Dec. 15, 1959 J. WEGNER 2,916,871

LUMINOUS WRIST-WATCH

Filed July 23, 1956

Fig.1

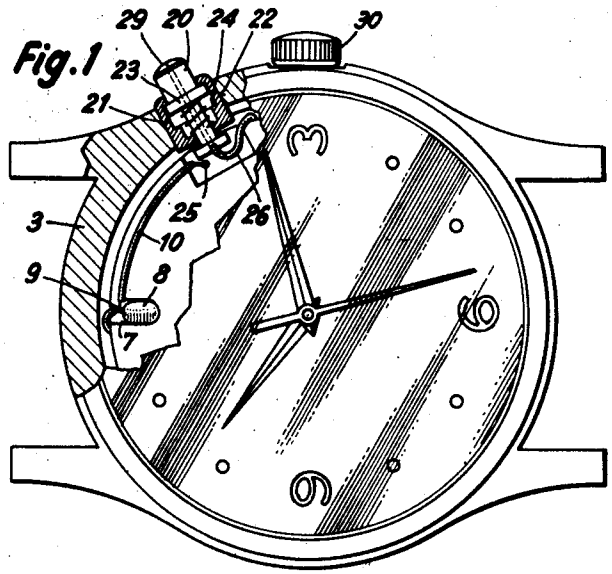


Fig.3

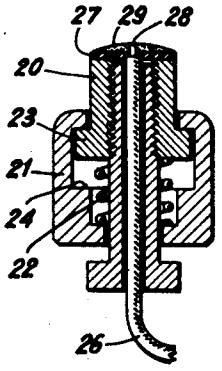


Fig.2

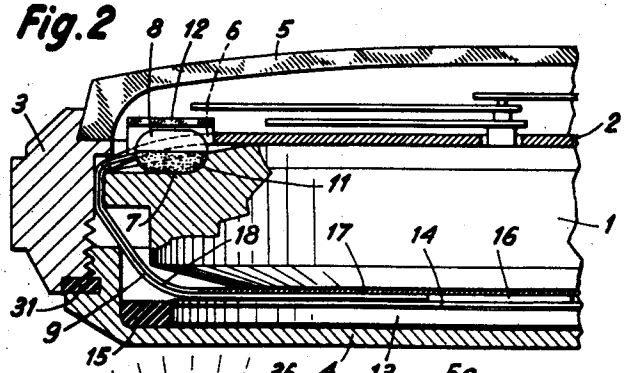


Fig.4

Fig.5

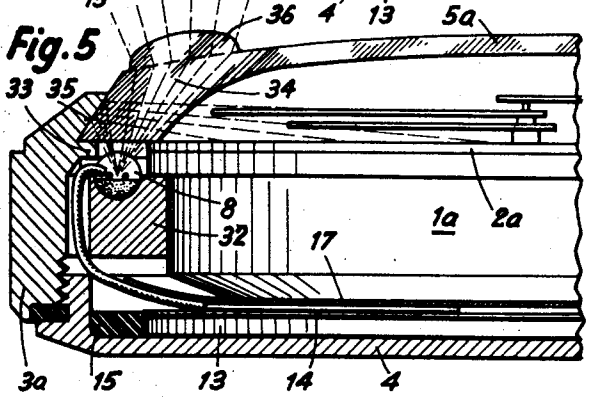
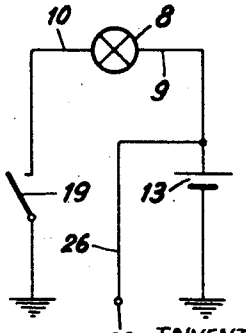


Fig.6



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United States Patent Office 2,916,871 Patented Dec. 15, 1959

2,916,871

LUMINOUS WRIST-WATCH

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Application July 23, 1956, Serial No. 599,638

Claims priority, application Switzerland April 30, 1956

12 Claims. (Cl. 58—50)

This invention relates to luminous wrist-watches in which the dial may be illuminated by an incandescent lamp located in the watchcase.

Timepieces enabling a time visibility in the darkness by illuminating the dial with an incandescent lamp have already existed for a long time. With respect to watches provided with a luminescent radio-active material, illuminating the dial with a lamp has also the advantage of illuminating objects other than the watch.

In most of the known solutions applied to clocks and pocket watches, the source of electric energy supplying the incandescent lamp with current is located outside the watchcase, so that an application of these known solutions to the wrist-watch is practically impossible.

It is therefore an object of the invention to illuminate the watch by using a metallic element which simultaneously constitutes a part of the watchcase and an element of the said source of energy.

Further objects of the invention will appear in the course of the following description.

Two embodiments of the watch according to the invention are represented, by way of example, in the drawings annexed to this specification.

In the drawings:

Fig. 1 is a plan view of the first embodiment, with certain parts in section;

Fig. 2 is a diametrical part-sectional view of the watchcase of Fig. 1, the movement being represented in elevation with certain parts in section;

Figs. 3 and 4 are large-scale views of two different details of the watch shown in Figs. 1 and 2;

Fig. 5 is a sectional view similar to that of Fig. 2 of the second embodiment, and

Fig. 6 shows the wiring diagram for watches constructed according to the two embodiments mentioned above.

The wrist-watch shown in Figs. 1 and 2 comprises a usual movement 1 with a dial 2 fixed by known means (not shown) in a watchcase comprising a case band 3, a bottom 4 and a glass 5 fixed in a bezel formed on the case band 3.

Opposite the numeral "12" the dial 2 is provided with a cutout 6 and a housing 7 is provided in the baseplate of the movement 1. An incandescent lamp 8 is located in the housing 7 of the baseplate to which it is fixed by any appropriate means known in the art for instance by means of a paste or of glue. The lamp 8 extends through the cutout 6 above the dial 2 in order to satisfactorily illuminate the surface of the dial. This lamp comprises a glass bulb, and a filament the two ends of which are connected to wires 9 and 10 outside the bulb. A thin silver coating is deposited on the part of this bulb located below the dial 2 in order to reflect the light emitted by the filament upwards of Figure 2.

The lamp 8 is covered by a transparent member 12 represented in perspective and on a larger scale in Fig. 4. The member 12 is engaged in the cutout 6 of the dial 2 and thus fixed to the latter. It carries the numeral "12"

of the horal division of the watch. If that member 12 is made of molded plastics, the numeral "12" may consist of depressions provided in the lower face of this member 12, which is turned towards the lamp 8, the said numeral being then made visible by a thin metal coating deposited on the walls of said depressions by atomization under vacuum according to a process well known in the art. Provided that it still remain transparent, the member 12 can, of course, also be colored.

The lamp 8 is fed by an accumulator, i.e., a storage battery the electrodes 13 of which are located in the bottom 4 of the watchcase. The accumulator or storage battery 13, which is not represented in detail in the drawings, comprises an electrode constituted by a cadmium plate in contact with the bottom 4 of the watchcase and a plate-like electrode made of a nickel carbon alloy, this second electrode being located above the first from which it is separated only by a dielectric consisting of a film containing an organic acid or potassium hydroxide. A steel plate 14 closely contacting the upper electrode of the accumulator 13 constitutes the inner contact member or pole of the accumulator.

The bottom 4 of the watchcase is separated from the upper electrode and from the plate 14 by a ring 15 of insulating material.

It clearly follows from the foregoing description of the accumulator, i.e., storage battery, that the bottom 4 of the watchcase forms a pole or contact member of the accumulator. Experiments have shown that an accumulator of the type described can store such a quantity of energy that it can supply the lamp 8 with a sufficient current during several hours.

The wire 9 of that lamp is connected to a metal sheet 16 which is in contact with the pole 14 of the accumulator 13. This wire 9 is, of course, covered with an insulating coating to avoid any short-circuit with the movement or with the watchcase. The metal sheet 16 is itself isolated from the movement 1 by means of a plastic sheet 17. The sheet 17 covers the whole lower face of the movement and it is provided with a tongue 18 glued to the wire 9 in order to avoid any accidental breaking of this wire when assembling or disassembling the watch.

The diagram of Fig. 6 shows a circuit breaker 19 provided in the circuit of the lamp 8. This circuit breaker has a button 20 located in a sleeve 21 which is pressed with force fit into a bore of the case band 3. A spring 22 urges the button 20 outwards, whereas the inward path of this button is limited by collar 23 thereof and an inner shoulder 24 of the sleeve 21. The button 20 closes the circuit of the lamp 8 by coming in contact with the bare end portion 25 of the wire 10 when the button 20 is urged into the watchcase.

The rod of this button 20 has a through axial bore and a wire 26, connected to the inner pole of the accumulator 13, is set in this bore as shown in Fig. 3. A ring 27 of insulating material covers the upper face of the button 20. The wire 26 passes through this ring and its bare end portion 28 is fixed to the ring by a welding spot 29. This spot has thus the same potential as the inner pole of the accumulator 13, since it is isolated from the ground which is the watchcase. It enables recharging the accumulator 13. This welding spot therefor needs only to be connected to one pole of a source of direct current, whereas the other pole of this source is connected to the watchcase.

Experiments have shown that by utilizing for instance the battery of a common flashlight the accumulator 13 may be recharged within a few seconds to such an extent that it may feed the lamp 8 satisfactorily during several hours.

It will be observed that the spot 29 of the diagram of

Fig. 6 could be provided at another place of the periphery of the watchcase, since it is the only purpose of this spot 29 to permit the bearer of the watch to recharge the accumulator without requiring either the removal of a piece or even the opening of the watch.

Instead of having the circuit breaker 19 of the diagram of Fig. 6 constituted by a button 20 which only closes the circuit of the lamp as long as it is actuated, one could, of course, use a circuit-breaker located in the case band or at the periphery of the movement, which would close the circuit of the lamp 8 upon actuating a control button and which would keep this circuit closed until the said control button would be actuated again. Such a circuit-breaker would enable keeping the lamp 8 in circuit without requiring permanent pressure on the button. The same result could also be obtained by means of a latch sliding coaxially to the case band and mounted thereon in order to keep a pusher rod in contact with the bare end of a wire connected to the lamp, against the action of a spring which would only urge the pusher rod away from the said wire, when the said latch would be released.

It will be understood that instead of providing a separate switch button, one could combine the circuit-breaker 19 of the diagram of Fig. 6 with the winding and hand-setting crown 30 of the watch.

Since the watchcase bottom forms a part of the accumulator, the latter does not increase very much the thickness of the watch. With a movement 1 having no special mechanisms such as a selfwinding mechanism, an alarm mechanism, a calendar mechanism or a moon-phase mechanism, the total thickness of the watch described is approximately the same as that of an alarm-watch or of a selfwinding watch.

The electrical elements described are very simple and do not complicate the assembling or disassembling of the watch, when the latter must be repaired, since the accumulator is integrally fixed to the watchcase bottom and may be assembled and disassembled with the latter, and since it suffices to raise the sheet 17 of plastic material to uncover the movement 1 of the watch. Assembling or disassembling of the watch hands and the dial 2 is possible without moving the lamp 8, because the latter is fixed only to the baseplate of the movement.

The watchcase illustrated may be made watertight by using, besides the gasket 31, a watertight crown 30 and a watertight button 20 well known in the art.

The watch represented in Fig. 5 comprises the same electrical elements as those described in the first embodiment. In the watch of Fig. 5 the movement 1*a* is, however, held in a case band 3*a* by means of a spacer ring 32. The movement 1*a* and the dial 2*a* carried thereby are, however, smaller than the rim flange 33 of the watchcase, so that an annular area of the ring 32 is visible between the watchcase and the movement 1*a*. The latter is fixed to the ring 32 and consequently to the case-band 3*a* by well known means (not shown). The lamp 8 is fixed here in a lodging provided in the spacer ring 32 in order to appear between the movement 1*a* and the ring 33.

In order to conceal the annular area of the ring 32 appearing around the movement, the glass 5*a* is provided with a relatively thick rim portion 34, which extends above the dial 2*a* of the watch. The truncated-conical face 35 of the bezel receiving the rim portion 34 of the glass is polished as well as possible in order to serve as a mirror to reflect a part of the light emitted by the lamp 8 onto the dial 2*a* for illuminating its numerals as well as the watch hands.

A lens 36 formed in the glass 5*a* is located above the lamp 8 to deflect another part of the light emitted by the latter in a cone of rays, so that the watch may also serve as a flashlight.

While two embodiments of the invention have been shown and described in detail hereabove, it should be understood that various changes in the sizes, shape and arrangement of parts would appear obvious to those skilled in the art and could be resorted to without departing from the spirit or sacrificing the advantages of the invention which is only defined by the appended claims.

I claim:

1. In a wrist-watch comprising a case band, a movement surrounded by said case band, a dial adjacent to said movement, and a crystal adjacent to said dial and mounted in said case band, in combination, a source of electrical energy; two metal members constituting the poles of said source of electrical energy, said source of electrical energy being sandwiched therebetween, one of said metal members being disengageably attached to said case band so as to form together with said case band and crystal a case enclosing said movement and dial; an incandescent lamp mounted within said case for illuminating said dial; and circuit means for establishing a connection between said lamp and said band and between said lamp and the other one of said metal members, respectively.

2. A wrist-watch as set forth in claim 1, wherein said source of electric energy is a storage battery.

3. A wrist-watch as set forth in claim 1 wherein said circuit means include switch means for closing and interrupting said connection and being operable from the outside of said case.

4. A wrist-watch as set forth in claim 3, wherein said source of electric energy is a storage battery, and wherein an insulated terminal means is mounted on the outside of said case and an insulated circuit member is installed in said case for connecting said terminal means with said other one of said metal members, whereby said storage battery may be recharged by conductively connecting an outside source of direct current with said case and with said terminal means, respectively.

5. A wrist-watch as set forth in claim 4, wherein said case band has a perforation, said switch means being mounted in said perforation and including a hollow member extending from the inside of said case to the outside thereof, and said insulated terminal means being mounted on the outer end of said hollow member, with said insulated circuit member extending from said terminal means through said hollow member to the inside of said case.

6. A wrist-watch as set forth in claim 5, wherein said hollow member is the control member of said switch means.

7. A wrist-watch as set forth in claim 1, wherein said dial is provided with a cutout, and wherein said movement is provided with a recess in alignment with said cutout of said dial, said incandescent lamp being mounted in said recess so as to project through said cutout beyond the remote face of said dial, a transparent element being attached to said dial so as to at least partly cover said cutout and said lamp therein.

8. A wrist-watch as set forth in claim 7, wherein a sign forming part of the horal division of said dial is carried by said transparent element.

9. A wrist-watch as set forth in claim 1, wherein a coat of reflecting material is applied to a portion of said incandescent lamp so as to reflect its light in the direction toward said crystal.

10. A wrist-watch as set forth in claim 1, wherein an annular spacer member is interposed between said case band and said movement so as to surround and support the latter in said case band, said spacer member being provided with a recess facing said crystal, and said incandescent lamp being mounted in said recess, said dial and the adjacent portion of said movement being spaced, at least in the neighborhood of said recess, from said case band so that light radiated from said lamp can pass through said crystal.

11. A wrist-watch as set forth in claim 10, wherein said crystal has a wide peripheral edge overlapping the

area where said dial and movement are spaced from said case, band, and wherein said case band is provided with a bezel for accommodating the edge of said crystal and for reflecting a part of the light from said lamp in the direction toward said dial.

12. A wrist-watch as set forth in claim 11, wherein said crystal is formed with a lens portion on its outside face opposite said recess and said lamp therein for changing the direction of the rays of light passing through said lens portion.

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