. The bell is secured to a stem 60 fixed to a bracket 62, the latter being suitably secured to the back plate 64 of the clock. The bracket 62, in addition to serving as a support for the bell, acts as a limit stop to prevent the clapper arm 52 from swinging upwardly more than a predetermined distance.

A follower arm 66 is pivotally mounted upon the shaft 54 and is pulled to the left (Fig. 1) by a tension spring 68 which has one end secured to the arm and the other end anchored to any suitable fixed support, so that the follower will be normally held in engagement with the peripheral edge of a notched cam 70. The cam 70 is secured to a sleeve 72 which is rotatable upon a shaft 74 but frictionally driven therewith. A spring 76 compressed between the cam 70 and a gear 78 fixed to the shaft 74 normally presses the right hand end of the sleeve (Fig. 2) against a friction washer 80, which is held on the shaft 74 by a pointer 82. The pointer is cooperable with a suitable dial formed on the inside of a manually engageable cup 84 which is secured to the sleeve 72. By rotating the cup 84, the position of the cam relative to the shaft 74 may be adjusted to set the time at which the alarm is to sound. The gear 78 is driven through idler gears 86, 88 and 90 from a gear 92, which is the low speed gear of the time gear train of the clock, and is connected to the hour hand. The gear ratios of this gear train are such that the gear 78 will make one revolution in twelve hours.

The conductor 40 of the secondary coil is connected to a contact 94, which is carried by the projection 44 of the clip 42 but insulated therefrom. The contact 94 is adapted to cooperate with a similar contact 96, carried by the clapper arm 52 but likewise insulated therefrom. A flexible conductor 98 connects the contact 96 with a contact point 100 carried by a bracket 102 fixed to the frame plate 64 but insulated therefrom. The contact 100 is adapted to be engaged by an insulated contact 104 carried by the follower arm 64 and is connected to conductor 38. It will thus be seen that when the contacts 94, 96 and 100, 104 are closed, the secondary coil 36 will be short-circuited.

The follower arm 66 has a lever 106 secured thereto. A lever 108, which projects through a slot 110 formed in the rear plate 64 and has its inner end pivotally secured to a bracket 112 carried by said plate 64, is adapted to engage the extremity of the lever 106. Thus, by swinging the lever 108 downwardly, the lever 106 will be pivoted clockwise (Fig. 1) and the contacts 100, 104 thereby separated.

In operation, the cam 70 is set upon the shaft 74 in the desired relation thereto (as determined

by the cooperation of the pointer 82 with the dial formed within the cup 84). When the cam 70 is thus positioned, it will rotate with the shaft 74 because of its frictional connection therewith. At the time set, the notch 71 in the cam 70 will have rotated to the position substantially as shown in Fig. 1, and the follower 66 permitted to drop into the notch under the influence of the spring 68. When the follower drops into the notch, the contacts 100, 104 will close, thus short-circuiting the secondary coil 36. The contacts 94, 96 will remain closed during the operation of the clock because the magnetic attraction upon the armature 50 will be sufficient to overcome the slight upwardly directed force exerted by the spring 48. The armature 50 and the clapper arm 52 have a sufficiently low natural period of oscillation that they will not respond to the variations in magnetic flux due to the passage of the alternating current through the primary coil 32. When, however, the secondary coil 36 is short-circuited, there will be a momentary decrease in the intensity of the magnetic flux acting upon the armature 50, this decrease being sufficient to permit the light spring 48 to force the armature away from the projection 44 and angle clip 46, thereby breaking the contacts 94, 96.

As soon as the secondary coil 36 is no longer short-circuited upon the separation of the contacts 94, 96, the magnetic flux acting upon the armature 50 will again increase to its normal intensity and rapidly draw the armature toward the angle clip 46 and projection 44 until arrested by the closing of contacts 94, 96 and engagement with the spring 48. It will thus be seen that as long as the contacts 100, 104 remain closed, the clapper arm 52 will act as a vibrator and cause the clapper 56 to strike the bell 58. The alarm may be shut off by swinging the lever 108 downwardly, which, through its engagement with the lever 106, will swing the follower arm 66 clockwise and separate the contacts 100, 104.

The mechanism illustrated in Fig. 3 is substantially identical with that previously described and illustrated in Figs. 1 and 2, and similar reference characters have therefore been applied to the similar parts. In this modified construction, the shut-off lever 108 and similar parts have been omitted and a suitable snap switch 118 connected in series with the conductor 38. The switch 118 may be mounted upon the clock or may, as shown, be connected thereto by an extension cord 120, so that the alarm may be shut off from a distance. It will be apparent that after the alarm has commenced ringing, it may be shut off by opening the circuit through the switch 38, since when this switch is open it is impossible to short-circuit the secondary coil 36. In other respects the operation of the modified construction is identical with that previously described with reference to the constructions of Figs. 1 and 2.

While I have illustrated and described a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details set forth but desire to avail myself of all changes within the scope of the appended claims.

I claim:

1. In an electric alarm clock, the combination of a synchronous motor having a field coil, a secondary coil magnetically coupled with said field coil, a normally open circuit for said secondary coil, means for closing said circuit at a predetermined time, sound producing means positioned adjacent said coils so as to be influenced by the magnetic flux produced thereby, and a current interrupter operated by said last-named means to interrupt the circuit in said secondary coil thereby to vary the intensity of the magnetic flux produced by said coils.

2. In an electric alarm clock, the combination of an alternating current controlled time regulating means having a primary coil adapted to be supplied with alternating current, a secondary coil magnetically coupled with said primary coil, an element of magnetic material mounted for vibratory movement in the magnetic field of said primary coil and adapted to be held closely adjacent said coil by the magnetic force thereof, a spring for moving said element away from said coil when the magnetic force of said primary coil is decreased, a pair of contacts, one fixed to said element and one fixed relative to said coil, and a time controlled switch, said pair of contacts and said switch being in series with said secondary coil and adapted when closed to short-circuit the latter.

3. In an electric alarm clock, the combination of an alternating current device for controlling the speed of operation of the clock, said device including a coil adapted to be supplied with alternating current, electro-magnetic means for relatively slowly varying the intensity of the magnetic flux produced by said coil as compared with the frequency of the alternating current supply, sound producing means responsive to said variations in the intensity of the magnetic flux, and means for rendering said electro-magnetic means operative at a predetermined time.

4. In an electric alarm clock, the combination of a synchronous motor having a field coil and a rotor, a gear train driven by said rotor, alarm release mechanism driven by said gear train, a switch adapted to be closed by said alarm release mechanism at a predetermined time, a vibratory armature of magnetic material movable in the magnetic field of said coil, said vibratory element having circuit making and breaking contacts, a spring for moving said element away from the denser portion of the magnetic field of said coil, a secondary coil magnetically coupled with said first-named coil for decreasing the magnetic field thereof upon the closing of said switch, and conductors connecting said switch, said circuit making and breaking means and said secondary coil in series.

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