

SPECIFICATION

Alarm Switch and Alarm Set Device

The present invention relates to an alarm timepiece.

- 5 Alarm clocks, alarm clock devices, and alarm wristwatches are well known. An electric alarm mechanism is generally activated by closing a switch at the predetermined alarm time. One contact of the switch may be the hour hand or a
10 separate hour wheel which rotates about the dial. The outer 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
15 contact means to activate the alarm mechanism.

- Typical problems encountered in the prior art alarm timepieces are switch reliability, difficulty of setting the alarm mechanism, complexity and
20 cost of alarm switch and setting mechanism.

- The present invention seeks to provide a device having a simple, robust and relatively inexpensive structure which combines the capabilities and advantages of direct manual actuation and setting
25 of the alarm indicator and switch, is adapted for ease of use and involves a minimum of associated parts.

- The present invention provides an alarm timepiece including a housing, a switch and an
30 alarm time set mechanism to activate an electric alarm circuit at a predetermined time comprising: a manually rotatable crystal; an hour hand comprising one contact of the switch; an electrically conductive alarm set ring extending
35 circumferentially about the timepiece and affixed to said crystal and rotatable therewith; an alarm set indicator comprising the other switch contact, said indicator being mounted at one end to the alarm set ring and contacting the hour hand with
40 the other end as said hour hand is rotated into contact therewith; a slip ring extending circumferentially about the timepiece and having biasing means engaging the alarm set ring and exerting bias on the alarm set ring for providing
45 spring bias mounting and assembly of the crystal and the alarm set ring inside the housing by spring pressure against the housing and for providing electrical connection between the alarm set ring and the alarm circuit.

- 50 The present invention further provides an alarm clock including an electric alarm device having a switch and an alarm time set mechanism to activate the alarm circuit at a predetermined time comprising: a case; a manually rotatable crystal
55 having gripping means at its outer periphery for purposes of rotating said crystal; an hour hand comprising one contact of the switch; an electrically conductive alarm set ring extending circumferentially about the clock and affixed to
60 said crystal for rotation therewith and including an alarm set indicator extending inwardly from the inner periphery of the alarm set ring for contacting the hour hand with its inner end portion as said hour hand is rotated into contact

- 65 therewith; guide means extending circumferentially about the clock and having an inner peripheral guide for guiding the hour hand into positive contact with the inner end portion of said alarm set indicator; and biasing means
70 engaging the alarm set ring and exerting spring bias on the alarm set ring for providing spring bias mounting of the crystal and the alarm set ring inside the case and for providing electrical connection between the alarm set ring and the
75 alarm circuit.

A preferred embodiment of the present invention will now be described by way of example, reference being made to the accompanying drawings in which:—

- 80 Figure 1 is a partial top plan view of the face of a timepiece according to the present invention; Figure 2 is a partial cross-sectional view illustrating the co-operating members of the alarm switch and alarm set device;

- 85 Figure 3 is a cross-sectional view of the crystal and alarm set indicator ring mounted thereto;

- Figures 4a, 4b and 4c are respectively a top plan view, a cross-sectional view taken along section A—A in Figure 4a of the alarm set indicator ring, and an end view of the indicator switch contact portion; and

- Figures 5a and 5b are respectively a top plan view and a cross-sectional view taken along section A—A in Figure 5a of the slip ring contact assembly.

- Referring to the drawings, the electric alarm timepiece 10 shown in Figure 1, is a clock although the invention may be incorporated in other types of timepiece. A clock movement (not shown) including an alarm switch and an alarm set device are mounted in clock case 11 behind a face plate 12. The alarm circuit and the alarm or buzzer are not disclosed in detail since they are conventional and any of a number of different arrangements may be used.

- 105 The preferred embodiment of alarm clock 10 includes an hour hand 14, a minute hand 15, a seconds hand 16 and an alarm set indicator 17. A day ring 18 and a date ring 19 are visible through windows 20 and 21 respectively in the dial 22. Conventional indicia 23 are provided to indicate time in co-operation with the hands 14, 15 and 16. An alarm set insulator ring 24 of transparent material is mounted above the indicia and extends
110 circumferentially about the clock. The insulator ring 24 which may be of plastics material includes inner and outer concentric ridges 25 and 26 formed on the upper surface of the alarm set insulator ring 24. These ridges 25, 26 ensure alignment and contact between the hour hand 14 and the alarm set indicator 17.

- The present invention is designed to provide direct manual positioning of the alarm set (indicator) device, without the need for gear mechanisms, such that when the hour hand 14 engages the alarm set indicator 17, the alarm circuit is activated.

The alarm set indicator 17 is mounted to an alarm set indicator ring 29 which extends

circumferentially about the clock beneath a manually rotatable crystal 32.

The alarm set indicator ring 29 includes a body portion or periphery 31 which is affixed, for example by ultrasonic welding, to the rotatable crystal 32 in a circumferential crystal retaining slot or cut-out 32A. The outer periphery 31 of the ring 29 is held by a crystal projecting ledge portion 33 formed by ultrasonic welding. The crystal 32 and ring 29 are rotated about the clock to set the alarm time by means of tactile gripping edges or knurled surface portions 34 of the crystal 32.

The alarm time is set by manually rotating the crystal to position the alarm set indicator 17 to the desired alarm time.

The alarm set indicator 17 and ring 29 may comprise a unitary stamped electrically conductive metal washer or ring like member having an inwardly directed indicator and switch contact arm member 17. The inwardly directed indicator member 17 is deformed or bent at a point 35 in a downward direction from the plane of the ring member 29 to provide spring bias for positive engagement with the tip 28 of the hour hand 14. The tip portion 27 of the alarm set indicator 17 is provided with a bent or contoured portion to provide smooth engagement between the tip 28 of the hour hand 14 and the tip 27 of the alarm set indicator 17 at the desired time. As may be seen from Figure 4c, the contact portion 27 of the alarm set indicator 17 is slightly lowered so that contact is established when the main portion of the indicator 17 and the hour hand 14 are aligned. The ridges 25 and 26 formed on the alarm set insulator ring 24 guide the tip 28 of the hour hand 14 beneath and into engagement with the alarm set indicator 17. The alarm set indicator 17 is mounted to or forms an extension of the alarm set indicator ring 29 at point 30 and is cantilevered therefrom towards the interior of the watch 10 to rest on the guide ridge 26. Positive switch contact is provided by this arrangement over long periods of use thereby ensuring a high degree of reliability in the alarm arrangement.

A slip ring 36 is mounted between the alarm set insulator 24 and the alarm set indicator ring 29 by means of tabs 37 which extend from the slip ring 36 downward into the body portion of the clock 10 for affixing said ring member in a desired position. One tab 37A of the slip ring 36 also extends into the body portion of the clock and is elongated to serve as an electrical connection with the alarm circuitry. Three spring prongs 38 are equally spaced about the slip ring 36 to electrically engage or contact the alarm set indicator ring 29 and to provide spring bias against the alarm set indicator ring 29 to urge the rotatable crystal against the face plate 12 of the case 11 to thereby rotatably mount the crystal 32 to the clock 10. The prongs 38 are formed of resilient metal so as to provide sufficient spring bias to maintain electrical contact with the alarm set indicator ring 29 and provide sufficient spring

pressure for urging the crystal 32 against the face plate 12 and thereby provide frictional engagement therewith. The spring bias pressure is therefore selected to enable the crystal 32 to be manually rotated for alarm setting while providing adequate friction between the face plate 12 and a co-operating surface portion 39 of the crystal 32 to maintain the crystal 32 and therefore the alarm set indicator ring 29 at the desired alarm position.

In operation, the rotatable crystal and alarm set indicator ring assembly 29, 32 may be manually rotated by means of the gripping edges 34 of the watch crystal 32, causing the alarm set indicator 17, which is mounted thereto, to be moved to the desired alarm time. When the hour hand 14 reaches the desired alarm time, the tip 28 of the hour hand 14 engages and passes underneath the contact portion 27 of the alarm set indicator 17, guided by ridge 25. If an on-off alarm switch 40 is set for alarm actuation, the alarm circuit is completed/energized for actuating a conventional buzzer arrangement. As mentioned previously, such circuit and buzzer arrangements are conventional and hence have not been described in detail in this specification.

Claims

1. An alarm timepiece including a housing, a switch and an alarm time set mechanism to activate an electric alarm circuit at a predetermined time comprising: a manually rotatable crystal; an hour hand comprising one contact of the switch; an electrically conductive alarm set ring extending circumferentially about the timepiece and affixed to said crystal and rotatable therewith; an alarm set indicator comprising the other switch contact, said indicator being mounted at one end to the alarm set ring and contacting the hour hand with the other end as said hour hand is rotated into contact therewith; a slip ring extending circumferentially about the timepiece and having biasing means engaging the alarm set ring and exerting bias on the alarm set ring for providing spring bias mounting and assembly of the crystal and the alarm set ring inside the housing by spring pressure against the housing and for providing electrical connection between the alarm set ring and the alarm circuit.

2. An alarm clock including an electric alarm device having a switch and an alarm time set mechanism to activate the alarm circuit at a predetermined time comprising: a case; a manually rotatable crystal having gripping means, at its outer periphery for purposes of rotating said crystal; an hour hand comprising one contact of the switch; an electrically conductive alarm set ring extending circumferentially about the clock and affixed to said crystal for rotation therewith and including an alarm set indicator extending inwardly from the inner periphery of the alarm set ring for contacting the hour hand with its inner end portion as said hour hand is rotated into contact therewith; guide means extending circumferentially about the clock and having an



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circumferentially about the clock beneath a manually rotatable crystal 32.

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2. An alarm clock including an electric alarm device having a switch and an alarm time set mechanism to activate the alarm circuit at a predetermined time comprising: a case; a manually rotatable crystal having gripping means, at its outer periphery for purposes of rotating said crystal; an hour hand comprising one contact of the switch; an electrically conductive alarm set ring extending circumferentially about the clock and affixed to said crystal for rotation therewith and including an alarm set indicator extending inwardly from the inner periphery of the alarm set ring for contacting the hour hand with its inner end portion as said hour hand is rotated into contact therewith; guide means extending circumferentially about the clock and having an



- inner peripheral guide for guiding the hour hand into positive contact with the inner end portion of said alarm set indicator; and biasing means engaging the alarm set ring and exerting spring bias on the alarm set ring for providing spring bias mounting of the crystal and the alarm set ring inside the case and for providing electrical connection between the alarm set ring and the alarm circuit.
- 10 3. A timepiece as claimed in Claim 1 or Claim 2 wherein the crystal includes surface deformations about its periphery to be gripped for purposes of alarm time setting.
- 15 4. A timepiece as claimed in any one of the preceding claims wherein the alarm set ring and alarm set indicator comprise a unitary stamped electrically conductive ring having an outer circumferential periphery received within a circumferential groove in the crystal and mounted thereto.
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5. An alarm clock as claimed in Claim 2 wherein the guide means comprises a transparent electrically insulating ring extending circumferentially about the clock and having raised portions forming a plurality of ridges at the internal end thereof to guide the hour hand into positive contact with the alarm set indicator.
- 25 6. An alarm clock as claimed in Claim 2 wherein the biasing means comprises an electrically conductive slip ring extending circumferentially about the clock and having a plurality of protruding prongs forming spring means for engaging the alarm set ring and exerting spring bias thereto for urging the crystal outwardly against the case for providing spring bias mounting of the crystal and the alarm set ring.
- 30 35 7. An alarm timepiece substantially as hereinbefore described with reference to the accompanying drawings.
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