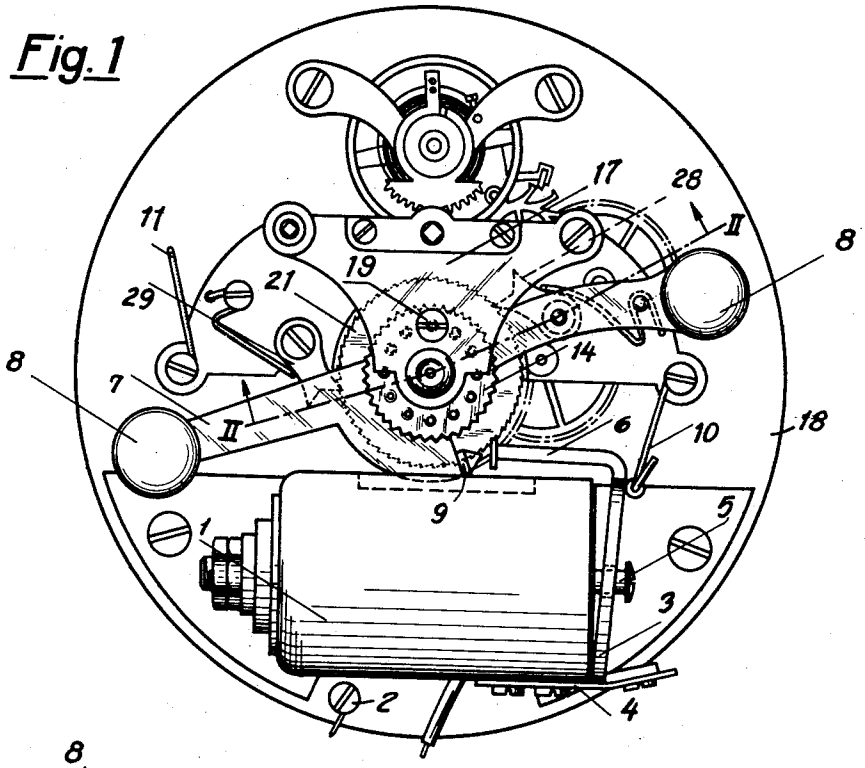
Aug. 22, 1950 E. STEINMANN 2,519,713

TIMEPIECE WITH ELECTROMAGNETIC WINDING DEVICE

Filed Oct. 30, 1945

Fig. 1



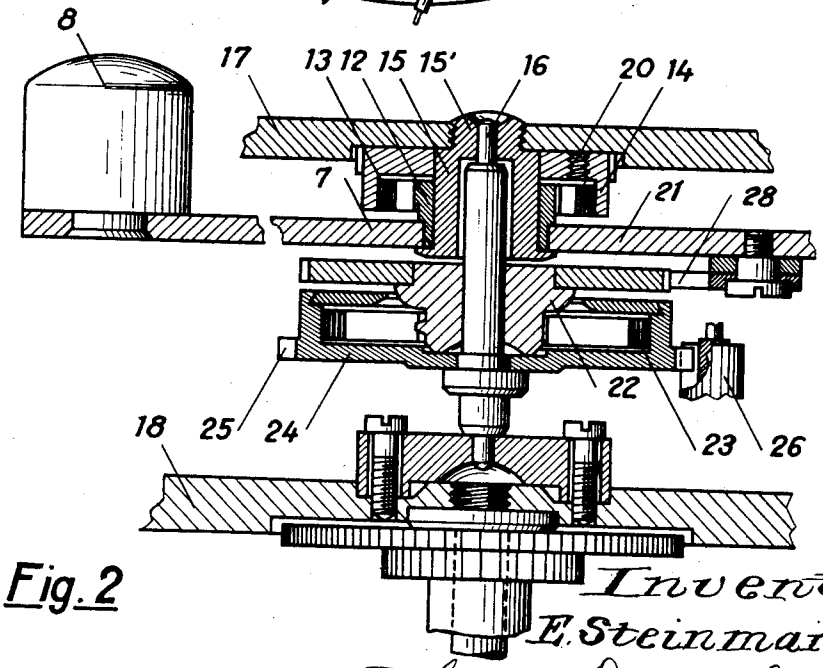


Fig. 2

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TIMEPIECE WITH ELECTROMAGNETIC WINDING DEVICE

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1 Claim. (Cl. 58—41)

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This invention relates to time-pieces with electro-magnetic winding device and more particularly to time-pieces in which the oscillating armature of the electro-magnet attracted by this latter, actuates an equalizer which promotes by its rotation the setting of a mainspring and in which the equalizer, driven back by the said mainspring sets through its return movement a second mainspring lodged in a barrel the toothed crown of which meshes with the first wheel of the movement.

A chief feature of the invention resides in that the bush of the first mainspring is mounted on a stationary sleeve in the bottom of which is pivoted the arbor of the second barrel, the bush of the second mainspring being mounted directly on said arbor.

The annexed drawing illustrates, by way of example, an embodiment of the invention;

Fig. 1 is a plane view from the side opposite the base plate, and

Fig. 2 is a cross section on enlarged scale of the driving mechanism, along the line II—II of Fig. 1.

With reference to the drawing, 1 designates an electro-magnet, the coil of which is connected with one of the poles of a source of current, the other pole of which is connected through the terminal 2 with the earth. 3 is the armature oscillatingly mounted on the body of the electro-magnet by means of a spring blade 4 serving as a hinge. The armature 3 is guided by an axial rod 5 and has an arm 6 parallel to the axis of the electro-magnet. 7 is an equalizer, the arms of which are provided with weights 8. The equalizer has further a contact member 9 adapted to co-operate with the extremity of the arm 6 of the armature in order to close or open the circuit of the electro-magnet 1. 10 is a resilient stop adapted to damp the shocks of the armature 3 when the latter comes back to its position of rest as shown in Fig. 1. 11 is another resilient stop limiting the clockwise rotation of the equalizer 7.

The equalizer 7 is dependent upon the bush 12 to which is fixed the inner extremity of a first mainspring 13 lodged in a stationary barrel 14. This barrel is mounted on a stationary sleeve 15 screwed in the upper bridge 17; on the sleeve 15 is rotatably mounted the bush 12 of the first mainspring 13, which bush is dependent upon the equalizer 7. The barrel 14 may be fixed in several angular positions with respect to the sleeve 15 by means of a screw 19 adapted to engage one of a series of bores 20 provided in the bottom

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of the barrel 14, whereby the initial tension of the mainspring 13 may be regulated.

In the bottom 15' of the sleeve 15 is journalled the upper end of a central arbor 16, the lower end of which is pivoted in a bearing fixed to a lower bridge 18.

On this central arbor 16, above the equalizer 7, there is loosely mounted a bush 22 dependent upon a ratchet wheel 21; to the bush 22 is hooked the inner end of a second mainspring 23 lodged in a second barrel 24 the rotatable drum of which is wedged to the central arbor 16 and carries a toothed crown 25 which meshes constantly with the first pinion 26 of the gear train of the movement.

The operation of the electro-magnetic winding device is as follows:

When the circuit of the electro-magnet is closed between the arm 6 of the armature and the contact 9 of the equalizer 7, the electro-magnet attracts its armature. The equalizer 7 is then driven in the clockwise direction and sets the upper mainspring 13, the inner end of which is hooked to the bush 12 dependent upon the equalizer. When the armature 3 runs against the electro-magnet, the equalizer 7, the moment of inertia of which is relatively high, pursues its clockwise rotation under the action of its vis inertiae, whereby the contact between the members 6 and 9 is interrupted. The resilient stop 11 limitates the clockwise rotation of the equalizer. As the armature is not more attracted, it is brought back by the spring blade 4 to its position of rest against the stop 10. The upper mainspring 13 by releasing itself rotates the equalizer 7 in the counterclockwise direction. During this return rotation, the equalizer drives by means of the pawl 28 carried by its upper face the ratchet wheel 21 dependent upon the bush 22 to which is hooked the inner end of the lower mainspring 23, thus setting said mainspring. As the ratchet wheel 21 and the bush 22 are held in their angular position by the pawl 29, the mainspring 23 releases itself slowly and rotates the drum of the barrel 24 which meshes with the first wheel of the movement.

The only function of the upper mainspring 13 resides thus in bringing back the equalizer and in setting the lower mainsprng 23 which acts alone as a driving spring. This arrangement has with respect to the known construction of the single mainspring acting simultaneously as driving member and as antagonistic spring for the equalizer the double advantage of suppressing the too blunt impulses given to the movement and

of limiting the tension of the driving mainspring, for it is easy to calibrate the upper mainspring so that its force cannot overreach a predetermined limit of tension of the lower mainspring. In the known devices comprising a single mainspring, the impulses given to the first wheel by the equalizer are communicated by means of the ratchet wheel alone. Obviously, if at the beginning of the return oscillation of the equalizer the driving pawl carried by the latter lies in front of the apex of a tooth of the ratchet wheel, the impulse given to the movement will begin with a shock. Further during the forward oscillation of the equalizer, no oscillation is given to the movement. The time piece as described and shown in the drawing suppresses those irregularities owing to the second mainspring which absorbs itself the shocks of the impulses and drives the movement continuously and with a force always substantially constant, thus improving the precision while permitting the frequency of the winding impulses to be substantially reduced. Further, due to the fact that the bush **22** of the second mainspring is mounted directly on the central arbor **16**, the extremity of which is pivoted in the bottom of the stationary sleeve **15**, the frictions are substantially reduced.

What I claim is:

In an electro-magnetic self-winding time piece comprising a time piece movement, the combination of a frame, an electromagnet having an oscillating armature spring hinged thereto to be moved in one direction when said electro-magnet is energized and in the opposite direction when not, a barrel arbor pivoted by its lower extremity in the frame and by its upper extremity in the bottom of a stationary sleeve secured to the frame, a weighted equalizer having a hub rotatably mounted on said stationary sleeve, a first barrel rotatably mounted on said sleeve adjacent said hub, a first mainspring about said arbor having its inner end attached to said equalizer hub and its outer end attached to said first barrel, means for fixing said first barrel in different angular positions with respect to said stationary sleeve whereby the initial tension of said first mainspring may be regulated, said first mainspring actuating said equalizer and said armature cooperating when energized with said equalizer for retensioning said first mainspring, said equalizer and said armature forming cooperating contacts to open and close the circuit of the electromagnet, a second barrel secured to said arbor and having teeth intended to drive the time piece movement, a second mainspring in said second barrel having its outer end attached thereto, a winding ratchet having its hub rotatably mounted on said arbor adjacent the lower end of said stationary sleeve and controlling the inner end of said second mainspring for winding it up, and an actuating pawl controlling the winding movement of said ratchet, said pawl being actuated by said equalizer when said equalizer is moved by said first mainspring to close the circuit with said armature.

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