

[54] ELECTRONIC WRIST WATCH WITH ALARM

*Primary Examiner*—George H. Miller, Jr.  
*Attorney*—Eric H. Waters et al.

[75] Inventor: **Yuki Tsuruishi, Suwa, Japan**

[73] Assignee: **Kabushiki Kaisha Suwa Seikosha,**  
Tokyo, Japan

[22] Filed: Feb. 17, 1972

[21] Appl. No.: 227,107

[30] **Foreign Application Priority Data**

Feb. 18, 1971 Japan..... 46/7159

[52] U.S. Cl. .... 58/57.5

[51] **Int. Cl.**..... **G04b 23/12, G04c 21/34**

[58] **Field of Search**..... 58/57.5, 90 R

[56] **References Cited**

## UNITED STATES PATENTS

3,577,876	5/1971	Spadini .....	58/57.5
-----------	--------	---------------	---------

## [57] ABSTRACT

An electronic wrist watch with an alarm has a buzzer provided on the outside of a watch case, a perforated cover which covers said buzzer, an excitation circuit which drives said buzzer, apparatus for operating the excitation circuit at some predetermined time, and a small-size dry cell battery for supplying the oscillating power of said buzzer. The cover is coextensive with the watch case.

## 2 Claims, 4 Drawing Figures

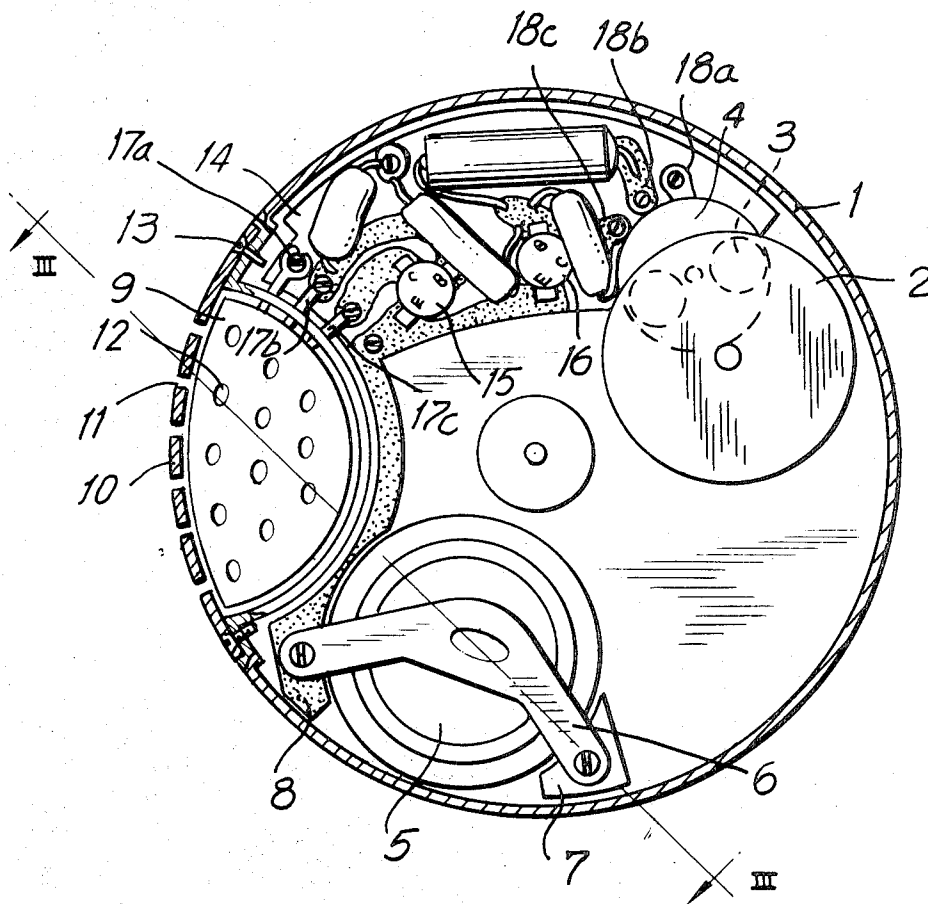




FIG. 3

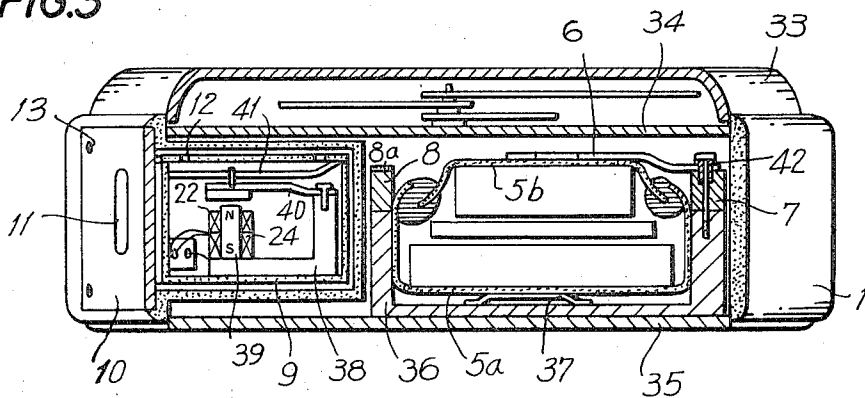
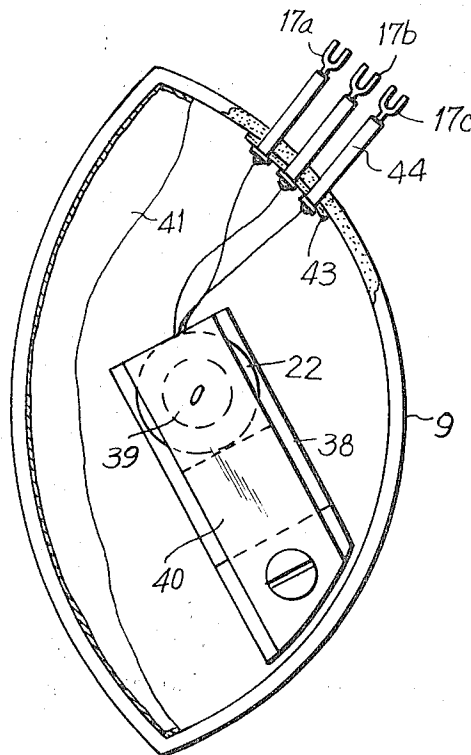


FIG. 4



## ELECTRONIC WRIST WATCH WITH ALARM

## FIELD OF THE INVENTION

The present invention relates to electronic wrist watches with alarms and more particularly to electronic wrist watches provided with time indicating buzzers and the like.

## BACKGROUND

Conventional alarm wrist watches are known which are of the mechanical type and are so constructed that a hammer rod strikes a part of a back cover. In these mechanical alarm wrist watches, a spring has to be wound before each usage. Moreover, the sound of the buzzer is weak and unpleasant.

Recently, a mechanical wrist watch has been developed wherein the sound of the buzzer is improved. This new wrist watch comprises a barrel drum and a battery whereby the buzzer is electrically driven. This wrist watch is large in size, especially in thickness, as a result of which its value is greatly reduced.

## SUMMARY OF INVENTION

An object of the present invention is to eliminate the above disadvantages and to provide a wrist watch with very great appeal.

Another object of this invention is to provide an improved electronic wrist watch which has a very small-size buzzer which is used as an alarm and which is characterized by good water resistance.

To achieve the above and other objects of the invention there is provided an alarm timepiece comprising a case provided with an internal enclosure and including a portion defining an external recess, there being an alarm in such recess and there being moreover provided timing means in the aforesaid enclosure along with power means, connecting means extending through said portion of the case and connecting the power means and alarm.

According to a feature of the invention, said connecting means extends in water-tight relationship through the aforesaid portion.

The timing means may be advantageously operatively associated with the power means to control the same. Furthermore, there may advantageously be provided in accordance with a further feature of the invention a perforated cover over the above-mentioned recess which cover shields the alarm and is coextensive with the casing exclusive of the aforementioned portion.

The alarm may preferably be a buzzer including at least one perforated part for facilitating noise transmission in conjunction with the above-mentioned perforated cover.

According to the invention the power means may be coupled to the timing means for driving the same.

According to a preferred embodiment of the invention the above-mentioned cover is held to the casing by a screw fastener. Still further, the above-mentioned power means may include a transistor circuit for operating the alarm and timing means, such circuit including a battery, an oscillating circuit section including a transistor and a buzzer driven by this circuit section, there being furthermore provided a switch controlled by the timing means and controlling the circuit section. Such circuit may further include a section for driving the timing means.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partly cross-sectional view of an electronic alarm wrist watch incorporating a recessed buzzer system in accordance with one embodiment of the invention;

FIG. 2 is a schematic circuit diagram illustrating a circuit for driving the buzzer and the timing mechanism of the watch in FIG. 1;

FIG. 3 is a cross-sectional view taken along line III-III in FIG. 1; and

FIG. 4 shows a detail of the watch of FIG. 1 on enlarged scale.

## DETAILED DESCRIPTION

FIG. 1 shows an outline of the inside of an electronic alarm wrist watch according to the invention. Element 1 is a watch case. The watch case 1 is provided with a peripheral recess in which is accommodated a buzzer 9. Over this recessed portion is attached a buzzer cover 10 by means of screws 13.

The buzzer cover 10 is provided with a plurality of perforations or holes 11. The cover 10 and case 1 have like curvatures as appears from FIG. 1.

Element 2 is a balance wheel which is used as the time standard. A tuning fork or a quartz crystal may be used as the time standard in other embodiments. Element 3 is a permanent magnet attached to the balance wheel 2 and element 4 is a coil. This balance-wheel construction is well known and need not be further described.

The terminals 18a, 18b and 18c of the coil 4 are connected to a power source, a detecting condenser and the collector electrode of a transistor 16 for driving the balance wheel respectively. Element 5 is a small-size dry cell battery and, in this embodiment, one battery serves for driving both buzzer 9 and balance wheel 2. The positive pole of the battery 5 is grounded to the plate of the watch and the negative pole is pressed by a spring 6 on insulators 7 and 8. The electrode reaches from the insulator 8 to a predetermined position on a base plate 14 of the associated circuit.

The buzzer 9 is provided with a plurality of small holes 12 in order that any generated sound may be easily transmitted therefrom. The buzzer 9 is connected to the associated circuit by connecting members 17a, 17b and 17c which are good electrical conductors. A transistor 15 is provided for the buzzer. Since the connecting members 17a, 17b and 17c pass through the case 1, they are insulated from the case 1 by rubber or plastic such that the watch case is sealed in order to maintain the same waterproof. Therefore, the movement and the circuit are incorporated in the waterproof case, while the buzzer 9 is incorporated in a ventilated space so sound can be effectively transmitted.

FIG. 2 is a diagram of an electronic circuit for driving the buzzer and the balance wheel of the watch in the embodiment of FIG. 1. In FIG. 2, element 19 is a battery, element 20 is a buzzer, element 21 is a transistor for driving a buzzer, and element 22 is a detecting coil. Also included are a base bias resistor 23, a coil 24 for driving the buzzer, a balance wheel 25 which constitutes as aforesaid the time standard for the watch, a transistor 26 forming part of a circuit for driving the balance wheel, a detecting coil 27, a detecting condenser 28, a base bias resistor 29, a coil 30 for driving the balance wheel and a condenser 31 for preventing

harmonic-wave oscillation. The detecting coil 27 and the driving coil 30 are formed as a unit constituting coil 4 shown in FIG. 1. The detecting coil 22 and the driving coil 24 are incorporated in the buzzer 9.

Usually, the circuit for driving the buzzer is inoperative as a switch 32 is open. At a time previously set, when the switch 32 is closed by conventional means, the circuit operates and the buzzer begins to ring. The switch 32 can be easily operated for example by a flexible pin attached to an hour wheel (not shown), according to a well known technique.

FIG. 3 is a cross-sectional view of the watch in FIG. 1 taken along line III—III in FIG. 1, element 33 is the front glass of the watch, element 34 is the front dial, element 35 is the rear lid and element 36 is the base plate of the watch movement. The battery 5 has a positive terminal case part 5a and a negative terminal case part 5b. Positive terminal case part 5a is electrically in contact with the base plate 36 through a terminal spring 37. Element 38 is a magnetic plate which is fixed in buzzer 9.

Element 39 is a permanent magnet, element 40 is a vibrating arm and element 41 is a resonator film. This constitution of the buzzer 9 is already known. Element 8a is a conductive film on an insulator 8. Spring 6 is insulated from base plate 36 by a plastic bushing 42 and insulator 7 or 8. The spring 6 is in contact with conductive film 8a. Therefore, negative terminal 5b of the battery 5 is connected with a negative point of the electronic circuit.

FIG. 4 is an enlarged inside view of the buzzer. Resonator film 41 is pasted with its outside edge to an inside wall of buzzer case 9. The three terminal wires are guided out to the connecting members 17a, 17b and 17c. These connecting members are covered with insulating tubes 44 and fixed at an insulator plate 43 which is mounted inside the buzzer case 9.

The wrist watch according to this invention can include an ultra compact-sized speaker. Further, by providing batteries for the buzzer and the watch independently, the sound of the buzzer can be increased.

As described in the above, the electronic alarm wrist watch according to the present invention has a waterproof construction and only the buzzer is exposed to the outside so that sound can be transmitted efficiently. Further, the circuits for buzzer and watch can be mounted on a common base plate and one battery can serve two purposes. Thus, the watch is very advantageous for practical use.

In the above detailed description of a preferred embodiment of the invention there has been set forth an alarm time piece comprising a case provided with an internal enclosure and including a portion defining an external recess, there being an alarm in such recess and timing means in said enclosure along with a power source. A connecting means extends through the afore-

noted portion of the case and connects the power means and alarm, preferably in watertight relationship.

There has also been shown a wrist watch in which the timing means is operatively associated with and controls the power means and in which there is employed a perforated cover shielding the alarm and located over the recess whereat it is fixed by means of screw fasteners. Such cover is preferably coextensive with the case exclusive of the portion defining the external recess.

The alarm as has been noted above may be a buzzer or a compact speaker or other such transducer for converting electrical signals into audible sound. The buzzer may preferably include at least one perforated part for facilitating noise transmission.

According to further aspects of the embodiment disclosed hereinabove, the power means may be coupled to and drive the timing means and the power means may include a transistor circuit for operating the alarm and timing means. Such circuit may include a battery, an oscillating circuit section including a transistor, a buzzer driven by the circuit section and a switch controlled by the timing means and controlling this circuit section. The aforementioned section may further include a section for driving said timing means.

There will now be obvious to those skilled in the art that many modifications and variations of the construction set forth hereinabove. Such modifications and variations will not however depart from the scope of the invention if defined by the following claims.

What is claimed is:

1. An alarm electronic wristwatch comprising a watch case, means in said case by which a recess is provided peripherally in said watch case, said means being provided with perforations, a buzzer contained in said recess and including an oscillating portion, a buzzer cover contiguous with said case and covering said recess and said buzzer, said buzzer cover being provided with a plurality of perforations in order to transmit sound externally of said watch case, at least one screw fixing said cover onto said watch case, an electronic circuit for driving said buzzer in said watch case, means for electrically connecting said circuit to said buzzer, means for operating said circuit for driving said buzzer at a selectable time, said circuit including a transistor including a base electrode, switch means inserted in series with said base electrode of the transistor for driving said buzzer, an oscillator constituting a time standard for said watch, a driving circuit for said oscillator, a base plate supporting both said driving circuit for said buzzer and said exciting circuit for said oscillator, and a single battery for supplying both said circuits with energy.

2. A wristwatch as claimed in claim 1 wherein said cover and case have like curvatures.

\* \* \* \* \*