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ELECTROMAGNET FOR WINDING AUTOMOBILE CLOCKS

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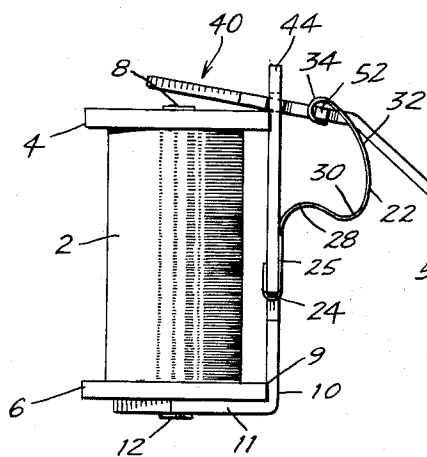


Fig. 2

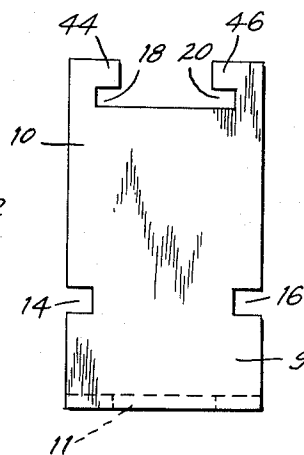


Fig. 4

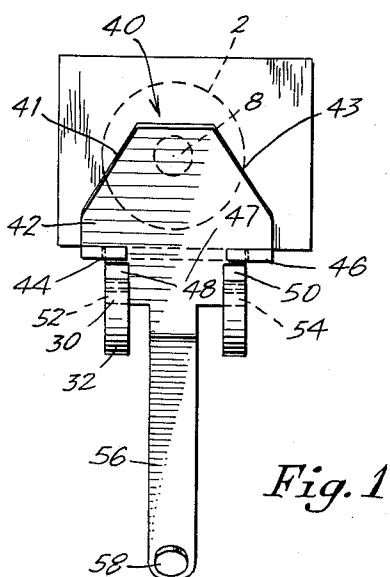


Fig. 1

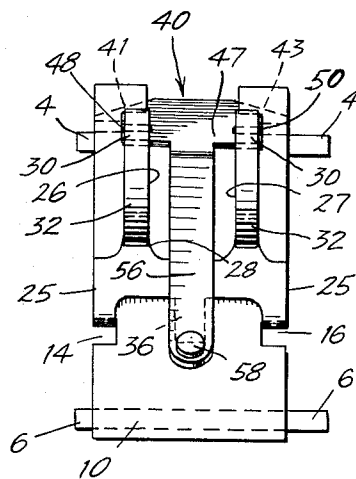


Fig. 3

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ELECTROMAGNET FOR WINDING AUTOMOBILE CLOCKS

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6 Claims. (Cl. 317-165)

This invention relates to self-winding clocks and more particularly relates to an electrically actuated winding mechanism for use in such clocks.

In the normal electric automobile clock now in use, the coil of an electromagnet is periodically energized causing the electromagnet armature to move and in moving to wind the main spring of the clock. The winding of the main spring usually takes place in the following manner. When the coil of the electromagnet is energized, it attracts its armature due to the magnetic field generated. When the armature moves, it contacts and moves some sort of inertia element which is attached to the source of motive power of the clock, such as a helical spring or a spiral coiled main spring. Movement of the inertia element causes the spring to be wound.

Both the armature and the inertia element are made parts of the clock's electrical circuit so that when the armature completes its path of travel, the circuit is broken due to the further movement of the inertia element as a result of its kinetic energy. A spring, commonly a leaf spring, returns the armature to its initial position and the main spring, as controlled by the escape mechanism, returns the inertia element to its initial position, that is, in contact with the armature. When the armature and inertia element make contact, the electrical circuit is completed, the coil energized, and the process repeated.

The armature return leaf spring is normally mounted on the side of the electromagnet coil by means of a number of screws and the armature-contact arm attached to the spring by suitable screws, bolts or pins. The armature-contact arm is often made in two sections which are bolted to or attached to opposite sides of the leaf spring. Although this mechanism is satisfactory in operation, the assembly costs are considerable, as is the cost of replacing the contact arm if its contact becomes pitted or otherwise damaged.

According to the present invention, it has now been found that by using a novel spring, an integral armature-contact arm can be used and the mechanism easily assembled and disassembled.

It is therefore a primary object of this invention to provide an electrically actuated winding mechanism of simple and inexpensive construction for a clock.

It is also an object of this invention to provide a novel spring for use in an electrically actuated winding mechanism for clocks.

It is another object of this invention to provide an improved spring and armature return assembly for electric clocks.

It is a further object of the invention to provide a novel armature return spring for electric clocks.

These and further objects and advantages of the invention will become more apparent upon reference to the following specification, claims and appended drawings wherein:

FIGURE 1 is an elevation view of the spring and armature assembly of the present invention;

FIGURE 2 is a side view of the spring and armature assembly of the present invention;

FIGURE 3 is a top view of the spring and armature assembly of the present invention; and

FIGURE 4 is an elevation view of the mounting plate used in the present invention.

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Referring now to the several figures, a coil 2 of the type normally used in electric automobile clocks is mounted on a core 8 between two fiber board end plates 4 and 6. An extension of the core 8 of the electromagnet coil protrudes through the end of plate 4 to exert an attractive force on an armature-contact arm generally indicated at 40. A mounting plate 10 having a vertical portion 9 and a horizontal portion 11 and made of any suitable metal is fastened to the end plate 6 in any desired manner, for example, as by the screw 12 through the horizontal portion 11 (FIGURE 2). For added strength and stability, the end plate 6 may be bonded to this portion of the mounting plate 10 by any suitable adhesive. In a similar manner, the leading edge of the end plate 4 may be bonded to the vertical portion 9 of the mounting plate 10.

The vertical portion 9 of the mounting plate 10, as best seen in FIGURE 4, is preferably rectangular in shape and has a pair of rectangular notches 14 and 16 formed in its lateral edges. An inverted T-shaped notch is formed in the upper edge of the vertical portion 9 leaving two rectangular channels 18 and 20.

A convoluted spring, generally indicated at 22, is mounted on the mounting plate by means of bifurcated bent over sections 24 which fit into the notches 14 and 16, and are wrapped upwardly around vertical portion 9, as best seen in FIGURE 2. The bifurcated arms extend downwardly from a base 25 of spring 22. A pair of parallel bifurcated arms 26 and 27 also extend outwardly and upwardly from base 25. The turned over sections 24 serve to hold the base 25 flush against the plate 10. Since the arms 26 and 27 are identical, only one of them will be described. The arm 26 has a first curved portion 28 which bends away and downward from the base 25, as seen in FIGURE 2. The arm then bends upward as shown at 30 and takes the form of a reversed C, as shown at 32. The loose end of the arm is bent over in a reverse bend at 34 for purposes presently to be explained. The radius of curvature of the portions 28 and 30 are greater than that of the portion 34. The spring is also provided with a central arm 36 depending from the base 25. This arm serves as a contact to which one end of the coil 2 may be connected.

The combination armature-contact arm 40 is tiltably mounted in the inverted T-shaped notch of the mounting plate. The armature-contact arm 40 is preferably provided with a first section 42 (FIGURE 1) which covers the protruding end of core 8 and can be attracted thereby. This first section 42 may be of any desirable configuration that presents a good attractive mass to the electromagnetic force exerted by the coil 2. As shown, the section 42 is rectangular with its corners truncated at 41 and 43 to conserve material.

The section 42 of armature-contact arm 40 is approximately the same width as the vertical portion 9 of mounting plate 10 but is joined to a narrower section 47 to provide shoulders 44 and 46 which extend through the channels 18 and 20 at the upper end of the mounting plate 10. The width of the armature-contact arm is further reduced at 48 and 50 to form lugs 52 and 54. A contact arm section 56 of the armature-contact arm depends from this widened section and is provided at its outermost end with an electrical contact 58.

In the operation of the present invention, the armature-contact arm is inserted in the inverted T-shaped notch in the mounting plate so that the shoulders 44 and 46 are located in the channels 18 and 20. The spring 22 is then positioned so that its turned over ends 24 are in the notches 14 and 16 in the plate 10 and its arms 26 and 27 extend upward with the bent over ends 34 wrapped around the lugs 52 and 54 of the armature-contact arm.

The particular configuration of the spring causes a force

having outward and downward components to be exerted on the armature-contact arm 40 (FIGURE 2). With the armature-contact arm in the position shown in FIGURE 2, a contact 60 on an inertia element 62 is carried toward the contact 58. The inertia element is driven in this direction by the main or drive spring of the clock (not shown). When the two contacts 58 and 60 establish an electrical connection, the coil 2 is energized and the section 42 of the armature-contact arm is attracted to the core 8, causing the armature-contact arm to rotate in a counterclockwise direction. This movement of the armature-contact arm causes a corresponding movement of the inertia element against the force of the clock main or driving spring. When the section 42 of the armature-contact arm engages the core 8, its counterclockwise movement is stopped. The inertia element 62, however, due to its inertia continues to move against the force of the driving spring. This continued movement of the inertia element causes the separation of contacts 58 and 60 with the consequent breaking of the circuit and de-energization of the coil 2.

Upon the de-energization of the coil 2, the armature return spring 22 draws the lugs 52 and 54 downward and thus causes the armature-contact arm to rotate in a clockwise direction. The inertia element 62 is then driven under the influence of the driving spring of the clock until it again causes contact 60 to engage contact 58. This engagement closes the circuit, thus energizing coil 2 and causing a repetition of the cycle previously described.

In the event the contact 58 becomes pitted or otherwise damaged, the armature-contact arm may be replaced without the laborious procedure of unscrewing and then re-screwing a number of screws or bolts. It is only necessary to disengage the ends 34 of the spring from the lugs 52 and 54, slide the armature-contact arm away from the vertical portion of the mounting plate to disengage the shoulders 44 and 46 from the channels 18 and 20, and lift the armature-contact arm upward away from the assembly. A new arm can be just as easily inserted, the whole operation taking only a matter of seconds.

It will be seen from the foregoing that the present invention provides a simple and inexpensive armature return spring assembly for motor driven, self-winding clocks. No screws or bolts are needed in this assembly and the armature-contact arm can therefore be easily inserted and replaced if such becomes necessary.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. An electromagnetic device comprising a coil, a magnetizable core surrounded by said coil, end plates for said coil, a mounting plate supported by said end plates and having at least one end protruding beyond a corresponding end plate, said protrusion being provided with a notch, an armature mounted in said notch, said armature having a first portion and a second portion, said first portion being on one side of said mounting plate and overlying one end of said core, said second portion of said armature being on the other side of said mounting plate and having a pair of lugs, and an armature return spring having a base with a pair of arms formed integral therewith, said

base being secured to said mounting plate, each of said arms having a first portion curving away from said mounting plate and a second portion recurving toward said mounting plate, said second portion terminating in a substantially closed loop having a radius of curvature smaller than said first and second portions and received over one of said lugs, whereby said loops and lugs secure said spring to said armature.

2. In an electro-magnetic device for winding the main spring of a clock having a coil, a plate, and an armature mounted on said plate, the improvement comprising an armature return spring having a base, said base having a first pair of arms for engaging said plate, and a second pair of arms integral with said base, each of the arms of said second pair having a first portion curving away from said plate, a second portion recurving toward said plate, and a third portion curving away from said plate, said third portion having a smaller radius of curvature than said first or second curved portions and adapted to engage said armature.

3. In an electro-magnetic device for winding the main spring of a clock having a coil, an armature movable by said coil, and a mounting plate for said armature, the improvement comprising an armature return spring having a base, a first pair of arms extending from said base and engageable with said plate to hold said base flush with said plate, and a second pair of arms extending from said base, each of the arms of said second pair having a first portion curved away from said plate, a second portion curved toward said plate and having a curvature opposite to that of said first portion, and a third portion curved away from said plate, said third portion having a radius of curvature smaller than said first or second portion and adapted to engage said armature.

4. An assembly comprising a magnetizable core, a substantially L-shaped plate having one leg secured to one end of said core and another leg extending along the core in spaced relationship thereto so that said core and said other leg have adjacent free ends, said other leg having a pair of notches formed in its lateral edges and an inverted T-shaped notch formed in its free end, an armature, said armature having a pair of notches formed in its edges for mounting said armature in said T-shaped notch, said armature having a pair of lugs, an armature return spring having a base, said base having a first pair of arms for engaging said notches formed in the lateral edges of said other leg, and a second pair of arms integral with said base, each of the arms of said second pair having a first portion curving away from said other leg, a second portion recurving toward said plate, and a third portion curving away from said plate, said third portion engaging said lugs whereby said armature is biased away from said core and is held in place by the force exerted by said spring.

5. An assembly according to claim 4 wherein said armature is formed of a first and second portion, said first portion being within the attractive field of said core when said core is energized, said second portion having said lugs formed on its edges.

6. An assembly according to claim 5 wherein said second portion has an electrical contact mounted thereon.

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