ELECTRIC ALARM TIMEPIECE

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ABSTRACT
An electric alarm timepiece includes an on-off switch wherein the alarm ringing circuit is closed when the bottom surface of the hour hand contacts an alarm set spring extending beneath the tip of the hour hand. The outer portion or tip of the hour hand is guided by a formed ridge on the alarm time set ring and moves about the inner surface of the ring thereby assuring proper contact closure with the spring. The alarm set spring is mounted at one end to the alarm set ring and is rotatable therewith for purposes of setting. 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.

8 Claims, 5 Drawing Figures
ELECTRIC ALARM TIMEPiece

BACKGROUND OF THE INVENTION

The present invention relates to timpieces 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 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 means 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.

Among the more pertinent prior art disclosures are Spadini U.S. Pat. Nos. 3,577,876 issued May 11, 1971, 3,611,702 issued Oct. 12, 1971 and particularly U.S. Pat. No. 3,638,418 issued Feb. 1, 1972 which is directed specifically to the switch arrangement for an electric timpiece. The Spadini patents, however, disclose, in general, an arrangement wherein switch contact is made between an axial extension coupled to the hour hand and an axial extension coupled to the alarm hand. This differs considerably from the structure of the present invention as does U.S. Pat. No. 3,596,460 to Wuthrich which issued Aug. 3, 1971 and which discloses an alarm set disc carrying a contact point for making electrical contact with contact means mounted on the hour wheel.

In the foreign art, Swiss Pat. No. 470,709 and British Pat. No. 161,381 are of interest but as in the case of the U.S. art cited above, none of the references discloses the subject electric alarm on-off switch for use in a watch wherein contact closure is produced between the bottom surface of the hour hand and an alarm set spring which is maintained in position by a ridge on the inner surface of an alarm set ring. It is, of course, to be understood that neither the foreign art or U.S. patents mentioned above are intended to be all-inclusive lists of the relevant prior art and other patents may exist which are pertinent.

SUMMARY OF THE INVENTION

The present invention relates to an electric alarm watch having 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 and insures 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 object of this invention is to provide a new and improved electric alarm timpiece.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention may be more clearly seen when viewed in conjunction with the accompanying drawings wherein:

FIG. 1 is a top plan view of the face of an alarm watch incorporating the switch arrangement of the present invention;

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

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

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

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

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, the invention comprises an electric alarm watch 10 which includes an improved alarm on-off switch 11 which will be described in greater detail hereinafter. As shown in FIG. 1, the watch 10 may be a day-date type watch although the invention may be incorporated in other type watches. The watch movement (not shown) including alarm switch 11 is mounted in watch case 12 between the crystal 13 and 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 subject alarm watch 10 of the preferred embodiment includes an hour hand 16, a minute hand 17, and a second hand 18 and in addition an alarm set indicator means 19. In FIG. 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 cooperation with the hands 16, 17 and 18. An alarm set ring 28 of transparent material is mounted beneath the indicia and extends circumferentially about the watch. The ring 28 which may be of plastic 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 the alarm set spring 19 which comprises the alarm set indicator means.

The present invention is designed to provide positive contact between the 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 FIG. 2, 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 is hidden by the knurled ring 29. The positive switch contact is provided by a formed 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 set 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 insuring 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 ring gear 41 at its lower extremity. The ring 28 is rotated about the outer shaft to set the alarm time by means of the ring gear 41 which is engaged by gear means coupled to the stem 42.

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 enlarged 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 spring 19 to a predetermined alarm time. The pinion 46 and ring gear 41 are shown in engagement in FIGS. 2 and 3. This occurs when the stem 42 is pulled outwardly from the watch 10 for alarm setting purposes. At this time, enlarged stem portion 47 is disengaged from the upwardly projecting portion 52 of spring 53. V-shaped contact portion 54 of the spring element 53 is in engagement with the projecting spring element 56 to complete the alarm circuit. The spring 56 is a fixed member and is in constant contact with extension 65 of alarm set spring 19. When the stem 42 is pushed inwardly as shown in FIG. 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 of the spring 56.

In operation, 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. 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 buzzer arrangement. As mentioned previously, such circuits and buzzer arrangements are conventional and hence have not been described in any detail in this specification. Typical arrangements may be seen in the prior art described previously.

While the invention has been described with respect to a preferred embodiment, it should be apparent to those skilled in the art that numerous modifications may be made thereto without departing from the spirit and scope of the invention.

What is claimed 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 alarm set ring extending circumferentially about the watch and including guide means at the inner periphery, an intermediate body portion and 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 of 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 alarm set ring extending circumferentially about the watch and comprising a main body portion, a recessed portion forming a ridge at the internal end 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 end, said end comprising a ring gear, and, wherein said alarm set spring is mounted at its outer end to the alarm set ring and wherein the alarm set ring is 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 above and parallel to the spring and being joined to the spring by a connecting portion projecting upwardly and at an angle to the spring.

4. An electric alarm watch in accordance with claim 2 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, 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, switch means activated by the enlarged inner portion of the stem.

5. An electric alarm watch in accordance with claim 4 wherein:
   the switch means comprises a first spring member fixedly mounted at one end and 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 the switch.
means and a second spring member having a fixed outer end and extending inwardly to contact the first spring member.

6. An electric alarm watch in accordance with claim 2 wherein:
the alarm set ring includes a transparent main body portion having opaque ring portions on both the inner and outer ends thereof extending circumferentially thereabout to obscure respectively the end portion of the spring and the end portion of the hour hand with the inner opaque portion and the ring mounting arrangement with the outer portion.

7. An electric alarm watch in accordance with claim 6 wherein:
the inner and outer opaque rings comprise a knurled-type effect on the upper surface of the alarm set ring.

8. An electric alarm watch in accordance with claim 6 further including:
supporting 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.

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