

PATENT SPECIFICATION

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(54) STEM LOCKING MECHANISM FOR ELECTRIC CALENDAR WATCHES

(71) We, TIMEX CORPORATION, a Corporation organized under the laws of the State of Delaware, United States of America of Waterbury 20, Connecticut, United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to electric horological devices including calendar indicating ring or rings for indicating the day and/or date. More particularly, the invention relates to electric calendar watches with provision of rapid advancement of a calendar indicating ring and is especially directed to a stem locking mechanism for preventing inadvertent actuation of the rapid advancing mechanism.

Watches are known where the day and/or date are indicated on rings which are automatically advanced from one position to the next. Watches are also known with provisions for rapid advancement of the calendar ring, and also for rapid advancement of a date ring with respect to a day ring to account for months having less than 31 days, without disturbing the timekeeping of the hands.

In the case of an electric watch, the stem does not provide a winding function as in a mechanical watch, and it is convenient to employ a stem which can be rotated in one axial position for setting the hands to the correct time and in another axial position to cause rapid advancement of a calendar ring. However, a problem has been experienced whereby inadvertent rotation of the stem in the latter position can cause undesired rapid advancement of the calendar ring. A proposal which seeks to solve this problem is a stem mechanism with three selectable axial positions, the rapid advancing or intermediate position

serving to disengage a combination detent and calendar ring drive so that a separate rapid advancing drive mechanism can be actuated. The mechanism is fairly complicated and the user must choose between three axial operating positions of the stem.

Accordingly, an object of the present invention is to provide a stem mechanism in an electric calendar watch which locks the stem against inadvertent actuation of the rapid advance mechanism and which is economical to manufacture.

According to the invention there is provided an electric watch of the type having a calendar ring and including means for circumferentially advancing the ring from one position to the next during normal timekeeping, a time setting wheel with teeth and a rotatably mounted and axially slidable stem carrying a time setting pinion mounted for engagement with said time setting wheel in a first axial stem position, a fixed stem bracket receiving one end of the stem and having means co-operating with the stem either to hold it in said first axial position or to urge it toward a second axial position wherein the time setting pinion is disengaged from the time setting wheel, a date setting member adapted to be coupled to the stem and having at least one tab means thereon engageable with said calendar ring to advance it to a new circumferential position, said member further being disengageable from the stem when the stem is moved to said first axial position, said stem having locking key means thereon and said stem-receiving portion of said stem bracket having an irregular aperture therein for receiving said locking key means and preventing rotation of the stem in one direction when the stem is in said second axial position, and cam means formed by the wall of said aperture and operative, when the stem is in the second axial position and is rotated in the

other direction, to cause the stem to move to a third intermediate axial position without engaging the time setting wheel or disengaging the date setting member, whereby the date may be rapidly advanced by rotation of the date setting member in the said other direction.

The above and other features and advantages of the invention will be made further apparent by reference to the following description of a preferred embodiment of the invention, reference being had to the accompanying drawings, in which:—

Figure 1 is a partial plan view illustrating a stem locking mechanism in a day/date electric watch, showing the stem in its inner or locked position;

Figure 2 is an elevation, taken along line 2-2 of Figure 1, showing the stem in an intermediate or calendar advancing position;

Figure 3 is an enlarged detail end view of the stem bracket showing the lock;

Figure 4 is a corresponding enlarged elevation on the line 4-4 of Figure 3;

Figures 5A and 5B are cross-sectional views taken on line 5A-5A in Figure 4 and illustrate the action of the cam, and

Figure 6 is an end view of the key lock and date change member.

In the drawings, only such portions of the electric calendar watch mechanism are shown as are necessary for an understanding of the present invention.

Referring to Figure 1, an electric calendar watch 1 includes a stem 2 which is rotatable and which is also movable in an axial direction, both by means of a conventional crown 3. The watch includes conventional time indicating hands driven by means of a suitable battery-powered indexing mechanism and synchronized or regulated by conventional means. The hands are interconnected with a ring gear, a portion of which is shown at 4, and which, when rotated, will rotate the hands for setting the time. The watch also includes a rotatable date ring 5 and, if desired and as shown, may also include a separately rotatable day ring 6. Although the invention is particularly illustrated with respect to rapid advancement of the date ring, it could be equally well employed for the day ring by suitable modification and hereinafter these separate rings will be referred to generically as calendar rings.

The date ring 5 includes indexing teeth 5a on its outer periphery. Index teeth 5a are used for normal advancement of the date ring by a conventional advancing mechanism (not shown) and are held in place when not being rotated by a spring detent (not shown). The type of advancing mechanism and detenting mechanism used during normal time advancement of the

date ring 5 is immaterial to the present invention and a large number of types are known in the art.

Rapid advancement of the date ring 5 in accordance with the present invention is provided for by means of a date setting member 7 connected to stem 2. Member 7 is a sheet metal arm terminating in diametrically opposed tabs 8. Rotation of member 7 one-half revolution causes tabs 8 to engage teeth 5a to advance date ring 5 by one day to the next detenting position.

Reference to Figure 2 of the drawings shows further details of the stem mechanism, in this case when the stem has been rotated 90° into the rapid advancing position and also shifted axially from its inner or locked position as will be amplified later in greater detail. The watch includes a conventional casing back 9, bezel 10, crystal 11, movement assembly 12, and dial 13 with windows 13a, 13b for viewing the day and date respectively.

The details of connection between the date setting member 7 and stem 2 are as follows. A bushing 14 is connected to the inner periphery of member 7 and permits axial sliding of a cylindrical section 15 of the stem. Protrusions 16 on the stem co-operate with tabs 17 on the member 7 so that the stem can slide in the bushing. Protrusions 16 and tabs 17 together act as a coupling which causes member 7, bushing 14 and stem 2 all to rotate together when the stem is in the axial position "B" shown in Figure 2. However, withdrawal of the stem to an outer axial position "C" causes protrusions 16 to slip past tabs 17 so that when the stem is rotated to set the time, the bushing 14 and date setting member 7 are not rotated.

The bushing 14 includes diametrically opposed detenting cams 18 which are oriented to co-operate with a spring (not shown) so that the tabs 8 on the date setting member 7 normally are oriented as shown in Figure 1 rather than as shown in Figure 2, so that they will not interfere with the normal calendar advancing mechanism.

Returning to Figure 1 of the drawings the stem includes opposed stopping faces 20 and 21 which co-operate with a fixed stem bracket 22 to hold the stem in first or second axial positions. The stem bracket has opposed spring arms 23 which act on sloping face 20 to normally urge the stem toward said second axial position indicated herein as "A" which is a normal run position for the watch and which also corresponds to the locked position hereinafter to be described. The stem also includes a time setting pinion 24 which, when the stem is withdrawn axially to said first axial position "C" co-operates with the crown

teeth 4 on the minute wheel so that the hands can be set. Movement to position "C" is enabled by the resilience of arms 23 on the stem bracket.

5 The end of the stem may also engage the end of a lever 25 for the purpose of arresting the balance wheel when the stem is pulled into position "C".

10 In accordance with the present invention, the stem also includes a key lock 26 and the stem bracket includes a co-operating lock and cam aperture 27, Figures 2 and 3. Elements 26 and 27 co-operate to lock the stem against rotation in one direction and
15 to force it to move axially against stem bracket arms 23 to an intermediate position "B", so as to enable the stem to rotate 180° to advance the date ring 5 by one number and then to return back to the locked position "A". The means by which
20 this is accomplished will be made clear by reference to the enlarged views Figure 3 and Figure 4 of the drawings.

25 Figure 3 shows that the stem cross section is made to include a key lock section 30. The flat base 34 of stem bracket 22 is correspondingly formed with an irregular aperture 31 in the shape of a key hole, which locks the key 30 against rotation. At
30 diametrically opposed corners of the key hole slot, tabs 32 are struck in opposite directions to provide inclined cam surfaces on an angle of about 45°. These cam surfaces 32 cause the key portion 30 when
35 rotated in one direction to ride up out of the key hole slot 31 so that the stem moves axially (as indicated by the change of position of pinion 24) from an axial position "A" to an intermediate axial position
40 "B". Reference to Figure 2 of the drawings will also indicate the stem when it is in intermediate position "B".

45 Figures 5A and 5B further illustrate the operation. When the stem is turned in the direction of the arrow in Figure 5A, it is forced out of the key hole slot to the intermediate axial position shown in Figure 5B. However, the stem cannot be turned in the other direction unless it is actually pulled
50 in an axial direction out of the key hole slot.

55 Figure 6 shows the relative position of the key lock and the tabs 8 on the date setting member 7. Normally the latter is inactive and in the horizontal position shown, so as not to interfere with the normal advancement of the date ring 5. However, in the intermediate stem position "B" the member 7 rotates in the direction indicated by the arrow for one-half revolution to advance the date ring.

Operation

65 Withdrawing the stem by means of the crown to a first or outer axial position "C" causes the stem pinion 24 to engage teeth

4 of the minute wheel, whereby rotation of the stem causes the hands to be set. Also in the first axial position, projections 16 on the stem are disengaged from the tabs 17 on the date setting member 7.

70 When the stem is pushed into a second or inner axial position "A" as shown in Figure 1, key 30 is disposed in slot 31 so that the stem cannot easily rotate. In this position, the tabs 8 of the date setting member 7 are in the horizontal position
75 shown in Figure 6 and disengaged from the date ring 5 so that the day and date are advanced in the normal manner when the watch runs.

80 When it is desired to advance the date ring by one calendar date number, crown 3 is rotated in the proper direction. The key 30 in the stem slides on cam surfaces 32 on the stem bracket causing the stem to shift slightly to a third or intermediate axial position "B". The bushing 14 and disc 7 are still coupled to the stem via projections 16 and tabs 17, but the stem
85 pinion 24 is disengaged from minute wheel teeth 4. Continued rotation of the crown causes the date setting tabs 8 to engage the teeth 5a of the date ring. After one-half revolution the flexible spring arms 23 of the stem bracket urge the key 30 back into
90 slot 31 to again lock the stem. The member 7, therefore, is only actuatable when the stem is in the intermediate position.

WHAT WE CLAIM IS:—

1. An electric watch of the type having a calendar ring and including means for circumferentially advancing the ring from one position to the next during normal timekeeping, a time setting wheel with teeth and a rotatably mounted and axially
100 slidable stem carrying a time setting pinion mounted for engagement with said time setting wheel in a first axial stem position, a fixed stem bracket receiving one end of the stem and having means co-operating with the stem either to hold it in said first axial position or to urge it toward a second axial position wherein the time setting pinion is disengaged from the time setting wheel, a date setting member adapted
105 to be coupled to the stem and having at least one tab means thereon engageable with said calendar ring to advance it to a new circumferential position, said member further being disengageable from the stem when the stem is moved to said first axial position, said stem having locking key means thereon and said stem-receiving portion of said stem bracket having an irregular aperture therein for receiving said
110 locking key means and preventing rotation of the stem in one direction when the stem is in said second axial position, and cam means formed by the wall of said aperture and operative, when the stem is in the
115 120 125 130

teeth 4 on the minute wheel so that the hands can be set. Movement to position "C" is enabled by the resilience of arms 23 on the stem bracket.

5 The end of the stem may also engage the end of a lever 25 for the purpose of arresting the balance wheel when the stem is pulled into position "C".

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20 Figures 5A and 5B further illustrate the operation. When the stem is turned in the direction of the arrow in Figure 5A, it is forced out of the key hole slot to the intermediate axial position shown in Figure 5B. However, the stem cannot be turned in the other direction unless it is actually pulled in an axial direction out of the key hole slot.

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Operation

30 Withdrawing the stem by means of the crown to a first or outer axial position "C" causes the stem pinion 24 to engage teeth

4 of the minute wheel, whereby rotation of the stem causes the hands to be set. Also in the first axial position, projections 16 on the stem are disengaged from the tabs 17 on the date setting member 7.

35 When the stem is pushed into a second or inner axial position "A" as shown in Figure 1, key 30 is disposed in slot 31 so that the stem cannot easily rotate. In this position, the tabs 8 of the date setting member 7 are in the horizontal position shown in Figure 6 and disengaged from the date ring 5 so that the day and date are advanced in the normal manner when the watch runs.

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second axial position and is rotated in the other direction, to cause the stem to move to a third intermediate axial position without engaging the time setting wheel or disengaging the date setting member, whereby the date may be rapidly advanced by rotation of the date setting member in the said other direction.

2. A watch according to Claim 1, wherein said date setting member has diametrically opposed tabs to engage the calendar ring and wherein said aperture is key hole shaped with diametrically opposed cam surfaces, whereby one half revolution of the stem in the said third intermediate position advances the calendar

ring by one position.

3. A watch according to Claim 1 or Claim 2, wherein said stem bracket includes a base portion with diametrically opposed spring arms, and wherein said aperture is cut in said base portion.

4. An electric calendar watch including a stem mechanism substantially as hereinbefore described with reference to the accompanying drawings.

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