

PATENT SPECIFICATION

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(54) ALARM WRIST WATCH

(71) We, KABUSHIKI KAISHA SUWA SEIKOSHA, a Japanese company of 3-4, 4-chome, Ginza, Chuo-ku, Tokyo, Japan, 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 concerns an alarm wrist watch.

The conventional alarm wrist watch has a mechanically operated alarm mechanism which comprises a hammer which strikes a part of the back cover of the watch. In such a watch, it is necessary to wind the spring of the alarm movement every time it is to be used, and the alarm does not have a loud sound and is of a somewhat unpleasant character.

A wrist watch having a mechanically driven watch movement is known in Japan which is provided with a buzzer which is electrically driven by a battery. This wrist watch, however, involves the use of a barrel drum and is therefore of large size and is thick so that it is not readily saleable.

According to the present invention, there is provided an alarm wrist watch having a closed watch case which is sealed against the ingress of water and which has a watch movement mounted therein, an electrically operated buzzer which is mounted on the outside of the said case, a buzzer cover which covers the buzzer and which is provided with aperture means through which the sound of the buzzer may pass, a buzzer driving circuit which is disposed within said case and which is arranged to be energised by a battery therein, means electrically connecting said buzzer to said buzzer driving circuit, and control means for operating said buzzer driving circuit at a predetermined time.

The buzzer may be electrically connected to the said buzzer driving circuit by leads

which pass through and are both insulated from and sealed to the said case.

The buzzer and the buzzer cover may be provided with a plurality of apertures through which the sound of the buzzer may pass.

The watch preferably has an electrically driven watch movement disposed within said case. Moreover, both the electrically driven watch movement and the buzzer driving circuit may be arranged to be driven by a common battery disposed within said case.

The said control means may comprise a normally open switch in said buzzer driving circuit, and means operated by said movement for closing the switch at the said predetermined time.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

Figure 1 is a diagrammatic sectional plan view of an alarm wrist watch according to the present invention, and

Figure 2 is a circuit diagram showing a circuit which may be employed in an alarm wrist watch according to the present invention.

In Figure 1 there is shown an alarm electronic wrist watch having a closed watch case 1 which is sealed against the ingress of water. Mounted within the watch case 1 is an electrically driven watch movement whose time standard is a balance wheel 2 (or alternatively, if desired, a tuning fork or quartz crystal, not shown). The balance wheel 2 is provided with magnets 3 which co-operate magnetically with a driving coil 4, the latter being arranged to drive the balance wheel 2. The driving coil 4 is provided with terminals 18a, 18b and 18c which are respectively connected to a small dry battery 5 or other electrical power source, a detecting circuit condenser (not shown in 90

Figure 1 but corresponding to a detecting circuit condenser 28 in Figure 2) and the collector of a transistor 16 for driving the balance wheel 2, all the said parts being disposed within the case 1. Also disposed within the case 1 is a transistor 15 for driving an electrically operated buzzer 9.

The positive terminal of the battery 5 is earthed to a base plate 14, while the negative terminal thereof is contacted by a spring 6 opposite ends of which are secured to an insulator 7 and to a member 8, the latter being connected to the emitter electrodes of the transistors 15, 16.

The watch case 1 is provided externally with a part-spherical recess 1a within which is mounted an electrically operated buzzer 9, so that the buzzer 9 is mounted on the outside of the case 1. The recess 1a, and the buzzer 9 mounted therein, are covered by a buzzer cover 10 which is secured to the case 1 by screws 13. The buzzer 9 is provided with a plurality of small apertures 12, while the buzzer cover 10 is provided with a plurality of apertures 11 through which the sound of the buzzer 9 may pass.

The buzzer 9 has a detecting coil 22 and a driving coil 24 which are connected to terminals on the base plate 14 by means of leads 17a, 17b, 17c made of good electrically conductive material, one of the said terminals being a common positive terminal. A buzzer driving circuit is disposed within the case 1, but is not shown in Figure 1. The said driving circuit incorporates the transistor 15 for driving the buzzer. The leads 17a, 17b, 17c are both insulated from and are sealed to the case 1 by being covered with rubber or plastics material.

Thus the water resistance of the case 1 is not impaired by the fact that the leads 17a, 17b, 17c pass therethrough. The arrangement is accordingly such that, although the buzzer 9 is disposed outside the case 1 and within an apertured cover such that its sound can be easily heard, nevertheless, the movement of the watch and the electrical circuits are incorporated within the water resistant case 1.

In Figure 2 there is shown an electrical circuit suitable for driving the buzzer and the balance wheel of the watch shown in Figure 1.

Referring to Figure 2, a small dry battery 19 is connected in the buzzer driving circuit to drive an electrically operated buzzer 20, the buzzer driving circuit also comprising a transistor 21, the detecting coil 22 for the buzzer 20, a base bias resistor 23, and the driving coil 24 for driving the buzzer 20.

The battery 19, in addition to supplying the current required for operation of the

buzzer 20, also supplies the current required for driving a balance wheel 25. For this purpose it is connected in a circuit which comprises a transistor 26 for driving the balance wheel 25, a detecting coil 27, a detecting circuit condenser 28, a base bias resistor 29, a coil 30 for driving the balance wheel 25, and a condenser 31 for suppressing harmonic oscillations. The detecting coil 27 and the driving coil 30 are in practice formed as a unitary coil corresponding to the coil 4 shown in Figure 1. The detecting coil 22 and the driving coil 24 are incorporated in the buzzer 9.

The buzzer driving circuit also comprises a normally open switch 32. When, however, the switch 32 is closed at a predetermined time selected by the user of the watch, the buzzer driving circuit operates the buzzer which thus begins to buzz. Closure of the normally open switch 32 may be effected at the said predetermined time by a flexible pin (not shown) which is attached to an hour wheel (not shown) of the watch movement.

Thus the arrangement illustrated in Figures 1 and 2 of an electronic wrist watch whose buzzer is mounted externally of its case, enables the watch to be made very compactly and yet to be provided with a clearly audible alarm. Moreover, if desired, separate batteries may be provided for the buzzer and the watch movement so that the sound of the buzzer can be increased yet further. Although the sound of the buzzer can be very clearly heard by reason of its being provided externally of the watch case, the water resistance of the latter is not impaired. Moreover, the circuits for the buzzer and the watch movement can be mounted on the same base plate and one battery can serve both functions.

WHAT WE CLAIM IS:—

1. An alarm wrist watch having a closed watch case which is sealed against the ingress of water and which has a watch movement mounted therein, an electrically operated buzzer which is mounted on the outside of the said case, a buzzer cover which covers the buzzer and which is provided with aperture means through which the sound of the buzzer may pass, a buzzer driving circuit which is disposed within said case and which is arranged to be energised by a battery therein, means electrically connecting said buzzer to said buzzer driving circuit, and control means for operating said buzzer driving circuit at a predetermined time.

2. A watch as claimed in claim 1 in which the buzzer is electrically connected to the said buzzer driving circuit by leads

Figure 1 but corresponding to a detecting circuit condenser 28 in Figure 2) and the collector of a transistor 16 for driving the balance wheel 2, all the said parts being disposed within the case 1. Also disposed within the case 1 is a transistor 15 for driving an electrically operated buzzer 9.

The positive terminal of the battery 5 is earthed to a base plate 14, while the negative terminal thereof is contacted by a spring 6 opposite ends of which are secured to an insulator 7 and to a member 8, the latter being connected to the emitter electrodes of the transistors 15, 16.

The watch case 1 is provided externally with a part-spherical recess 1a within which is mounted an electrically operated buzzer 9, so that the buzzer 9 is mounted on the outside of the case 1. The recess 1a, and the buzzer 9 mounted therein, are covered by a buzzer cover 10 which is secured to the case 1 by screws 13. The buzzer 9 is provided with a plurality of small apertures 12, while the buzzer cover 10 is provided with a plurality of apertures 11 through which the sound of the buzzer 9 may pass.

The buzzer 9 has a detecting coil 22 and a driving coil 24 which are connected to terminals on the base plate 14 by means of leads 17a, 17b, 17c made of good electrically conductive material, one of the said terminals being a common positive terminal. A buzzer driving circuit is disposed within the case 1, but is not shown in Figure 1. The said driving circuit incorporates the transistor 15 for driving the buzzer. The leads 17a, 17b, 17c are both insulated from and are sealed to the case 1 by being covered with rubber or plastics material.

Thus the water resistance of the case 1 is not impaired by the fact that the leads 17a, 17b, 17c pass therethrough. The arrangement is accordingly such that, although the buzzer 9 is disposed outside the case 1 and within an apertured cover such that its sound can be easily heard, nevertheless, the movement of the watch and the electrical circuits are incorporated within the water resistant case 1.

In Figure 2 there is shown an electrical circuit suitable for driving the buzzer and the balance wheel of the watch shown in Figure 1.

Referring to Figure 2, a small dry battery 19 is connected in the buzzer driving circuit to drive an electrically operated buzzer 20, the buzzer driving circuit also comprising a transistor 21, the detecting coil 22 for the buzzer 20, a base bias resistor 23, and the driving coil 24 for driving the buzzer 20.

The battery 19, in addition to supplying the current required for operation of the

buzzer 20, also supplies the current required for driving a balance wheel 25. For this purpose it is connected in a circuit which comprises a transistor 26 for driving the balance wheel 25, a detecting coil 27, a detecting circuit condenser 28, a base bias resistor 29, a coil 30 for driving the balance wheel 25, and a condenser 31 for suppressing harmonic oscillations. The detecting coil 27 and the driving coil 30 are in practice formed as a unitary coil corresponding to the coil 4 shown in Figure 1. The detecting coil 22 and the driving coil 24 are incorporated in the buzzer 9.

The buzzer driving circuit also comprises a normally open switch 32. When, however, the switch 32 is closed at a predetermined time selected by the user of the watch, the buzzer driving circuit operates the buzzer which thus begins to buzz. Closure of the normally open switch 32 may be effected at the said predetermined time by a flexible pin (not shown) which is attached to an hour wheel (not shown) of the watch movement.

Thus the arrangement illustrated in Figures 1 and 2 of an electronic wrist watch whose buzzer is mounted externally of its case, enables the watch to be made very compactly and yet to be provided with a clearly audible alarm. Moreover, if desired, separate batteries may be provided for the buzzer and the watch movement so that the sound of the buzzer can be increased yet further. Although the sound of the buzzer can be very clearly heard by reason of its being provided externally of the watch case, the water resistance of the latter is not impaired. Moreover, the circuits for the buzzer and the watch movement can be mounted on the same base plate and one battery can serve both functions.

WHAT WE CLAIM IS:—

1. An alarm wrist watch having a closed watch case which is sealed against the ingress of water and which has a watch movement mounted therein, an electrically operated buzzer which is mounted on the outside of the said case, a buzzer cover which covers the buzzer and which is provided with aperture means through which the sound of the buzzer may pass, a buzzer driving circuit which is disposed within said case and which is arranged to be energised by a battery therein, means electrically connecting said buzzer to said buzzer driving circuit, and control means for operating said buzzer driving circuit at a predetermined time.

2. A watch as claimed in claim 1 in which the buzzer is electrically connected to the said buzzer driving circuit by leads



which pass through and are both insulated from and sealed to the said case.

3. A watch as claimed in any preceding claim in which both the buzzer and the 5 buzzer cover are provided with a plurality of apertures through which the sound of the buzzer may pass.

4. A watch as claimed in any preceding claim in which the watch has an electrically driven watch movement disposed 10 within said case.

5. A watch as claimed in claim 4 in which both the electrically driven watch movement and the buzzer driving circuit 15 are arranged to be driven by a common battery disposed within said case.

6. A watch as claimed in claim 4 or 5

in which the said control means comprises a normally open switch in said buzzer driving circuit, and means operated by said 20 movement for closing the switch at the said predetermined time.

7. An alarm wrist watch substantially as hereinbefore described with reference to and as shown in the accompanying draw- 25 ings.

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