

- [54] **WRIST-WATCH WITH SELECTIVE TIME-DISPLAY**
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[57] **ABSTRACT**

A battery operated wrist-watch having an electrically powered time-display is so arranged that said display is activated only at the selection of the wearer, the objective being to conserve energy. A switching arrangement is provided which is operated by rotation of the wearer's arm to bring the wrist-watch into view. Consequently, the time-display can be activated without the use of the wearer's other hand to push a button or the like.

6 Claims, 2 Drawing Figures

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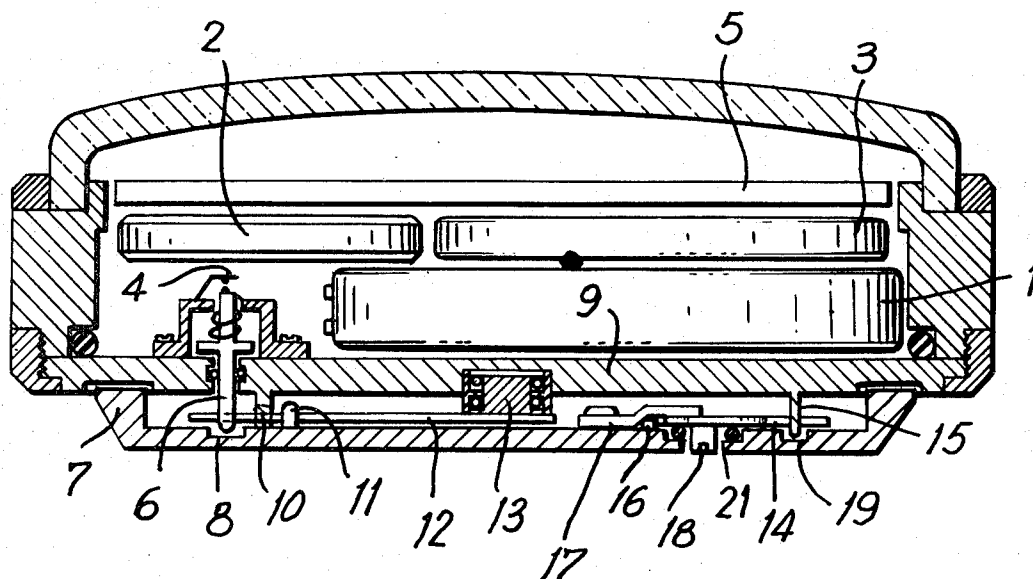


FIG. 1

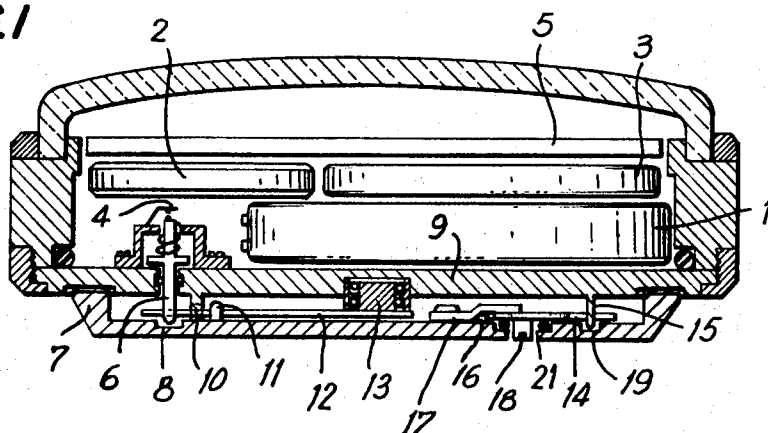
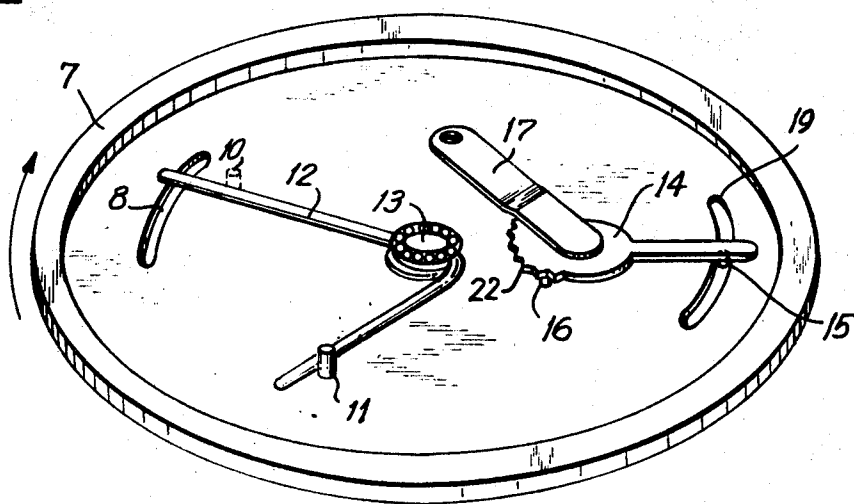


FIG. 2



WRIST-WATCH WITH SELECTIVE TIME-DISPLAY

BACKGROUND OF THE INVENTION

Wrist-watches which indicate the time by a digital display element based on light-emitting diodes or liquid crystals between transparent conductors are devices which are rapidly gaining acceptance, but they suffer, as yet, from the defect that the energy involved in displaying the time is still large. As a result, a continuous display of the time for as little as a few hours may be enough to exhaust the power-cell. Consequently, in watches of this type, it has been necessary to provide a switching mechanism so that the time is displayed only when the wearer wishes to note it. The mechanism up to now has been such that the user wears the watch on one hand and must use the other to activate the time-display; this can be awkward, especially when the other hand is engaged in some necessary function such as driving a car or carrying a package or a suitcase. Consequently, a wrist-watch which can be activated to show the time without using both of the user's hands is greatly to be desired.

SUMMARY OF THE INVENTION

A wrist-watch using an internal battery for powering display of the time has on the rear thereof a movable plate. Movement of the wearer's arm being the wrist-watch to bring the watch into view moves a plate relative to the remainder of the watch; the plate is coupled to a switch which connects the battery to the time-display means, making the time visible to the wearer. In a preferred form, twisting of the arm to bring the watch into view causes rotation of the plate. Provision is made for adjusting the excursion of the plate as a result of twisting of the arm and the plate is spring-biased so that the switch is normally in open position, thereby minimizing the use of energy from the battery and lengthening the useful life on the battery.

Accordingly, an object of the present invention is to provide an improved wrist-watch having a battery-powered time-display means requiring use of only one arm to cause said wrist-watch to display the time.

Another obvious object of the present invention is to provide an improved wrist-watch having a battery-operated time-display wherein display of the time is initiated by twisting of the arm on which the wrist-watch is worn.

A further object of the present invention is to provide an improved wrist-watch having a battery-operated time-display, wherein a normally open switch prevents connection of the battery to the time-display means when the time is not being observed in order to prolong the life of the battery.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises an article of manufacture possessing the features, properties, and the relation of elements which will be exemplified in the article hereinafter described, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a cross-sectional view through a wrist-watch in accordance with the present invention; and

FIG. 2 shows, in perspective, means for limiting the excursion of a rotatable plate mounted at the rear of said wrist-watch.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As aforementioned, it is desirable that battery-powered time-display means in a wrist-watch be activated selectively at the choice of the wearer without the use of both hands of the wearer. To affect this purpose, a movable plate is mounted at the rear of the wrist-watch. In a preferred embodiment as shown in FIG. 1, battery 1 drives crystal vibrator 2, and the output from crystal vibrator 2 is converted into a time signal by logic circuit 3 which passes on to contact point 4. Axial movement of pin 6 by means to be described below passes the time signal on to time-display means 5 and activates same.

The outer end of pin 6 which is spring-biased engages the bottom of arcuate groove 8 cut in plate 7 which is mounted for rotation. Groove 8 is tapered with respect to depth so that rotation of plate 7 in the direction of the arrow moves pin 6 axially in an inward direction to make contact with contact point 4, thereby activating time-display means 5.

A pin 10 on back cover 9 of the watch and a support pin 11 fixed to rotation plate 7 serve for mounting spring 12 which biases plate 7 for rotation opposite to the direction of the arrow. As a result, pin 6 normally rests on the deepest portion of the groove 8 as the result of which connection between battery 1 and time-display means 5 is normally broken.

Usually, a wrist-watch is worn on the outer face of one arm. To bring the face of the watch into view, the arm is turned toward one's body by twisting the arm. In the process the skin of the arm is pulled obliquely. This twist of the arm causes movement of the skin in contact with the rotatable plate, as a result of which the plate rotates through an angle sufficient to close contact between pin 6 and contact point 4 and activate time-display means 5. As is evident, movement of a plate suitably mounted at the rear of the watch could also be caused by rotating the hand backwards about the wrist, thereby causing translational movement of the skin underneath the watch.

To compensate for differences between individuals with respect to the amount by which the arm is twisted to bring the watch into view and with respect to the amount of movement of the skin, means are provided for adjusting the angle through which the rotating plate moves when the arm is twisted. Correction arm 14 is mounted directly to axle 18 which rests in opening 21 of rotatable plate 7. Arm 14 spans arcuate groove 19; pin 15 affixed to cover 9 limits the excursion of plate 7 in one direction and one end of arcuate groove 19 limits the excursion of plate 7 in the other direction.

Arm 14 is held firmly against plate 7 by leaf-spring 17. Accidental rotation of arm 14 is prevented by reason of the fact that one end of arm 14 is cut to form gear sector 22 which engages pin 16, affixed to plate 7. The limits of excursions of rotation of plate 7 are set by pin 15 making contact in one direction with arm 14 and in the other direction with an end of arcuate groove 19.

When desired to adjust the extent of rotation permitted plate 7, axle 18 is pressed inwardly against flexible

leaf-spring 17 far enough so that gear sector 22 is lifted free of pin 16 which is roughly as thick as gear sector 22. In a preferred form, the outer end of axle 18 is slotted so that it can be pressed inwardly by a screw driver until gear sector 22 is free of pin 16 and arm 14 can then be rotated to make the desired adjustment.

Plate 7 rotates about axle 13. In view of the fact that frictional force between the plate 7 and the wearer's arm may be not great during twisting of the arm to bring the watch face into view, it is desirable that plate 7 be mounted for easy rotation. Consequently, it is preferred that axle 13 be in the form of a ball bearing.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above article without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting scope.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. An improvement in a wrist-watch wherein display of the time requires the use of electric power from an internal electric battery and said time is to be selectively displayed by a time-display means, said improvement comprising a plate movably mounted at the rear of said watch, and switch means coupled to said plate and adapted to activate or deactivate said time-display means in accordance with the angular position of said plate, whereby twisting of the arm of the wearer of said wrist-watch to bring said watch into view causes, in sequence, twisting of the part of the wearer's skin in contact with said plate and movement of said plate in a direction such as to activate said time-display means.

2. The improvement as defined in claim 1, wherein said plate is spring-biased to a position in which said time-display means is inactivated.

3. The improvement as defined in claim 1, wherein

said plate is movably mounted for rotation, said rotation causing activation of said time-display means.

4. The improvement as defined in claim 3, wherein said plate has an arcuate groove therein, said groove tapering in depth from one end to the other, and said switch means having a first pin movable in a direction perpendicular to said plate and being biased to make continuous contact at its outer end with the bottom of said groove, whereby rotation of said plate in one sense or the other causes said first pin of said switch to move axially in one direction or the other and to make or break contact in said switch to activate or deactivate said time-display means.

5. The improvement as defined in claim 3, wherein said plate is spring-biased to a position in which said time-display means is inactivated and has a second arcuate groove therein, a pivotable arm is fixably mounted on the interior of said plate, one end of said arm spanning said second groove, said watch has a rear cover, a second pin is mounted on the exterior of said rear cover so that said second pin projects into said second groove between said arm and one end of said second groove, mechanical contact between said second pin and either of said arm and said one end of said second groove establishing the rotational excursion limits of said plate.

6. The improvement as defined in claim 5, wherein said arm is spring-biased toward said plate, said arm is fixedly joined to an axle, the other end of said arm has the form of a gear sector, a third pin is disposed on the interior of said plate in a position such as to lock said arm in a given position by engaging teeth of said gear sector, said plate has an opening into which said axle projects far enough so that pressure applied externally in an axial direction to said axle can lift said arm away from said third pin, and the outer end of said axle is shaped to make it possible to rotate said axle from the exterior of said plate, thereby making it possible to free said arm from said third pin, change the position of said arm with respect to said second groove, lock said arm by means of said third pin in a new position and adjust the limits of the rotational excursion of said plate.

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