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PATENT SPECIFICATION

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(54) AN ELECTRIC BATTERY MOUNTING ARRANGEMENT FOR AN ELECTRICALLY POWERED DEVICE

(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 relates to an electric battery mounting arrangement for an electrically powered device. Although the invention is not so restricted, it will be particularly described with reference to an eletcric battery mounting arrangement for an eletcric timepiece, such as an electrically powered wrist-watch.

According to the present invention, there is provided an electric battery mounting arrangement for a battery of an electrically powered device, e.g. a timepiece, said battery comprising two portions of opposite polarities and of differing external cross-sectional areas, the said mounting arrangement including: a battery receptacle and a conducting portion comprising a cover member forming a cover to the battery receptacle and resilient means for electrically contacting the larger portion of the battery when the battery is inserted into said mounting arrangement in the correct orientation, said resilient means defining, with the central portion of the cover member, a gap, the arrangement being such that if the battery is inserted into said mounting arrangement in an inverted orientation electrical contact between the smaller portion of the battery and the conducting portion is avoided.

Preferably an insulating member is provided in said gap.

The said resilient means may include a pair of spaced apart flexible plates depending from said cover member.

The scope of the invention also includes an electrically powered device, e.g. a timepiece, provided with an electric battery mounting arrangement as set forth above.

The invention will be described, merely by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a fragmentary cross-sectional view of a conventional battery-powered electric timepiece,

Figure 2 is a view similar to Figure 1, but showing a preferred embodiment of the present invention, and

Figure 3 is a view similar to Figure 2, but showing a battery in an inverted or "upside-down" position.

Referring first to Figure 1, the relevant parts of an electric battery-powered timepiece, such as a wrist-watch, are shown. The wrist-watch has a recessed base plate 2 and a case 8 formed to provide a space or receptacle for the insertion thereinto of a battery 1. The base plate 2 is provided with an insulating plate 3 and an elastic conductive plate 4 on top of the insulating plate 3, adapted to make electrical contact with one pole of the battery 1.

The case 8 is provided with an opening and a cover member 5 for said opening. The inner surface of the cover member 5 has a resilient or elastic conductive plate 6 secured thereto for making electrical contact with the other pole of the battery 1. The plate 6 has two lugs depending therefrom at acute angles and directed towards each other. The cover meber 5 and the plate 6 constitute a conducting portion of the mounting arrangement.

The positive or negative terminal of the battery is connected or earthed to the base plate where the sides of the battery abut the recess in the plate 2. The cover member 5 with the elastic plate 6 is mounted on the case 8 so that the elastic plate 6 is compressed in eletcrical contact with this terminal of the battery. The cover plate 5 is connected to the base plate 2 through the case 8. Thus a positive or a negative earth potential is applied to the base plate 2. The other terminal of the battery is connected to the plate 4.

However, the drawback of the above-

described arrangement resides in the fact that when the battery is inserted, the polarities of the respective terminals are difficult to identify, and moreover if the battery is inverted, i.e. inserted upside down, short-circuiting of the battery can be caused through the base plate 2, the case 8, the cover 5 and the plate 6 and a large amount of energy can be consumed in a very short time, even to the extent of completely exhausting the battery. The preferred embodiments of the present invention seek to eliminate the above-mentioned defects.

Referring now to Figures 2 and 3, in which parts similar to those in Figure 1 are indicated by like reference numbers, the battery 1 is substantially similar to that shown in Figure 1 and has two portions of opposite polarities and different external cross-sectional areas. The larger substantially cylindrical portion carries the positive pole, while the smaller portion, also substantially cylindrical, carries the negative pole and is normally adapted to be disposed nearer the bottom of the recess provided in the base plate 2 so as to be in electrical contact with the conductive plate 4.

The base plate 2 is insulated from the battery by the insulating plate 3. In contrast to Figure 1, in which the plate 6 has two depending lugs directed towards the centre of the larger cylindrical portion of the battery 1, in this embodiment as shown in Figure 2, the plate 6 is replaced by two depending lugs or plates directed outwardly towards the periphery of the larger cylindrical portion of the battery 1. In this way, a gap defined by the lugs 6 and the central portion of the cover members is formed between the inner surface of the cover member 5 and the top surface of the said larger portion of the battery 1. Into this space or clearance projects an insulating member 7 secured to the inner surface of the cover member 5.

In this embodiment, see Figure 3, even if the battery 1 is accidentally inserted in an inverted orientation, short-circuiting cannot occur because of the clearance kept between the battery and the elastic lugs 6.

The short-circuiting is positively prevented by the provision of the insulating member 7 which prevents any eletcrical contact of the smaller portion of the battery 1 with either the lugs 6 or the cover member 5.

However, this insulating member 7 is optional and may be omitted, if the lugs 6 are arranged to contact the larger portion of the battery 1 before the smaller portion of the battery 1 contacts either the lugs 6 or the cover member 5 which form a conducting portion of the mounting arrangement. Should the lugs 6 be able to contact the larger portion of the battery 1 by reason of variations in manufacturing tolerances, no short-circuiting will occur because the lugs 6 and the base plate 2 will have the same potential.

The present invention allows a battery 1 to be inserted into its mounting arrangement more safely and without the risk of consuming excessive amounts of energy stored in the battery when it is inserted in the wrong orientation.

WHAT WE CLAIM IS:—

1. An electric battery mounting arrangement for a battery of an electrically powered device, e.g. a timepiece, said battery comprising two portions of opposite polarities and of differing external cross-sectional areas the said mounting arrangement including a battery receptacle and a conducting portion comprising a cover member forming a cover to the battery receptacle and resilient means for electrically contacting the larger portion of the battery when the battery is inserted into said mounting arrangement in the correct orientation, said resilient means defining, with the central portion of the cover member, a gap, the arrangement being such that if the battery is inserted into said mounting arrangement in an inverted orientation electrical contact between the smaller portion of the battery and the conducting portion is avoided.

2. A mounting arrangement as claimed in claim 1 wherein an insulating member is provided in said gap.

3. A mounting arrangement as claimed in claim 1 or 2 wherein the said resilient means includes a pair of spaced apart flexible plates depending from said cover member.

4. A mounting arrangement substantially as hereinbefore described with reference to and as shown in Figures 2 and 3 of the accompanying drawings.

5. An electrically powered device, e.g. a timepiece, provided with an electric battery mounting arrangement as claimed in any preceding claim.

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