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[54] **CONTACT ARRANGEMENT FOR A BATTERY-POWERED WATCH**

[75] Inventors: **Eckhard Kern**, Schramberg; **Robert Wolber**, Lauterbach, both of Germany

[73] Assignee: **Gebruder Junghans Gesellschaft mit beschrankter Haftung**, Schramberg, Germany

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[51] **Int. Cl.**[2] **G04C 3/00;** G04B 19/30

[58] **Field of Search** ..... 58/23 R, 23 BA, 55

[56] **References Cited**

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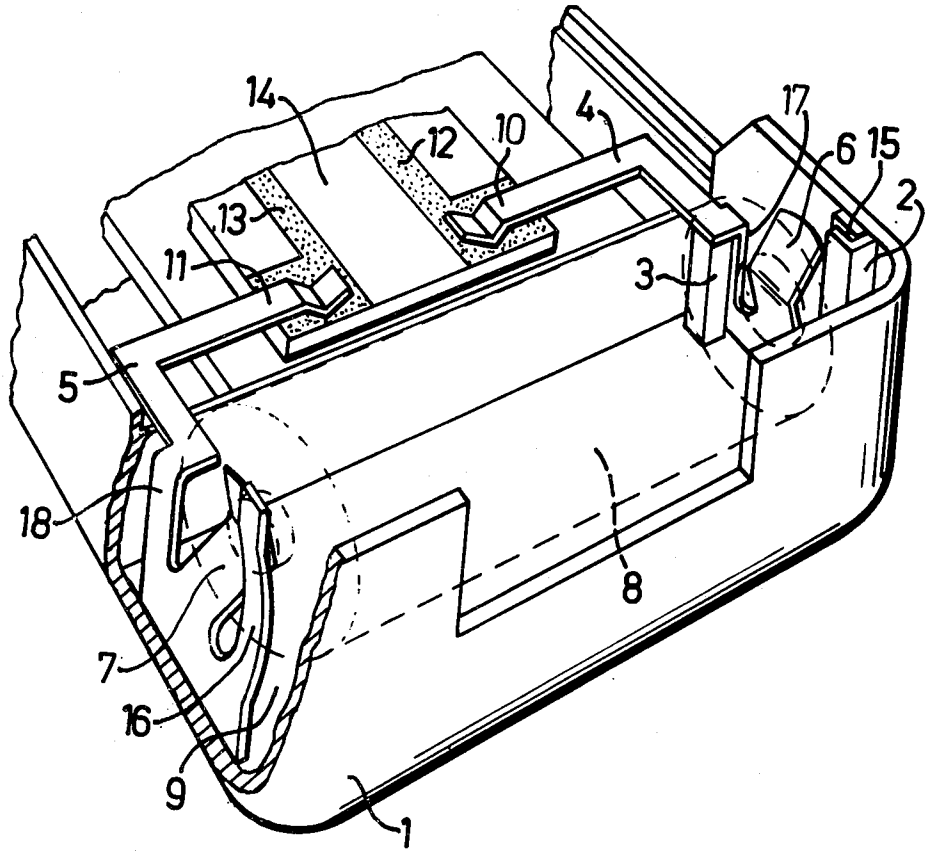
Primary Examiner—Edith Simmons Jackmon

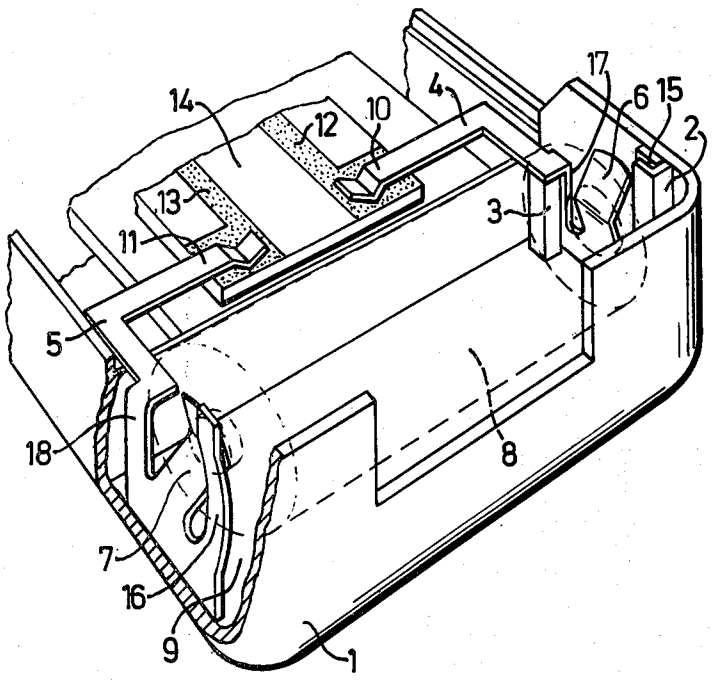
Attorney, Agent, or Firm—Burns, Doane, Swecker & Mathis

[57] **ABSTRACT**

A watch includes a housing formed of electrically insulative material, a battery, and a conducting plate with plural conductor paths. Electrically connected between the conductor paths and the poles of the battery are conducting rails. Each conducting rail includes first and second contact tongues formed of electrically conductive material. The conducting rail is mounted to the housing such that the first and second contact tongues contact a pole of the battery and one of the conductor paths, respectively. The conducting rails include spring arms that are inserted into slits of the housing to frictionally, but releasably, hold the conducting rails in the housing.

13 Claims, 1 Drawing Figure

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CONTACT ARRANGEMENT FOR A BATTERY-POWERED WATCH

BACKGROUND AND OBJECTS OF THE INVENTION

The invention concerns a contact arrangement for a battery-operated watch, the watch being the type having a plastic housing and guide rails for electrical connection between a battery and an electric conductor plate.

In the case of known battery-operated watches having a metal housing, the watch mechanism itself constitutes the mass-pole for the electric circuit. The other poles are constituted by contact paths of a conductor plate. The contact arrangement which constitutes the connection between these two latter poles and the poles of the battery is expensive. This is so primarily because a contact must be established for one thing with a metal part of the watch mechanism and for another thing with a conducting path of the conductor plate.

In the case of watch mechanisms in which the essential parts consist of plastic, the mass-pole must be provided on the conductor plate. In order to establish a connection with the battery, contact pieces are riveted onto the conductor path of the conductor plate. These contact pieces effect an electrical connection of the conductor path with the battery. The disadvantages in this case are that the riveting represents an additional work process, and that the assembly, in the case of production and repair, is cumbersome because of the riveted contact pieces.

It is one object of the present invention to minimize or obviate problems of the type outlined previously.

It is another object of the invention to provide a watch in which electrical connection between a battery and a conductor path is effected in the absence of riveting.

It is still an additional object of the invention to provide a contact arrangement for a plastic-cased, battery powered watch, which includes easily insertable and removable contact pieces.

It is a further object of the invention to provide a contact arrangement for a watch wherein the connection between the battery and the conductor path on the conductor plate is established without the attachment of conductor rails on the conductor plate.

BRIEF DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

According to the invention, these objects will be achieved through the fact that every conductor rail includes first and second contact tongues and is fixed on the plastic housing. The first contact tongue contacts one battery pole and the other contact tongue contacts a conductor path of the conductor plate. As a result, it will be possible to mount the conducting rails independently of the conductor plate and to exchange them individually in case of damage.

In a preferred development the two guide rails are developed symmetrically. At the same time it is possible to produce the guide rails from two stamped metal parts of the same shape by homologous bending of the stamped parts.

In an advantageous embodiment, each guide rail has an arm like a leaf spring inserted into a guide slit of the plastic housing. The arm is clamped firmly in the guide slit by spring action. As a result, the use of positive connecting elements is superfluous.

Further advantageous developments result from the following description of the drawing. The sole FIGURE shows an example of a fragmentary portion of a watch, in a broken-open state, depicting a contact arrangement according to this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A plastic housing **1,** shown in a partly broken-open state, has, at each end, a guide assembly that includes two guide parts **2** and **3.** The guide parts **2** and **3** are preferably formed of plastic and are integral with the housing **1.** Each guide assembly serves for receiving and holding a conducting rail **4** or **5.** In the FIGURE, only the guide parts **2** and **3** assigned to conducting rail **4** are shown for clarity.

Each conducting rail **4** and **5** is formed of an electrically conductive material and has a first contact tongue **6** and **7.** The contact tongues **6** and **7** are yieldable so as to fit against the two poles of a battery **8** (shown in broken lines), which can be inserted into a battery chamber **9** of the housing **1.**

The conducting rails **4** and **5** also include second contact tongues **10** and **11.** These second contact tongues are biased toward and rest on the electrical guide paths **12** and **13** of a conductor plate **14** which is mounted in the watch housing.

The conducting rails **4** and **5** further include mounting arms **15, 16, 17, 18** in the shape of leaf springs, which are inserted into slits formed by the guides **2** and **3.** These mounting arms are shaped so that they will be slightly deformed upon insertion into the slits so as to be frictionally secured to the housing by spring action.

The contact tongues **6** and **10,** or **7** and **11,** of the conducting rails **4** and **5,** in the case of the example of the preferred drawing and embodiment according to the innovation are fabricated so as to lie in approximately perpendicular planes in relation to one another. Naturally they can also have other angles in relation to one another and adapted to a certain construction.

In any case, the angles in the non-mounted state of the conducting rails must be dimensioned in such a way that when the conducting rails **4, 5** are inserted into the guide parts **2** and **3,** sufficient contact pressure on the conductor paths **12** and **13** will be ensured by a resilient bending-up of the second contact tongues **10** and **11.**

The conducting rails **4** and **5** can be produced from two metal parts stamped in the same shape. The necessary bendings can be produced by homologous bending such that the conducting rails form mirror images of one another. In this fashion, the conducting rails will be symmetrical about an axis passing between the guide rails perpendicular to the axis of the battery **8.**

With the contact arrangement described, a simple and, thus relatively inexpensive connection is created between the battery and the electric parts of the watch. The conducting rails are mounted on the housing of the watch rather than to the conducting plate. Significantly, the conducting rails can be removed or replaced quickly and easily without the need for breaking any permanent type of fastening, such as a rivet connection, due to the friction mounting thereof to the housing.

Although the invention has been described in connection with a preferred embodiment thereof, it will be

appreciated by those skilled in the art that additions, modifications, substitutions and deletions not specifically described may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A contact arrangement for a battery-powered watch having a housing formed of electrically insulative material, a battery, and a conductor plate; said conductor plate having a plurality of electric conductor paths; said contact arrangement comprising:

a plurality of conducting rails, each conducting rail including a first contact tongue and a second contact tongue formed of electrically conductive material;

each conducting rail being mounted to said housing such that said first contact tongue contacts a pole of said battery and said second contact tongue contacts one of said conductor paths;

the configuration of said conducting rails being such that, with the conducting rails being assembled to said housing, said second contact tongues are displaced from their rest position into spring biased engagement with said conductor paths.

2. A contact arrangement according to claim **1** wherein said conducting rails are relatively symmetrically oriented.

3. A contact arrangement according to claim **1** wherein said second contact tongues contact said conductor paths on the same side of said conductor plate.

4. A contact arrangement according to claim **3** wherein said second contact tongues contact said conductor paths on the same side of said conductor plate.

5. A contact arrangement according to claim **4** wherein the configuration of said conducting rails is such that, with the conducting rails being assembled to said housing, said second contact tongues are displaced from their rest position and into spring biased engagement with said conductor paths.

6. A contact arrangement according to claim **1** wherein said housing includes guide means defining a plurality of slit means; said conducting rails including at least two mounting arms that are shaped so as to be deformed when disposed in said slit means to establish a spring-induced frictional attachment to said housing.

7. A contact arrangement according to claim **5** wherein said housing includes guide means defining a plurality of slit means; said conducting rails including at least two mounting arms that are shaped so as to be deformed when disposed in said slit means to establish a spring-induced frictional attachment to said housing.

8. A contact arrangement according to claim **6** wherein each of said mounting arms comprises a leaf spring having an arched portion located intermediate its ends.

9. A contact arrangement according to claim **1** wherein each conducting rail includes at least one deformable portion that is received within a slit formed in said housing and is frictionally held therein by deformation of said deformable portion.

10. A contact arrangement for a battery-powered watch having a housing formed of electrically insulative material, a battery, and a conductor plate; said conductor plate having a plurality of electric conductor paths; said contact arrangement comprising:

a plurality of conducting rails, each conducting rail including a first contact tongue and a second contact tongue formed of electrically conductive material;

each conducting rail being mounted to said housing such that said first contact tongue contacts a pole of said battery and said second contact tongue contacts one of said conductor paths;

said housing including guide means defining a plurality of slit means; said conducting rails each including at least two mounting arms that are shaped so as to be deformed when disposed in said slit means to establish a spring-induced frictional attachment to said housing.

11. A contact arrangement according to claim **10** wherein said conducting rails are symmetrically oriented and said second contact tongues contact said conductor paths on the same side of said conductor plate.

12. A contact arrangement for a battery-powered watch having a housing formed of electrically insulative material, a battery, and a conductor plate; said conductor plate having a plurality of electric conductor paths; said contact arrangement comprising:

a plurality of conducting rails, each conducting rail including a first contact tongue and a second contact tongue formed of electrically conductive material;

each conducting rail being mounted to said housing such that said first contact tongue contacts a pole of said battery and said second contact tongue contacts one of said conductor paths;

each conducting rail including at least one deformable portion that is received within a slit formed by spaced walls of said housing and is frictionally held therein by deformation of said deformable portion against a wall of said slit.

13. A method of forming a contact arrangement for a battery-powered watch comprising the steps of:

providing a housing of electrically insulative material which includes a battery recess, and a conductor plate having a pair of electric conductor paths;

stamping a pair of identical metal conductor rails having first and second contact tongues;

deforming a portion of each stamped conductor rail to form conductor rails that are mirror images of one another;

inserting said conductor rails into slits situated at opposite ends of said battery recess and defined by spaced walls of the housing such that said deformable portions are deformed against a wall of each slit to frictionally hold said conductor rails in place, with said first contact tongues disposed in facing relation for making electrical contact with a battery therebetween and said second contact rails contacting said electric conductor paths.

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