Sept. 4, 1962 A. BEYNER ET AL 3,052,082

ELECTRIC TIMEPIECE

Filed April 19, 1960 2 Sheets-Sheet 1

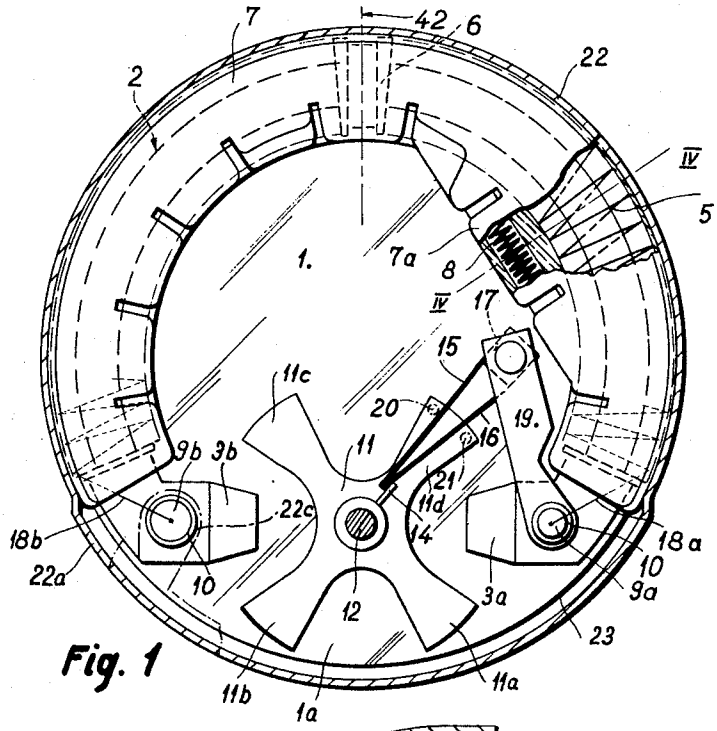


Fig. 1

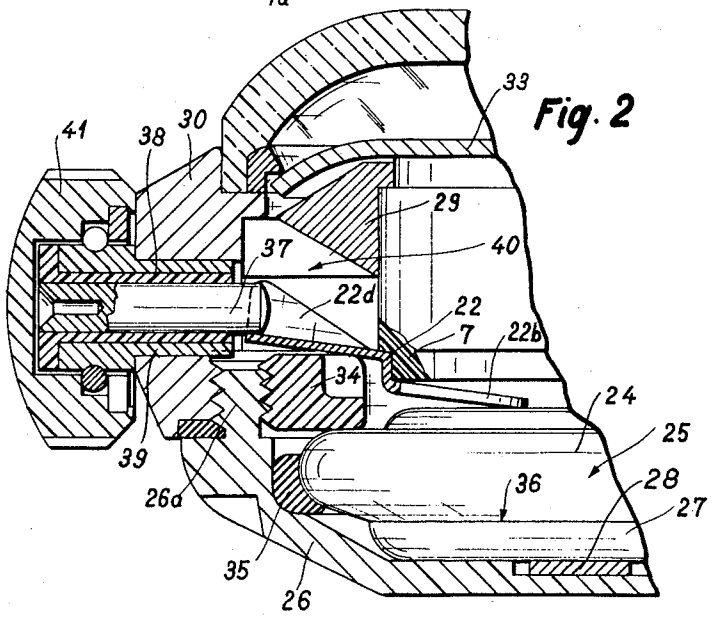


Fig. 2

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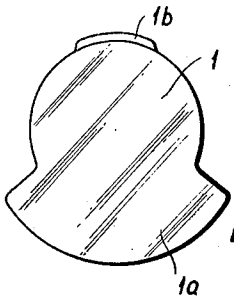


Fig.3

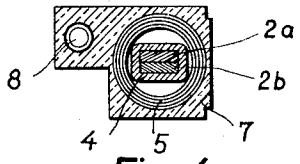
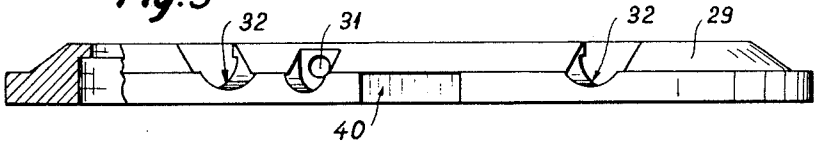


Fig.4

Fig.5



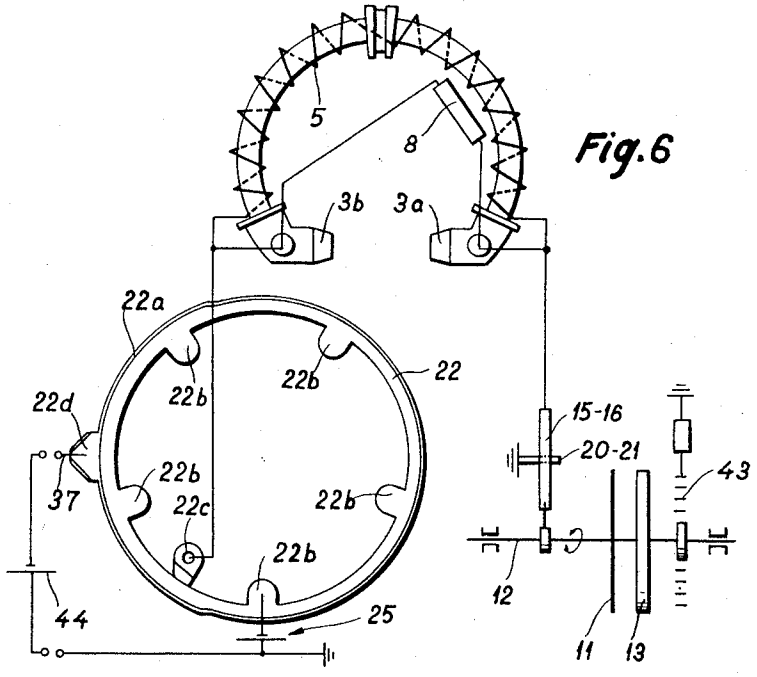


Fig.6

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ELECTRIC TIMEPIECE

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8 Claims. (Cl. 58—23)

The present invention relates to an electric timepiece.

This electric timepiece is characterised by the fact that a casing ring electrically insulated from the frame of the movement surrounds the latter and provides the electrical connection on the one hand between the motor and one terminal of an accumulator enclosed in the case, and on the other hand between the said accumulator and a terminal for re-charging the latter, which terminal is mounted on the case in such manner as to be electrically insulated therefrom.

One constructional form of the subject of the invention is illustrated by way of example in the drawings, in which only the parts necessary for an understanding of the invention have been shown.

FIGURE 1 is a diagrammatic plan view partly in fragmentary form and partly in section, of the movement of an electric timepiece,

FIGURE 2 is a fragmentary axial section through the timepiece with its case, to a larger scale,

FIGURE 3 is a plan view of the movement plate, to a smaller scale, in which only its outer contour has been shown,

FIGURE 4 is a section through a detail along the line IV—IV of FIGURE 1,

FIGURE 5 is an elevational view of a detail, partly in section, and

FIGURE 6 is a circuit diagram in which the main parts have been diagrammatically represented, and which illustrates the principle of operation of the motor.

The illustrated timepiece is a wrist watch having a round movement. The latter comprises a circular movement plate **1** having a portion **1***a* of larger diameter, as also an external lug **1***b* diametrically opposite the part **1***a* (FIGURES 1 and 3).

The electric motor of the said watch comprises a stator having a core **2** of horseshoe shape, which is terminated by two pole pieces **3***a* and **3***b*. The core is in turn formed of two ferromagnetic strips **2***a* and **2***b* (FIGURE 4) bedded in a layer **4** of electrically insulating material. The core carries an electric winding **5** formed of two parts separated by a sleeve **6** mounted on the strips **2***a* and **2***b*, at the mid-point of the latter. The winding is covered by a protective packing **7** of electrically insulating plastic material, which has a substantially square external section, except at the location of the section line IV—IV, where the packing has an internally extending projection **7***a* covering a resistance **8**, the function of which will hereinafter be indicated. The stator is fixed to the movement plate **1** by the lug **1***b* on the latter, which is introduced into a recess corresponding to the packing **7**, and by screws (not shown) which extend through holes **9***a* and **9***b* in the pole pieces **3***a* and **3***b*, from which they are electrically insulated by insulating bushes **10** internally lining said holes.

The rotor of the motor comprises a movable armature formed of a disc **11** of ferromagnetic material having four vanes **11***a*, **11***b*, **11***c* and **11***d*. The disc is mounted on the staff **12** of the balance wheel, which is not shown in FIGURE 1, but is diagrammatically represented at **13** in FIGURE 6. It is to be noted that the bridges of the movement, which partially cover the movable armature **11**, also have not been shown.

The driving pulses are controlled by the balance wheel and an associated switch. Staff **12** of the balance wheel carries for this purpose a dog **14** acting, in its passage, on two resilient switch blades **15** and **16** fixed to the plate **1** by means of an insulating stud **17** and electrically connected to the lead-out wire **18***a* of the winding **5** by a metal bar **19**. It is to be noted that the bar is also insulated from the fixing screw of the stator, which extends through the hole **9***a*. When the dog **14** is in contact with either one of the resilient blades **15** and **16**, it connects to ground in common with one of the poles of an electric current source, as will hereinafter be described, and further connects with the lead-out wire of the winding **5**. The current then flows through the winding in such manner that the movable armature **11** is thus subjected to a pulse. It is to be noted that two pins **20** and **21** are in addition fixed to the frame of the movement, at a bridge (not shown) which extends over the blades **15** and **16**. When the blades are deformed by the dog **14**, one of the blades, depending upon the direction of movement of the balance wheel, comes into contact with one of the pins **20** and **21**, whereby the grounding of these blades is further ensured. The motor drives the hands (not shown) through a normal mechanism, for example a lever, which also has not been shown, and which does not form part of the present invention.

The movement is surrounded by a casing ring **22** which bears on the insulating packing **7** of the stator, so that it is not in electrical contact with the frame of the movement. In order to avoid accidental contact, that portion **22***a* of the ring **22** which is situated opposite the portion **1***a* of the movement plate **1** is of larger diameter than the remainder of the ring **22**. In addition, the external diameter of the portion **1***a* of the plate is smaller than the external diameter of the insulating packing **7** of the stator. Consequently, a safety space **23** remains between the plate and the ring **22**. The ring has internal resilient lugs **22***b* bearing against a dome **24** of the envelope of an accumulator **25** (FIGURE 2) lodged in the back **26** of the watch case. This dome constitutes one of the poles of the accumulator, the other pole consisting of a dome **27** of the envelope, which dome is in contact with the back **26**, that is to say, with ground. An annular ring **28** is disposed between the dome **27** and the back to ensure electrical contact between these two parts. The casing ring **22** has in addition an inner lug **22***c* (FIGURES 1 and 6) connected to the lead-in wire **18***b* of the winding **5**. Thus, the electrical connection between the motor and the accumulator is ensured on the one hand through ground and on the other hand through the casing ring **22**. It is to be noted that the resilient tongues **22***b* serve both to ensure electrical contact and to suspend the movement resiliently in the case.

The movement is in addition surrounded by a cage **29** (FIGURES 2 and 5) bearing against the case body denoted by **30**. The cage is formed with an internally threaded hole **31** (FIGURE 5) to receive a screw laterally locking the plate **1**, the object of which screw is to ensure good electrical contact between the said plate and the cage **29**. The latter has two passages **32** through which access can be had by means of a screwdriver to the screws by which the feet (not shown) of the dial denoted by **33** (FIGURE 2) are secured.

It is to be noted that the accumulator **25** is maintained in position in the back **26** by a ring **34** of electrically insulating material, which is screwed into an internal screw thread in the ledge **26***a* of the back **26**. A fluid-tight packing **35** is disposed between the accumulator **25** and the back **26**. The packing has the object of preventing any electrolyte which may escape from the accumulator through the joint **36** between the

domes 24 and 27 from spreading into the case and more especially from reaching the movement.

The illustrated watch comprises in addition a terminal for recharging the accumulator. The terminal consists of a rod 37 surrounded by an insulating sleeve 38 which is in turn engaged in a sleeve 39 fitted in the case body 30. The rod 37 bears at its inner end against an external lug 22*d* of the casing ring 22, which extends freely into a recess 40 in the cage 29. When a current source (for example a dry cell) is placed in contact with the outer end of the rod 37, on the one hand, and with the case on the other hand, the accumulator 25 is recharged, the electrical connection being effected through the casing ring 22. A detachable cap 41 is fixed on the sleeve 39 to prevent the outer end of the rod 37 from being accidentally brought into contact with ground, for example by moisture of the ambient air or by the perspiration of the wearer of the watch.

Finally, it is to be noted that the hand setting stem of the watch, which is represented only by its axis 42 (FIGURE 1), passes between the two parts of the winding 5 by way of a recess (not shown) formed for this purpose in the insulating packing 7, level with the sleeve 6.

The operation of the illustrated watch is diagrammatically illustrated in FIGURE 6. It will be seen in this figure that with regard to the series connected accumulator and motor, one of the poles of the accumulator 25 is connected to ground, while the other pole is connected to the ring 22 by the lugs 22*b* of the latter. The lug 22*c* is connected to the input terminal of the winding 5, while the output terminal of the latter is connected to the blades 15 and 16. The latter are grounded when the dog 14 is in contact with them and when it applies them against the pins 20 and 21. The dog is in turn connected to ground by the staff 12 of the balance wheel and by the spiral spring denoted by 43, because since the bearings of the staff 12 consist of rubies, the staff is not directly in contact with the frame of the movement. In this figure, the armature 11 mounted on the staff 12 of the balance wheel 13 is shown at a distance from the stator, whereas in practice it is pivotally mounted between the pole pieces 3*a* and 3*b* above which there extend the ends of its vanes 11*a* to 11*d*. The recharging terminal 37, series connected with the casing ring and accumulator, has been diagrammatically illustrated, and so has the recharging cell denoted by 44. The resistance 8 bedded in the inner projection 7*a* of the insulating packing 7 of the stator is connected in parallel with the winding 5. It has the object of protecting the contact formed by the dog 14 and the blades 15 and 16, and it may be replaced by a diode.

What we claim is:

1. In an electric timepiece having a movement wherein an electric motor has a pair of motor terminals and a stator winding interconnecting said terminals, a case enclosing said movement, a recharging terminal mounted on said case and electrically insulated from said case, and an accumulator located within said case and having a pair of accumulator terminals connected in series electrical circuit with said motor across said motor terminals, the improvement which includes an electrically conductive support for said movement within said case and having resilient lugs electrically conductively supported by one of said pair of accumulator terminals, and said movement having electrical insulation embedding said stator winding and said insulation being engaged with said support whereby said movement is supported by said support and said resilient lugs thereof, electrically insulated from said support, said support being disposed electrically conductively between one of said pair of motor terminals and said one of said pair of accumulator terminals as a component of said series electrical circuit, and said support being electrically conductively between said recharging terminal and said one of said accumulator terminals as a conductor for said accumulator to be recharged.

2. In an electric timepiece as claimed in claim 1, wherein said electrically conductive support includes a lug electrically contacting said recharging terminal.

3. In an electric timepiece as claimed in claim 1, wherein the other accumulator terminal of said pair of terminals of said accumulator is grounded to said case, and the other motor terminal of said pair of motor terminals is grounded to said case.

4. In an electric timepiece as claimed in claim 1, wherein a cage is disposed between said movement and said case and is in grounded interconnection of said other motor terminal of said pair of motor terminals and said case, and said other accumulator terminal of said pair of accumulator terminals abuts the back of said case in an electrically grounded relation to said case.

5. In an electric timepiece having a movement wherein an electric motor has a pair of motor terminals and a stator winding interconnecting said terminals, a case enclosing said movement, a recharging terminal mounted on said case and electrically insulated from said case, and an accumulator located within said case and having a pair of accumulator terminals connected in series electrical circuit with said motor across said motor terminals, the improvement which includes an electrically conductive casing ring surrounding said movement within said case and having resilient lugs electrically conductively supported by one of said pair of accumulator terminals, and said movement having electrical insulation embedding said stator winding and said insulation being engaged with said casing ring whereby said movement is supported by said ring and said resilient lugs thereof, electrically insulated from said casing ring, said casing ring being disposed electrically conductively between one of said pair of motor terminals and said one of said pair of accumulator terminals as a component of said series electrical circuit, and said casing ring being electrically conductively between said recharging terminal and said one of said accumulator terminals as a conductor for said accumulator to be recharged.

6. In an electric timepiece having a movement wherein an electric motor has a pair of motor terminals and a stator winding interconnecting said terminals, said winding being on a stator core of said motor, a case enclosing said movement, a recharging terminal mounted on said case and electrically insulated from said case, and an accumulator located within said case and having a pair of accumulator terminals connected in series electrical circuit with said motor across said motor terminals, the improvement which includes said stator core having a substantially circular curvature and said winding and core co-extending more than 180° in terms of length of the core, a substantially circular frame of said movement, an electrically conductive substantially circular casing ring surrounding said frame in a peripherally spaced relation thereto within said case and having resilient lugs electrically conductively supported by one of said pair of accumulator terminals, and said movement having electrical insulation embedding said stator winding and said insulation being engaged with said frame and with said casing ring radially outward from said frame whereby said frame is supported in said peripherally spaced relation to said ring by said insulation, said casing ring being disposed electrically conductively between one of said pair of motor terminals and said one of said pair of accumulator terminals as a component of said series electrical circuit, and said casing ring being electrically conductively between said recharging terminal and said one of said accumulator terminals as a conductor for said accumulator to be recharged.

7. In an electric timepiece as claimed in claim 6, wherein said insulation embedding the stator winding has an opening receiving a hand-setting stem of said movement through said opening, and said stator winding is in two sections in series and said sections are disposed on opposite sides of said opening.

8. In an electric timepiece having a movement wherein an electric motor has a pair of motor terminals and a stator winding interconnecting said terminals, a case enclosing said movement, a recharging terminal mounted on said case and electrically insulated from said case, and an accumulator located within said case and having a pair of accumulator terminals connected in series electrical circuit with said motor across said motor terminals, the improvement which includes an electrically conductive casing ring surrounding said movement within said case, said casing ring having resilient internal lugs electrically conductively supported by one of said pair of accumulator terminals and having an external terminal lug and an internal terminal lug, and said movement having electrical insulation embedding said stator winding and said insulation being engaged with said casing ring whereby said movement is supported by said ring and said resilient lugs thereof electrically insulated from said casing ring, said internal terminal lug being electrically conductively connected with one of said pair of motor terminals placing said ring in said series electrical circuit, and said external terminal lug being electrically conductively connected with said recharging terminal making said ring a conductor for said accumulator to be recharged.

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