# United States Patent [19]

**Tornquist et al.**

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[54] **ILLUMINATED DIAL WATCH**


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[52] **U.S. Cl.** ..... **58/50 R,** 58/90 B, 240/6.43

[51] **Int. Cl.** ..... **G04b 19/30,** G04b 37/08

[58] **Field of Search** ..... 58/50 R, 90 B; 240/6.43



[56] **References Cited**

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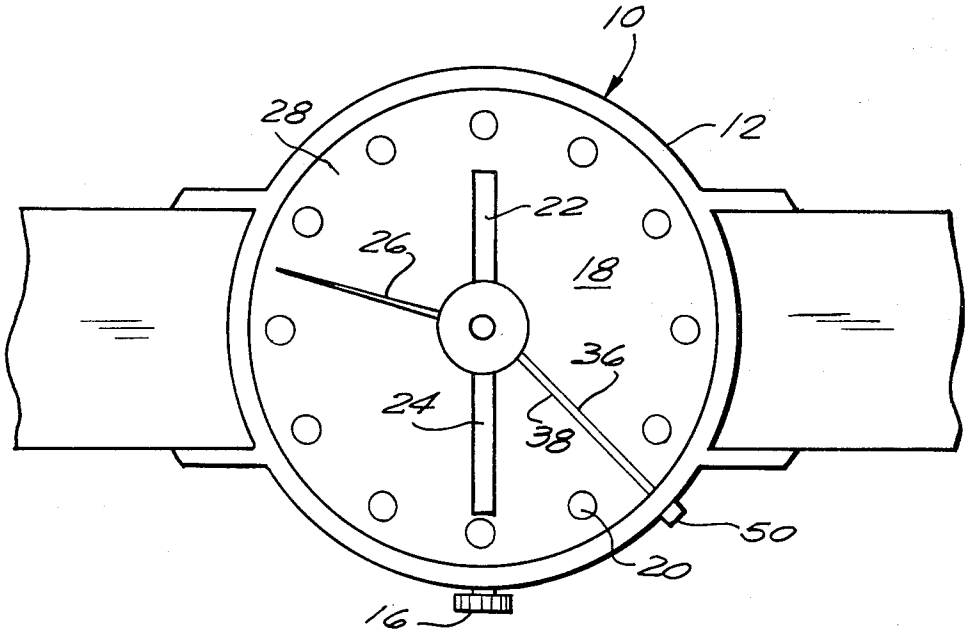
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[57] **ABSTRACT**

An improved watch is provided which includes a lamp mounted in the geometric center of the watch crystal. Light impervious reflecting means overlie the lamp and a minor portion of the crystal reflecting light from the lamp to the watch dial. A pair of electrically conductive leads extend from the lamp to a battery mounted in the watch case and a switch is provided for controlling current to the lamp. The crystal, lamp and leads are integrally formed into a single unit with the leads terminating in a pair of tabs adapted to meet in electrically conducting relationship with the terminals of the battery.


**4 Claims, 3 Drawing Figures**



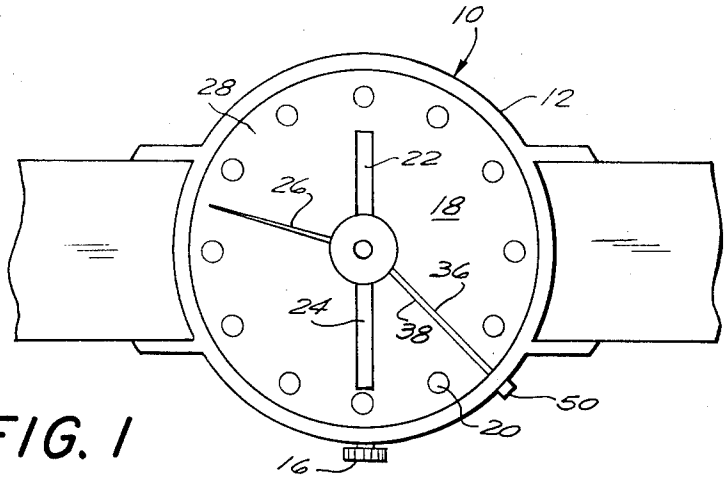



FIG. 1

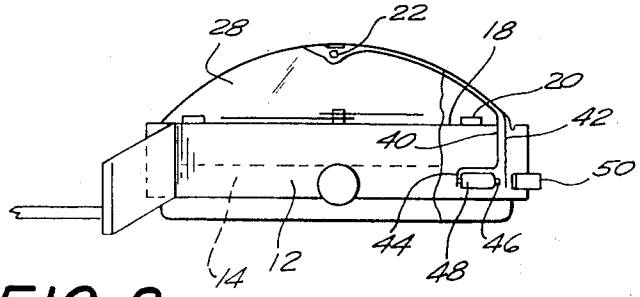



FIG. 2

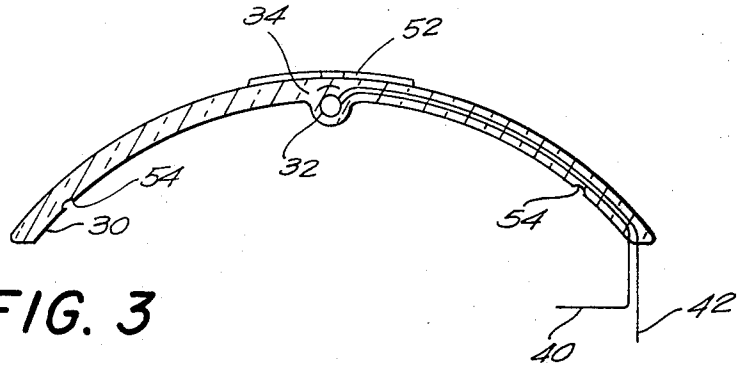



FIG. 3

# ILLUMINATED DIAL WATCH

## BACKGROUND OF THE INVENTION

Heretofore, clock and watch dials and hands have been treated with various luminous compounds to improve their visibility at night and under other low-light conditions. Although accepted and sold in the trade for many years, such clock and watch dials are extremely inefficient and almost totally ineffective since in darkness they only remain legible for the first few minutes after they are removed from light.

Previous attempts have been made to provide a watch with illuminating means such as the schemes disclosed in U. S. Pat. Nos. 3,018,614, 3,025,662, 3,114,236, 3,214,577, 3,224,184, 3,278,740, 3,298,172, 3,439,492, 3,452,538, 3,490,226, 3,514,939, 3,609,960, and 3,630,015.

The watches described in the above prior art references, however, each have one or more disadvantages which make them ineffective or impractical for commercial manufacture and use. The principal disadvantage stems from the fact that the light source in most of the references is located at the periphery of the dial. The light source thus brightly illuminates the adjacent dial portions but has little or no effect at distant points. Another major disadvantage of the prior art is the location of the battery and the manner of connecting the battery to the lamp.

Obviously, both the battery and lamp must be miniature for use on watches. This gives rise to problems associated with replacing either or both under field conditions. In most of the prior art patents, the problem is solved by mounting the battery in the watch strap and the lamp adjacent thereto connected by conventional means. One major drawback of this arrangement is that it requires a particular style and configuration of watch band and thus severely limits the choice of strap or band available to the user.

In view of the above, it is a principal objective of the present application to provide an improved illuminated dial watch which overcomes the aforementioned disadvantages of the prior art.

The above and other beneficial objects and advantages are attained in accordance with the present invention by providing a watch with a crystal having a lamp mounted in the geometric center thereof. Light impervious reflecting means are provided on the crystal overlying the lamp and a minor portion of the crystal thereby reflecting light downwardly toward the watch dial. A pair of electrically conductive leads extend from the lamp to the crystal edge and battery means are mounted in the casing for suitable connection with the leads. To this end, the crystal is provided with a pair of electrically conductive tabs at the periphery thereof with each of the leads terminating at one of the tabs. The tabs are so designed as to mate in electrically conductive contact with the terminals of the battery.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a top plan view of a watch produced in accordance with the present invention;

FIG. 2 is a side elevational sectional view of the watch of FIG. 1 taken along reference lines 2—2 in the direction indicated by the arrows; and



FIG. 3 is an enlarged sectional view of the watch crystal and lamp unit.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is now made to the drawings wherein the illuminated watch of the present invention is illustrated. The watch **10** comprises a casing **12** containing therein a conventional watch movement **14** governed and controlled by stem **16.** The nature and design of movement **14** is immaterial and thus may be of the type requiring periodic winding, self winding, electric, electronic or whatever. The top surface of casing **14** comprises a dial **18** having thereon numbers or other indicia of time **20.** The watch further includes an hour hand **22,** minute hand **24** and second hand **26** which sweep across the dial numbers driven by the movement **14** in a conventional manner.

The watch **10** of the present invention further includes a crystal **28** overlying the top of the casing exposing the watch dial and hands to view. The crystal **28** may be formed of glass or a suitable transparent plastic material. The latter is preferred for reasons which will become obvious forthwith. In this preferred embodiment, the crystal **28** is a dome-shaped member extending from a peripheral edge **30** adapted to engage the watch casing bezel in a sealing engagement to keep out dust and moisture. If desired, the bezel and peripheral edge can be designed in manners well known in the art to render the watch dust and/or waterproof.

A subminiature lamp **32** is molded into crystal **28** in a cavity **34** at the center of the crystal. A pair of leads **36** and **38** extend from the ends of the filament of lamp **32** and respectively terminate at tabs **40** and **42** positioned below the edge of the crystal. Tabs **40** and **42** are formed of electrically conductive material and designed to electrically engage with the terminals **44** and **46** of a subminiature battery **48** positioned within a suitable cavity within casing **12.** In this connection, it is to be noted that tab **42** is normally biased, by its own resiliency, out of contact with contact **46.** A switch, in the form of plunger **50** is provided extending through the casing and contacting tab **42.** When plunger **50** is pressed inwardly, tab **42** is forced to contact the battery terminal **46** thereby closing the circuit to lamp **32.** The natural resiliency of tab **42** tends to break contact with the battery and urge plunger **50** outwardly so that the lamp **32** will normally be out unless the plunger is held in.

To improve the illumination of the dial and hands, a light shield **52** is provided overlying the lamp. The bottom surface of shield **52** is reflective so as to direct as much light from lamp **32** downwardly as is possible. The reflector **52** is centrally positioned on the crystal over lamp **32** and covers only a minor portion of the crystal so as not to interfere with normal reading of the watch. It has also been found that by providing a series of cavities **54** on the inner surface of the crystal in approximate vertical alignment over the 5-minute marks on the watch face, an increased portion of the light from lamp **32** is directed to the 5-minute marks as would otherwise be available. This phenomena is believed to be due to the light-piping properties of the crystal material.

In order to facilitate the replacement of lamp **32** the lamp, crystal and shield are formed in a single integral unit along with leads **36** and **38** and tabs **40** and **42** as

illustrated in FIG. 3. Thus, when the lamp becomes spent, the entire crystal unit may readily be replaced with another unit containing a new lamp. To this end, tabs **40** and **42** are so designed as to mate with corresponding surfaces of the casing so as to insure the proper electrical relationship between tabs **40** and **42** and the battery contacts. In this connection, the leads are sufficiently fine as to be virtually inconspicuous when embedded in the plastic crystal.

Thus, in accordance with the above, the aforementioned objects and advantages of the present invention are effectively obtained.

Having thus described the invention, what we claim is:

**1.** In a watch of the type having a watch movement including a top surface containing thereon a dial and a pair of hands, a casing embodying said movement and a crystal overlying said casing and exposing said movements top surface, the improvement comprising: a lamp mounted in the geometric center of said crystal, light impervious reflecting means overlying said lamp and a minor portion of said crystal, electrical connecting means extending from said lamp to said casing, battery means mounted within said casing for electrical interconnection with said connecting means and switch means mounted in said casing and shiftable between a first position closing the circuit between said lamp and said battery and a second position opening the circuit between said lamp and said battery, said switch means including a manual operable portion extending outside said casing and adapted to shift said switch between said first and second positions.

**2.** The watch in accordance with claim **1** wherein said crystal, lamp and connecting means are integrally formed into a single unit.

**3.** The watch in accordance with claim **2** wherein said connecting means includes first and second electrically conducting leads and further comprising a pair of tabs affixed to said integral unit, said first tab being connected to one of said electrical leads, said second tab being connected to the other of said leads and said tabs being positioned on said unit to mate with said casing so that when said switch is in said first position an electrical circuit between said battery and lamp is complete.

**4.** The watch in accordance with claim **1** wherein said dial includes at least one minute indicator thereon and said crystal further includes at least one cavity therein vertically aligned with said minute indicator and extending outwardly from the inner surface of said crystal.

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