

PATENT SPECIFICATION

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(54) ELECTRIC ALARM TIMEPIECE

(71) We, TIMEX CORPORATION, a Corporation organized under the law 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:—

The present invention relates to timepieces and particularly to electric alarm watches and switch activating means therefor.

In electric alarm watches, the alarm mechanism is generally activated by closing a switch at the predetermined alarm time. One moving contact of the switch may be the hour hand or a separate hour wheel which rotates about the dial. The other switch contact may comprise, for example, a ring or separate contact element which may be rotated to set the desired alarm time. After setting, this latter contact remains stationary and is contacted by the moving contact to activate the alarm mechanism. The alarm set contact has indicator means coupled thereto so that the time setting can be seen visually by the wearer.

One of the problems encountered in alarm watches is switch reliability. The switch must be as inexpensive, small and durable as possible and yet must possess the necessary reliability. After continued use, the contact spacing may tend to increase so that proper engagement of the contacts does not occur. This may cause intermittent ringing or the alarm may fail to ring at all.

The object of this invention is to provide a new and improved electric alarm timepiece.

A more specific object of this invention is to provide a new and improved electric

alarm watch including a switch arrangement having numerous advantages over conventional alarm watch switches.

According to the present invention there is provided an electric alarm watch including a switch to activate the alarm circuit at a predetermined time comprising: an hour hand having an end portion comprising one contact of the switch, an alarm set spring comprising the other contact of the switch, one end of said spring being located beneath the hour hand and settable to engage the end portion thereof at a predetermined alarm time, an annular alarm set ring extending circumferentially about the watch and comprising a main body portion, a recessed portion forming a ridge at the internal periphery thereof to extend over and guide the hour hand into positive contact with the alarm set spring, and a downwardly projecting portion at the other periphery comprising a ring gear, said alarm set spring being mounted at its outer end to the alarm set ring and the alarm set ring being rotatable about the timepiece to set the alarm time.

Also according to the present invention there is provided an electric alarm watch including a switch to activate the alarm circuit at a predetermined time comprising: an hour hand comprising one contact of the switch, an annular alarm set ring extending circumferentially about the watch and including guide means at the inner periphery, an intermediate body portion and a dependent flange with ring gear means at the outer periphery for purposes of rotating said ring, an alarm set spring comprising the other switch contact, said spring being mounted at one end to the alarm set ring and contacting the hour hand with the other end as said hand is guided into positive contact therewith by the guide means, and stem means including pinion gear means mounted thereto to en-

gage said ring gear means during alarm setting.

A preferred electric alarm watch has an on-off switch wherein contact closure is produced by surface contact between the bottom surface of the hour hand and the alarm set spring. The tip or contact portion of the hour hand rotates beneath a ridge on the inner surface of the alarm set ring which ensures positive contact with the alarm set spring which is positioned below the hour hand. The alarm set spring is mounted on its outer end to the alarm set ring and extends inwardly therefrom to make contact with the bottom contact surface of the hour hand. The alarm time set ring includes a downwardly extending outer portion comprising a ring gear which is engageable by the stem pinion to set the alarm.

The above and other features and advantages of the present invention may be more clearly seen when viewed in conjunction with the accompanying drawings wherein:—

Figure 1 is a top plan view of the face of an alarm watch incorporating the present invention;

Figure 2 is an enlarged partial view of the watch as shown in Figure 1 with portions shown in cross-section;

Figure 3 is a cross-sectional view taken along the line 3-3 of Figure 2;

Figure 4 is an enlarged view of a portion of Figure 3 showing the stem pinion out of engagement with the ring gear portion of the alarm set ring; and

Figure 5 is a view taken along the line 5-5 of Figure 3 showing the hour hand contacting the alarm set spring.

Referring now to the drawings, the electric alarm watch 10 shown includes an improved alarm on-off switch 11 which will be described in greater detail hereinafter. As shown in Figure 1, the watch 10 may be a day-date type watch although the invention may be incorporated in other types of watch. A watch movement (not shown) including alarm switch 11 is mounted in watch case 12 between a crystal 13 and a watch back 14. The alarm circuit and alarm or buzzer are not disclosed in detail since they are conventional and any number of different arrangements may be used.

The alarm watch 10 of the preferred embodiment includes an hour hand 16, a minute hand 17, and a seconds hand 18 and in addition an alarm set indicator means. In Figure 1, a day ring 21 and a date ring 22 are visible through windows 23 and 24 respectively in the dial 26. Conventional indicia 27 are mounted about the watch 10 to indicate time in co-operation with the hands 16, 17 and 18. An alarm set ring 28 of transparent material is

mounted beneath the indicia by conventional supporting means (not shown) and extends circumferentially about the watch. The ring 28 which may be of plastics material includes inner and outer concentric rings 29 and 31 which comprise knurled surface portions on the upper surface of the alarm set ring 28. These knurled portions provide a pleasing esthetic effect and obscure visibility into the watch. The inner ring 29 obscures the contact between the hour hand 16 and an alarm set spring 19 which comprises the alarm set indicator means.

The present invention is designed to provide positive contact between a contact portion 32 of the alarm set spring 19 and the tip 33 of the hour hand 16 at a predetermined alarm time. Thus, when the hour hand 16 engages the set spring 19, the alarm circuit is activated. As may be noticed from Figures 2 and 3, the contact portion 32 of alarm set spring 19 is slightly offset and raised so that contact is established when the main portion of the spring 19 and the hour hand 16 are aligned. This offset portion 32 which is provided by an end portion of spring 19 above and parallel to the main portion of the spring and joined thereto by a connecting portion projecting upwardly and at an angle to the main portion, is hidden by the knurled ring 29. Positive engagement of the switch contacts is provided by a ridge 34 on the alarm set ring 28 which guides the tip 33 of the hour hand 16 into engagement with the alarm set spring 19. The ridge 34 is an extension of the upper surface of the ring 28 and forms a recess 36 with the main body of the ring 28. The tip 33 of the hour hand 16 rotates within the recess 36 while the set spring 19 is located beneath the hour hand 16. The spring 19 is mounted to ring member 28 at 37 and is cantilevered outwardly therefrom towards the interior of the watch 10. Positive switch contact is thus provided by this arrangement over long periods of use thereby ensuring a high degree of reliability in the alarm arrangement.

The alarm set ring 28 includes a curved body portion 38 leading to the ridge portion 34 extending inwardly at the inner periphery of said ring 28. The outer periphery of the ring 28 includes a downwardly projecting portion 39 including a ring gear 41 at its lower extremity and which is obscured from view by the outer ring 31.

The alarm time is set by means of the conventional stem arrangement shown in the drawings. The stem 42 includes an elongated shaft 43 which extends into the main body of the watch 10 and is held in position by mounting means 44 of member 45. The shaft 43 includes a pinion 46

mounted on an intermediate portion thereof and an enlarged stem portion 47 which acts as a switch actuating means. Located inwardly of enlarged portion 47 are contoured shaft portions 48 and 49 which are engaged by member 51 to lock the stem in various positions within the watch.

The stem pinion 46 is designed to engage the ring gear 41 thereby rotating the alarm set ring 28 and spring 19 to set the alarm time. The pinion 46 and ring gear 41 are shown in engagement in Figures 2 and 3. This occurs when the stem 42 is pulled fully outwardly from the watch 10 for alarm setting purposes, contoured shaft portion 48 being now engaged by member 51. At this time, enlarged stem portion 47 is disengaged from the upwardly projecting portion 52 of a spring 53. A V-shaped contact portion 54 of the spring element 53 is in engagement with a projecting spring element 56 to enable the alarm circuit. The spring 56 is a fixed member and is in constant contact with a circumferential extension 65 of alarm set spring 19.

The alarm set ring 28 may be rotated by means of the stem 42, causing the alarm set spring 19 which is mounted thereto to be moved to the desired alarm time. The stem 42 is then disengaged from the ring 28 by pushing the stem 42 inwardly to a mid-position in which stem 42 is locked in an alarm — enable position by member 51 engaging the shaft 43 between contoured shaft portions 48 and 49. In this manner, the stem pinion 46 is disengaged from the ring gear 41 to prevent accidental change of the alarm time set. At this mid-position of the stem 42, switch contacts 54 and 56 are still in engagement, to enable the alarm circuit, due to the spacing of the upwardly projecting portion 52 of spring 53 relative to the enlarged portion 47 and the mid-position spacing relative to the distance between portion 52 and enlarged portion 47. When the hour hand 16 reaches the desired time, the tip 33 of the hour hand 16 guided by ridge 34 engages the contact portion 32 of the alarm set spring 19, completing the alarm circuit to a conventional alarm or buzzer arrangement.

When the stem 42 is pushed fully inwardly as shown in Figure 4, the pinion 46 becomes disengaged from the ring gear 41 and the enlarged portion 47 contacts the end 52 of spring 53, causing disengagement of the V-shaped portion 54 from the spring 56, thus preventing completion of the alarm circuit. As mentioned previously, such circuits and buzzer arrangements are conventional and hence have not been described in any detail in this specification.

WHAT WE CLAIM IS:—

65 1. An electric alarm watch including a

switch to activate the alarm circuit at a predetermined time comprising: an hour hand comprising one contact of the switch, an annular alarm set ring extending circumferentially about the watch and including guide means at the inner periphery, an intermediate body portion and a pendant flange with ring gear means at the outer periphery for purposes of rotating said ring, an alarm set spring comprising the other switch contact, said spring being mounted at one end to the alarm set ring and contacting the hour hand with the other end as said hand is guided into positive contact therewith by the guide means, and stem means including pinion gear means mounted thereto to engage said ring gear means during alarm setting.

2. An electric alarm watch including a switch to activate the alarm circuit at a predetermined time comprising: an hour hand having an end portion comprising one contact of the switch, an alarm set spring comprising the other contact of the switch, one end of said spring being located beneath the hour hand and settable to engage the end portion thereof at a predetermined alarm time, an annular alarm set ring extending circumferentially about the watch and comprising a main body portion, a recessed portion forming a ridge at the internal periphery thereof to extend over and guide the hour hand into positive contact with the alarm set spring, and a downwardly projecting portion at the other periphery comprising a ring gear, said alarm set spring being mounted at its outer end to the alarm set ring and the alarm set ring being rotatable about the timepiece to set the alarm time.

3. An electric alarm watch in accordance with Claim 2 wherein the alarm set spring includes an end portion for contacting the hour hand, said end portion being offset and parallel to the spring and being joined to the spring by a connecting portion.

4. An electric alarm watch in accordance with Claim 2 wherein the alarm set ring includes a transparent annular main body portion having obscuring ring portions adjacent both the inner and outer peripheries thereof extending circumferentially thereabout to obscure respectively the end portion of the spring and the end portion of the hour hand by the inner portion and the ring mounting arrangement by the outer portion.

5. An electric alarm watch in accordance with Claim 4 wherein the inner and outer obscuring rings comprise a knurled effect on the upper surface of the alarm set ring.

6. An electric alarm watch in accordance with any one of Claims 2 to 5



mounted on an intermediate portion thereof and an enlarged stem portion 47 which acts as a switch actuating means. Located inwardly of enlarged portion 47 are contoured shaft portions 48 and 49 which are engaged by member 51 to lock the stem in various positions within the watch.

The stem pinion 46 is designed to engage the ring gear 41 thereby rotating the alarm set ring 28 and spring 19 to set the alarm time. The pinion 46 and ring gear 41 are shown in engagement in Figures 2 and 3. This occurs when the stem 42 is pulled fully outwardly from the watch 10 for alarm setting purposes, contoured shaft portion 48 being now engaged by member 51. At this time, enlarged stem portion 47 is disengaged from the upwardly projecting portion 52 of a spring 53. A V-shaped contact portion 54 of the spring element 53 is in engagement with a projecting spring element 56 to enable the alarm circuit. The spring 56 is a fixed member and is in constant contact with a circumferential extension 65 of alarm set spring 19.

The alarm set ring 28 may be rotated by means of the stem 42, causing the alarm set spring 19 which is mounted thereto to be moved to the desired alarm time. The stem 42 is then disengaged from the ring 28 by pushing the stem 42 inwardly to a mid-position in which stem 42 is locked in an alarm — enable position by member 51 engaging the shaft 43 between contoured shaft portions 48 and 49. In this manner, the stem pinion 46 is disengaged from the ring gear 41 to prevent accidental change of the alarm time set. At this mid-position of the stem 42, switch contacts 54 and 56 are still in engagement, to enable the alarm circuit, due to the spacing of the upwardly projecting portion 52 of spring 53 relative to the enlarged portion 47 and the mid-position spacing relative to the distance between portion 52 and enlarged portion 47. When the hour hand 16 reaches the desired time, the tip 33 of the hour hand 16 guided by ridge 34 engages the contact portion 32 of the alarm set spring 19, completing the alarm circuit to a conventional alarm or buzzer arrangement.

When the stem 42 is pushed fully inwardly as shown in Figure 4, the pinion 46 becomes disengaged from the ring gear 41 and the enlarged portion 47 contacts the end 52 of spring 53, causing disengagement of the V-shaped portion 54 from the spring 56, thus preventing completion of the alarm circuit. As mentioned previously, such circuits and buzzer arrangements are conventional and hence have not been described in any detail in this specification.

WHAT WE CLAIM IS:—

1. An electric alarm watch including a

switch to activate the alarm circuit at a predetermined time comprising: an hour hand comprising one contact of the switch, an annular alarm set ring extending circumferentially about the watch and including guide means at the inner periphery, an intermediate body portion and a dependant flange with ring gear means at the outer periphery for purposes of rotating said ring, an alarm set spring comprising the other switch contact, said spring being mounted at one end to the alarm set ring and contacting the hour hand with the other end as said hand is guided into positive contact therewith by the guide means, and stem means including pinion gear means mounted thereto to engage said ring gear means during alarm setting.

2. An electric alarm watch including a switch to activate the alarm circuit at a predetermined time comprising: an hour hand having an end portion comprising one contact of the switch, an alarm set spring comprising the other contact of the switch, one end of said spring being located beneath the hour hand and settable to engage the end portion thereof at a predetermined alarm time, an annular alarm set ring extending circumferentially about the watch and comprising a main body portion, a recessed portion forming a ridge at the internal periphery thereof to extend over and guide the hour hand into positive contact with the alarm set spring, and a downwardly projecting portion at the other periphery comprising a ring gear, said alarm set spring being mounted at its outer end to the alarm set ring and the alarm set ring being rotatable about the timepiece to set the alarm time.

3. An electric alarm watch in accordance with Claim 2 wherein the alarm set spring includes an end portion for contacting the hour hand, said end portion being offset and parallel to the spring and being joined to the spring by a connecting portion.

4. An electric alarm watch in accordance with Claim 2 wherein the alarm set ring includes a transparent annular main body portion having obscuring ring portions adjacent both the inner and outer peripheries thereof extending circumferentially thereabout to obscure respectively the end portion of the spring and the end portion of the hour hand by the inner portion and the ring mounting arrangement by the outer portion.

5. An electric alarm watch in accordance with Claim 4 wherein the inner and outer obscuring rings comprise a knurled effect on the upper surface of the alarm set ring.

6. An electric alarm watch in accordance with any one of Claims 2 to 5



wherein the alarm watch further includes an alarm set stem having an enlarged stem portion projecting from the watch to be grasped for purposes of alarm time setting.
5 a shaft portion having a pinion mounted at an intermediate point for engaging the ring gear during setting and an enlarged inner portion projecting outwardly from the shaft, and, further switch means activated
10 by the enlarged inner portion of the stem.

7. An electric alarm watch in accordance with Claim 6 wherein the further switch means comprises a first spring member fixedly mounted at one end and
15 having an intermediate portion with a V-shaped contact portion projecting upwardly therefrom and an upwardly extending end portion which is engageable by the enlarged stem portion to make and break

contact between the first spring member 20 and a second spring member having a fixed outer end and extending inwardly to cooperate with the first spring member.

8. An electric alarm watch in accordance with Claim 4 further including: sup- 25
porting means for the alarm set ring which permit rotation of said ring while in engagement therewith, and wherein the main body portion of the ring comprises generally curved upper and lower surfaces.

9. An electric alarm watch substantially as hereinbefore described with reference to the accompanying drawing.

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