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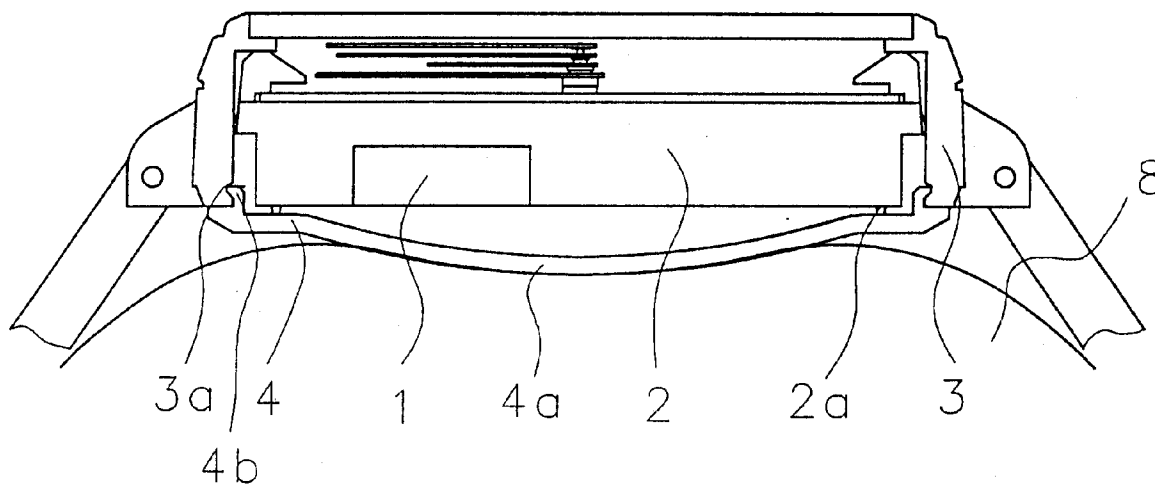
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(54) **Vibrating-alarm electronic timepiece**

(57) To transmit the vibration of an alarm mechanism (1) to a users arm (8) with a high efficiency, the surface (4a, 5a) of a case back (4) in contact with the

users arm (8) has a convex configuration on the side opposite to that on which the timepiece movement (2) is situated; thus ensuring contact between the case back (4) and the users arm (8).

FIG.1



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Description

The present invention relates to an electronic timepiece adapted to inform a user of a set time by way of a vibration and, more particularly, to a vibrating-alarm electronic timepiece having means on its case back for transmitting the vibration.

The conventional vibrating-alarm electronic timepiece, as illustrated in Fig. 5, has a movement 2 composed of hour and minute hands for indicating a time, a gear train for driving the hour and minute hands and a motor for driving the gear train. The movement also has a motor 1 for causing vibration and a circuit for controlling the motor for driving the gear train and the motor for causing vibration. The movement is fixed to the inner periphery of a timepiece case 3, with the outer periphery of the movement 2 having an interference fit therewith.

An eccentric weight (not illustrated) is attached to a rotating shaft of the motor 1 for causing vibration as a result of a high-speed rotation of the weight. Vibrations are caused by the centrifugal force of the weight and the result is to vibrate the timepiece as a whole. The vibration of the entire timepiece is transmitted from the case 3 to the arm 8 of a user via a case back 4 whose bottom surface configuration is flat.

However, in the conventional vibrating-alarm electronic timepiece, since the bottom surface configuration of the case back is flat, the case may be separated from the users arm. This can result from the manner of fastening a bracelet or the attitude of the timepiece. That is, the case back of the timepiece is inconveniently separated or floated from the surface of the arm. The result is that it is difficult to transmit the vibration to the users arm.

This invention provides an arrangement in which the case back has a convex configuration on a side opposite to that on which the movement is situated. In this arrangement, taken simply, the thickness of the material constituting the case back increases. This gives rise to the disadvantage that the timepiece increases in weight. Thus, the present invention preferably provides vibration transmitting means wherein the bottom surface of a case back is brought into contact with the arm of a user by means of a material having a uniform thickness. Thus, with the preferred arrangement of the present invention, it is possible to provide a case back which enables excellent transmission of the vibration, is light in weight and is easy to fabricate.

In a vibrating-alarm electronic timepiece embodying the present invention; a movement provided with vibration causing means is provided within a case, and vibration transmission means is provided on a case back secured to an inner-peripheral surface of the case.

The vibration transmission means is provided on the case back as a case back configuration, wherein a part of the case back becomes convex on a side opposite to that on which the movement is situated. The vibration transmission means is more effective if it is of a

configuration which slightly sinks into the users arm.

Also, the said case back configuration is preferably provided in such a way that the case back configuration is curved along a direction which connects the time indication position of 12:00 o'clock and the time indication position of 6:00 o'clock.

Also, the said case back configuration is easily manufacturable by performing drawing of a material having a substantially uniform thickness.

By providing a case back configuration wherein the case back better fits the users arm, the transmission of the vibration becomes reliable.

Embodiments of the present invention will now be described by way of further example only and with reference to the accompanying drawings, in which:-

Fig. 1 is a sectional view illustrating a vibrating-alarm electronic timepiece according to an embodiment of the present invention.

Fig. 2 is a plan view illustrating the relationship between a case back of the vibrating-alarm electronic timepiece according to an embodiment of the present invention and the arm of a user.

Fig. 3 is a perspective view illustrating a case back of another embodiment of the vibrating-alarm electronic timepiece according to the present invention. Fig. 4 is a sectional view illustrating a case back of still another embodiment of the vibrating-alarm electronic timepiece according to the present invention.

Fig. 5 is a sectional view illustrating a conventional vibrating-alarm electronic timepiece.

Fig. 1 is a sectional view illustrating a vibrating-alarm electronic timepiece according to an embodiment of the present invention. Fig. 2 is a plan view illustrating the relationship between the users arm and a case back assumed to have been mounted on the arm.

Referring to Fig. 1, a movement 2 provided with a motor 1 for causing vibration by rotating an eccentric weight (not illustrated) is engaged with the inner-peripheral surface of a case 3. By pressing and deforming fixing protrusions 2a, each made of an elastic material provided on the movement 2, by means of a case back 4 incorporated into the case, the movement 2 is fixed in place. The case back 4 is integrated with the case 3 by engagement in a recessed portion 3a provided in the case 3 of a protruding portion 4b provided on the case back 4. On the case back 4 there is provided means for transmitting vibration. That is, a convex portion 4a is provided on a side opposite to that on which the movement 2 is situated. The convex portion 4a is formed into a curved configuration so as to conform to the configuration of the users arm. The convex portion 4a is more effective if it is provided along the direction connecting the time indication position of 12:00 o'clock and the time indication position of 6:00 o'clock.

In another embodiment, illustrated in Fig. 3, the configuration of the means for transmitting a vibration, namely a convex portion 5a of a case back 5 is constructed with a semi-spherical configuration. By fitting this semi-spherical configuration to the users arm, it is possible to obtain the same effect as that attainable with the preceding embodiment.

In still another embodiment, illustrated in Fig. 4, it is possible to obtain the same effect as that attainable with the preceding embodiments by fixing a convex portion 7, semi-spherically constructed using a hard material such as plastic, to a case back 6 by means of, for example, an adhesive agent.

In the present invention, it is possible to make reliable the vibration transmission path for transmitting the vibration of the vibration causing means from the case back to the users arm. As a result of this, it is possible to transmit easily the vibration by the fitting of the case back to the users arm.

Further, by curving a part of the case back on the side opposite to that on which the movement is situated, and thereby making it convex; the convex configuration positively presses in to the surface of the users arm. Thus, a decrease in the effect of transmission of the vibration can be mitigated even when the bottom surface of the case back has a tendency to separate or float from the users arm, as a result of movement of the users arm or the method of fastening the belt.

Also, by performing drawing with the use of a material having a substantially uniform thickness, it is possible to manufacture a case back which is easy to fabricate and light in weight.

5. A vibrating-alarm electronic timepiece as claimed in claim 1, wherein the case back (4) is formed of a plastics material.

Claims

1. A vibrating-alarm electronic timepiece whose case back (4) is provided with means for transmitting a vibration, characterised by
the case back (4) being convex on the side thereof opposite to that on which the timepiece movement (2) is situated.
2. A vibrating-alarm electronic timepiece as claimed in claim 1, wherein the case back (4a) is curved along the timepiece direction connecting a time indication position of 12:00 o'clock and a time indication position of 6:00 o'clock.
3. A vibrating-alarm electronic timepiece as claimed in claim 1, wherein the case back (5a) is semi-spherical.
4. A vibrating-alarm electronic timepiece as claimed in any preceding claim, wherein the case back (4a, 5a) is formed from a material having a substantially uniform thickness.

FIG.1

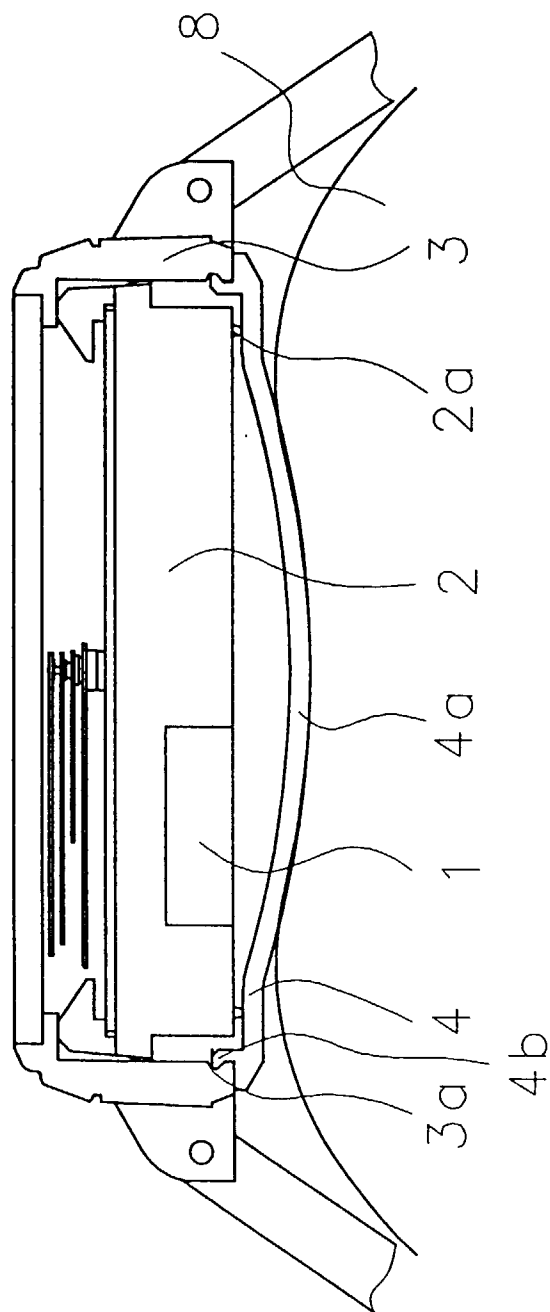


FIG.2

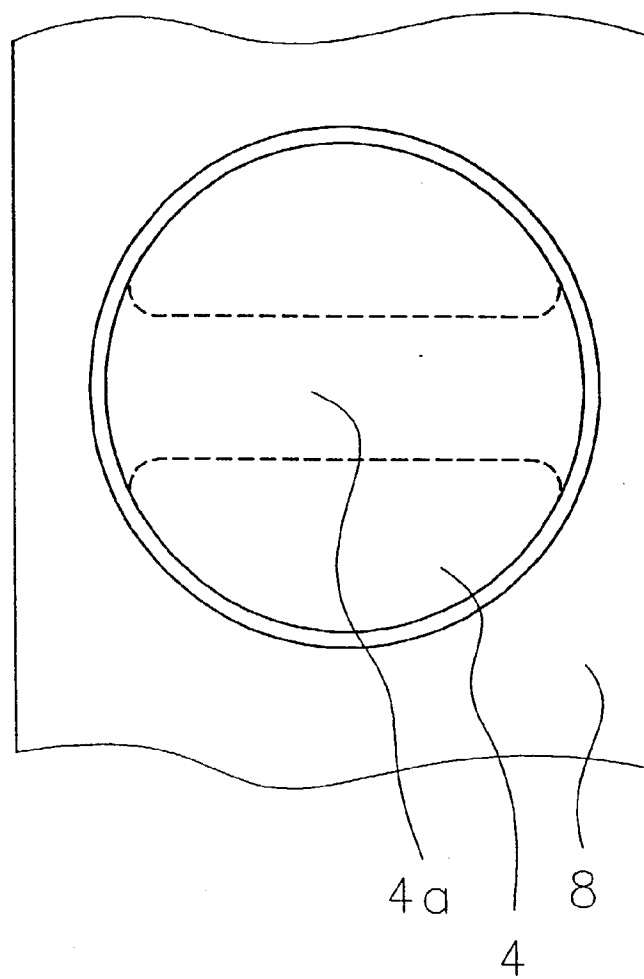
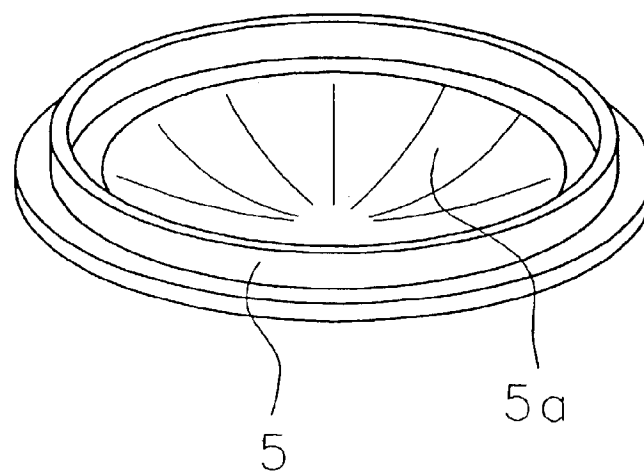


FIG.3



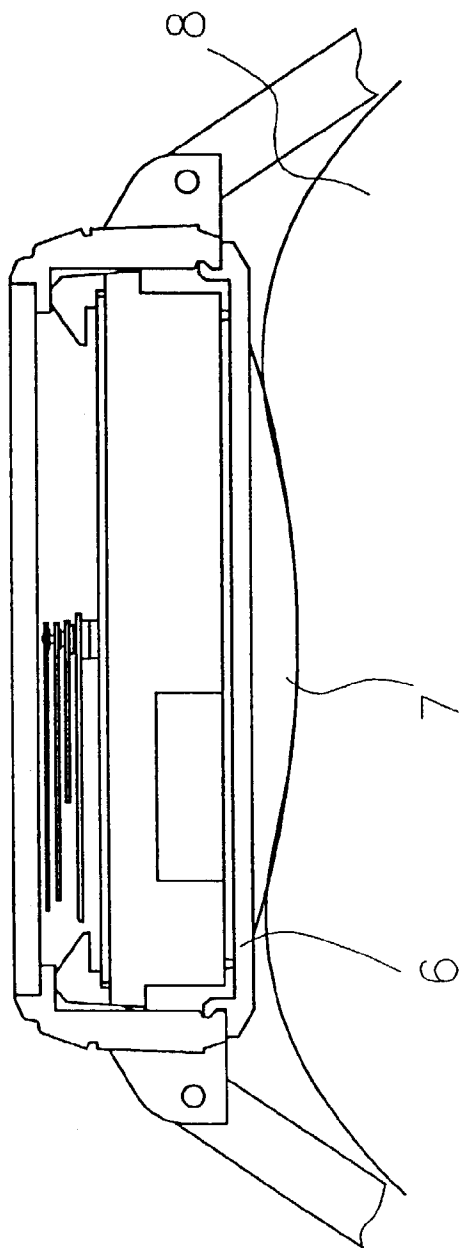


FIG.4

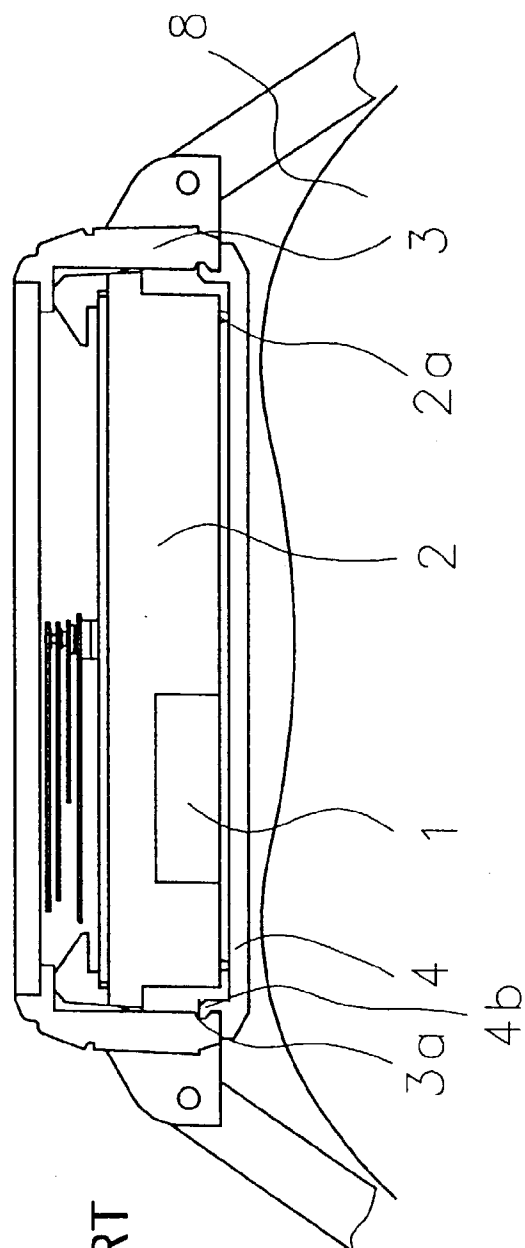


FIG.5 PRIOR ART