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(54) **ANTENNA FOR SMARTWATCH**

(57) The invention provides a smart wristwatch comprising an antenna configured to receive radio signals carrying information, and at least a hand and a dial to display at least the time of the day in an analogue manner. The antenna is comprised in the at least one hand.

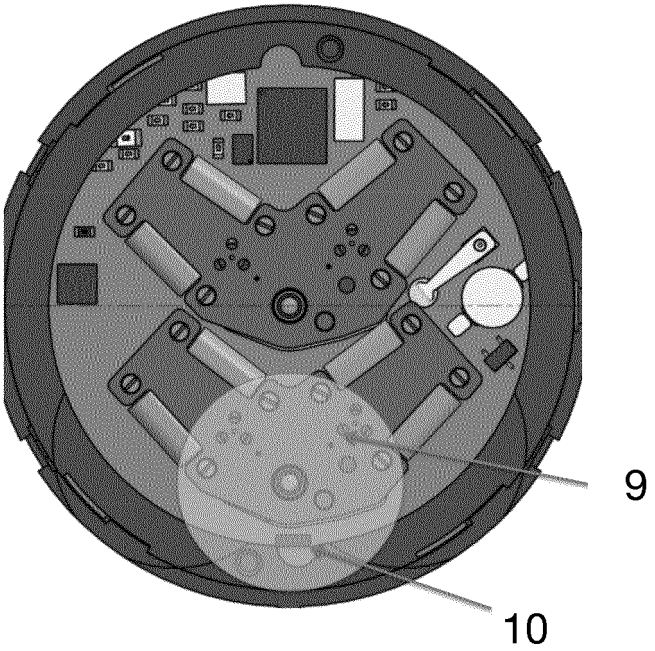


Fig. 7

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Description

Background

[0001] The omnipresence of information on the network and the profusion of portable connected devices makes it easy for users to access virtually any information independent from time and location. For portable connected devices the information may conveniently be transmitted from a network or from a dedicated local server to the portable connected devices via radio means. Depending on the connectivity features of the concerned portable connected device, the radio means may involve a cellular phone network, a wifi network, a bluetooth connection, any other radio transmission as appropriate or a combination of 2 or more or these.

[0002] Luxury wristwatches or watches constitute a category of the portable connected devices and for this purpose comprise a connected smartwatch module. Luxury smartwatches may have a metal encasing and/or a metal dial, either one of which effectively shields radio signals and thereby may reduce the quality of radio signal reception inside the wristwatch. The metal encasing may for example be in stainless steel or gold, while the metal may also be in one or a plurality of various metals. The connected smartwatch module needs to be able to receive and transmit data over radio frequency communication.

[0003] It is an aim of the invention to maintain the luxury design of a wristwatch, considered a personal jewel for the wearer while at the same time improving the quality of reception of radio frequency communication.

Summary of invention

[0004] In a first aspect the invention provides a smart wristwatch comprising an antenna configured to receive radio signals carrying information, and at least a hand and a dial to display at least the time of the day in an analogue manner. The antenna is comprised in the at least one hand.

[0005] In a preferred embodiment, a center axe driving the at least one hand is insulated inside the wristwatch and connected to a balun of the wristwatch.

[0006] In a second aspect the smart wristwatch comprises an antenna configured to receive signals carrying information, and an encasing made out of metal and enclosing at least a balun. The smart wristwatch further comprises a ceramic plate configured to be fixed on an opening of the encasing. The antenna is configured as a coil and is further arranged on the surface of the ceramic plate.

[0007] In a preferred embodiment, the opening of the encasing is on a side of the wristwatch intended to face a user's arm when the wristwatch is worn by the user.

[0008] In yet a further preferred embodiment, the coil is further connected to a charging circuitry for an electric capacitor inside the wristwatch, and arranged to operate as a receiving coil for inductive reception of electrical power.

[0009] In a third aspect, the smart wristwatch comprises an antenna configured to receive radio signals carrying information, and an analogue dial to display at least the time of the day in an analogue manner. The analogue dial comprises an aperture. The smart wristwatch further comprises a cover plate transparent to the radio signals, being arranged to cover the aperture of the analogue dial, and a ceramic plate mounted on the cover plate. The ceramic plate carries the antenna such that the antenna is at least partly in a zone of the aperture.

[0010] In a preferred embodiment the cover plate is made out of plastic.

[0011] In yet an other preferred embodiment the analogue dial is made out of metal.

[0012] In a fourth aspect, a smart wristwatch comprises an antenna configured to receive radio signals carrying information; an analogue dial to display at least the time of the day in an analogue manner; whereby the analogue dial comprises at least an aperture. The smart wristwatch further comprises a cover plate transparent to the radio signals, being arranged to cover the at least one aperture of the analogue dial, and a ceramic plate mounted on the cover plate. The ceramic plate carries the antenna such that the antenna is at least partly in a zone of the aperture.

[0013] In yet an other preferred embodiment the cover plate is made out of plastic.

[0014] In yet an other preferred embodiment the analogue dial is made out of metal.

[0015] In yet an other preferred embodiment, the smart wristwatch further comprises a representation of a text or symbol, whereby the representation is carried by the cover plate such that is visible through the aperture of the analogue dial.

[0016] In a fifth aspect, a smart wristwatch comprises an analogue dial to display at least the time of the day in an analogue manner. The analogue dial comprises at least an aperture. The smart wristwatch further comprises a cover plate arranged to cover the at least one aperture of the analogue dial, and a representation of a text or symbol, whereby the representation is carried by the cover plate such that is visible through the aperture of the analogue dial.

[0017] In yet an other preferred embodiment the text or symbol is representative of a brand.

[0018] As is apparent from the preceding paragraphs, the present invention generally provides a solution for realizing an antenna outside of the shielding encasing and dial of the wristwatch.

[0019] The present invention also provides a solution for easily customizing the wristwatch with the representation of a text or symbol.

Brief description of the drawings

[0020] The invention will be better understood in light of the description of preferred embodiment and the draw-

ings, wherein

figure 1 shows a schematic representation of a smart wristwatch according to a preferred embodiment of the invention;

figure 1a shows a schematic representation of a further embodiment of a smart wristwatch according to a preferred embodiment of the invention;

figure 2 shows a schematic representation of an analogue dial of the smart wristwatch according to another preferred embodiment of the invention;

figure 3 shows a transversal cut through a wristwatch module according to yet another preferred embodiment of the invention;

figure 4 shows a view of the bottom of a wristwatch according to the invention;

figure 5 illustrates a transversal view through a wristwatch according to the invention;

figure 6 shows a more detailed representation of a transversal view through a wristwatch according to the invention;

figure 7 shows an example of a mechanical movement in a preferred embodiment of the invention;

figure 8 shows an analogue dial and a cover plate according to a preferred embodiment of the invention;

figure 9 shows a sectional view through the analogue dial and cover plate of figure 8;

figures 10 and 11 show further examples of analogue smart wrist watches according to the invention;

figure 12 shows an example of an analogue smart wrist watch with a plurality of rectangular shaper apertures according to the invention; and

figure 13 shows yet a further example of an analogue smart wrist watch with a plurality of circular shaped apertures.

Detailed description of preferred embodiments

[0021] Figure 1 shows a schematic representation of a smart wristwatch and more particularly of components that are required to realize such a wristwatch. These components include a balun 1 that is connected to both a microprocessor 2 and an antenna 3.

[0022] Figure 1a shows a further example embodiment of a smart wristwatch in a schematic representation. In addition to the balun 1, the microprocessor / microcontroller 2 and the antenna 3, the wristwatch comprises a PI filter 7 connected between the antenna 3 and the balun 1.

[0023] Figure 2 shows a schematic representation of an analogue dial of the smart wristwatch. Three hands 4 are used to display the time, e.g., one hand is used to point the hours, an other hand the minutes and a further hand the seconds. One of the hands 4, e.g., the minute hand is also used as the antenna 3. A center axe driving the minute hand 4 is insulated inside the wristwatch module and connected to the balun (not illustrated in figure 2).

[0024] Figure 3 shows a transversal cut through a wristwatch module according to a preferred embodiment of the smart wristwatch, whereby the cut passes through a length of the center axe appropriately arranged for driving the hands 4. In the illustration all the hands 4 point is a same direction, and from top to bottom they are the minute hand, the hour hand and a connected hand. Similar as in figure 2, the minute hand also comprises the antenna 3 therein.

[0025] Figures 4-6 illustrate preferred embodiments in which the antenna 3, instead of being in a hand 4, is realized on a ceramic disc 5 as a coil.

[0026] Figure 4 is a view from the bottom of a wristwatch, i.e., the caseback or the side that is in contact with the body of the person wearing the wristwatch (person not shown in figure 4 and not considered to be part of the invention). The caseback comprises the ceramic disc 5 and the antenna 3 realized as a coil on the ceramic disc 5

[0027] Figure 5 illustrates a transversal view through a wristwatch according to a preferred embodiment, comprising again the ceramic disc 5 used as a caseback of the wristwatch, and the antenna 3, realized as a coil. The ceramic disc 5 functions as an insulator. The antenna coil 3 is connected to the balun 1 (connection not shown in figure 5).

[0028] Figure 6 shows a detailed representation of a transversal view through a wristwatch according to a further preferred embodiment, wherein the ceramic disc 5 is attached to the wristwatch at a cut-out made in a body 6 of the wristwatch. The ceramic disc 5 also carries on one of its surfaces the antenna coil 3.

[0029] Figures 7-9 illustrate further preferred embodiments in which the antenna 3, instead of being in a hand 4, or on a ceramic disc 5 used as a caseback of the wristwatch, is realised on a ceramic plate as a coil but in an aperture of the analogue dial as will be described herein below.

[0030] Referring to figure 8 this shows an example of an analogue smart wristwatch in a simplified manner, e.g., the hands have been left out for a simplified view, comprising an analogue dial 8, and an aperture in the analogue dial. The aperture is covered by a cover plate 9. While the aperture and cover plate 9 are illustrated in a circular shape, these may each well be realised in other shapes without departing from the scope of the present

invention. While the aperture and cover plate 9 are positioned at the 6 o'clock position of the analogue dial 8, the person skilled in the art will understand that these may well be positioned at other locations of the analogue dial 8 without departing from the scope of the invention.

[0031] In figure 8 the cover plate 9 may for example be made out of plastic or other synthetic material. The important property of the material for making the cover plate 9 is that it is mostly transparent for radio frequency communication. This enables to make the analogue dial out of any other material, for example a metal, even if this other material is opaque for radio frequency communication.

[0032] Figure 9 shows a sectional cut view through the analogue dial 8 and cover plate 9.

[0033] Figure 7 illustrates an example embodiment of a mechanical movement encased below the analogue dial 8 (dial not shown in figure 7). The cover plate 9 is shown in transparency as a circular plate. The cover plate 9 carries a ceramic plate 10 which in turn carries an antenna (not shown in figure 7) for receiving the radio frequency communication signals carrying information.

[0034] Figures 10 and 11 show further examples of analogue smart wrist watches with an aperture, wherein the cover plate that covers the aperture carries a representation of a text or symbol which remains visible through the aperture. In figure 10 this is indicated in a generic manner as "TEXT/INFO" as pointed with an arrow while in figure 11 the cover carries a representation of a brand illustrated as "BRAND" also as pointed with an arrow. This manner of introducing the representation of a text or symbol into the visual field of the dial is a particularly convenient manner of customizing the appearance, branding and/or decoration of the wristwatch and avoids having to directly mark the dial with the representation of a text or symbol. It becomes easier to customize the wristwatch and also less costly to do so.

[0035] While in figure 8 only 1 aperture is shown, this is only an example embodiment, and it would be possible to have a plurality of apertures, each one covered by its own cover plate. Figure 12 illustrates an example with 3 rectangular shaped apertures, each one having a cover that carries a text or a symbol. Although this is indicated in a generic manner with the mark "TEXT", each cover may actually have its own text or symbol that differs from the others. Each plate may be made out of material that is mostly transparent for radio frequency communication depending on the needs of the manufacturer of the wristwatch. Figure 13 illustrates an even further example with 4 circular shaped apertures, each one having its own cover.

[0036] While the antenna 3, which is embodied as a coil in figures 4 to 6 is intended for use as a radio frequency communication receiving part it may alternatively also be attributed to an induction charging circuitry, wherein it is used for contactless charging of a capacitor inside the wristwatch module.

List of references used

Reference number	Feature
1	balun
2	microprocessor
3	antenna
4	hands
5	ceramic disc
6	body
7	PI filter
8	analogue dial
9	cover plate
10	ceramic plate

Claims

1. A smart wristwatch comprising
an antenna configured to receive radio signals carrying information;
an analogue dial (8) to display at least the time of the day in an analogue manner;
whereby the analogue dial comprises at least an aperture;
the smart wristwatch further comprising
a cover plate (9) transparent to the radio signals, being arranged to cover the at least one aperture of the analogue dial, and
a ceramic plate (10) mounted on the cover plate,
whereby the ceramic plate (10) carries the antenna such that the antenna is at least partly in a zone of the aperture.

2. The smart wristwatch of claim 1, wherein
the cover plate 9 is made out of plastic.

3. The smart wristwatch of claim 2, wherein
the analogue dial (9) is made out of metal.

4. The smart wristwatch of claim 1,
further comprising
a representation of a text or symbol, whereby the representation is carried by the cover plate such that is visible through the aperture of the analogue dial.

5. A smart wristwatch comprising
an analogue dial (8) to display at least the time of the day in an analogue manner;
whereby the analogue dial comprises at least an aperture;
the smart wristwatch further comprising
a cover plate (9) arranged to cover the at least one aperture of the analogue dial, and
a representation of a text or symbol, whereby the representation is carried by the cover plate such that it is visible through the aperture of the analogue dial.

6. The smart wristwatch of claim 5, wherein the text or symbol is representative of a brand.

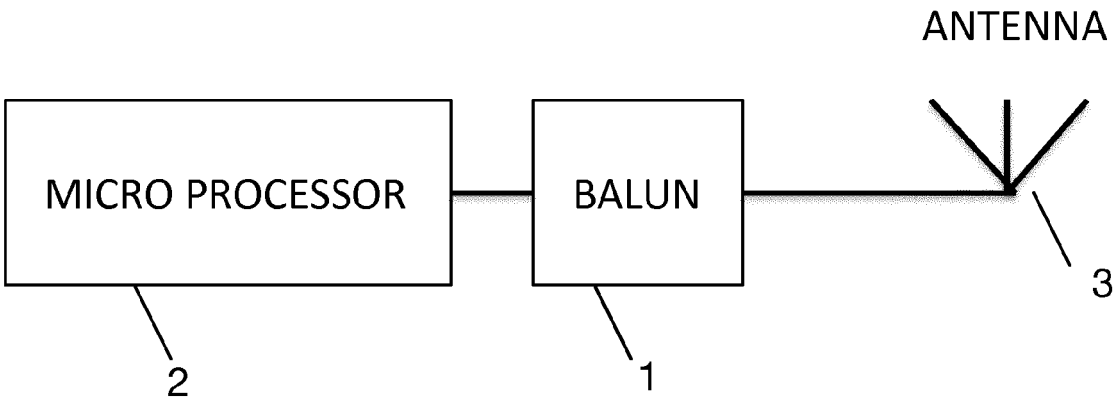


Fig. 1

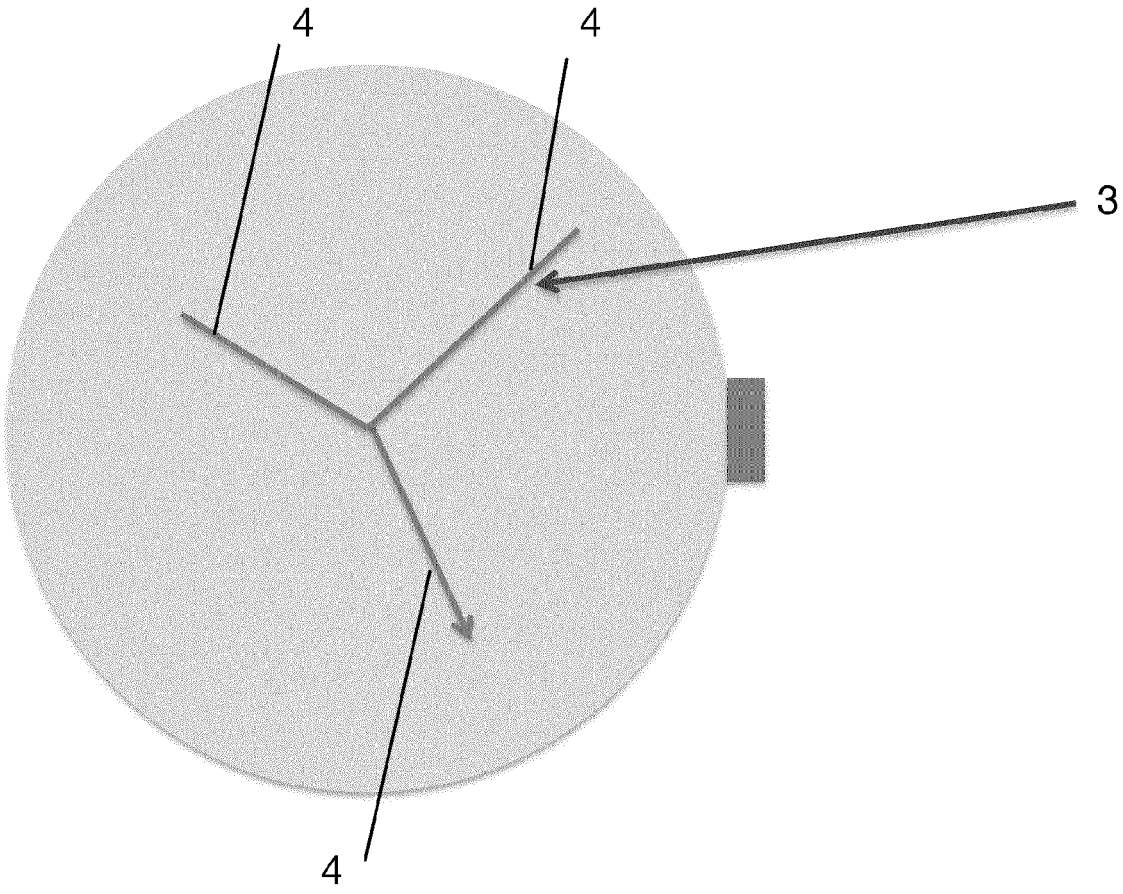


Fig. 2

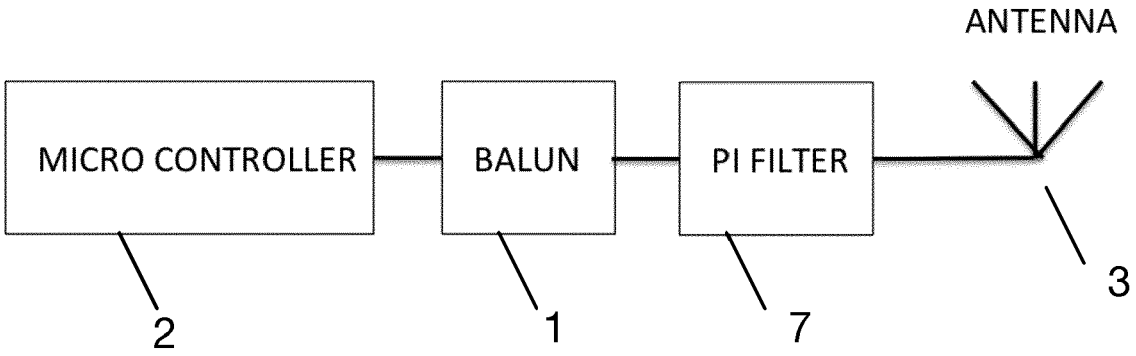


Fig. 1a

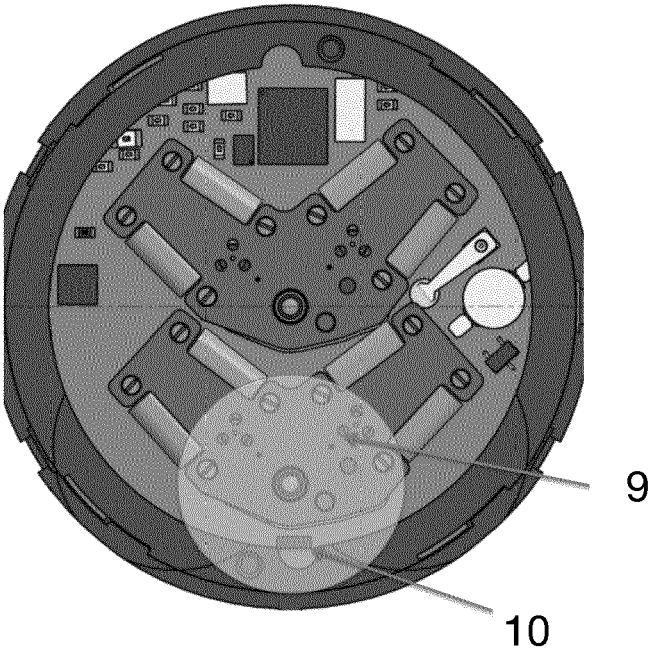


Fig. 7

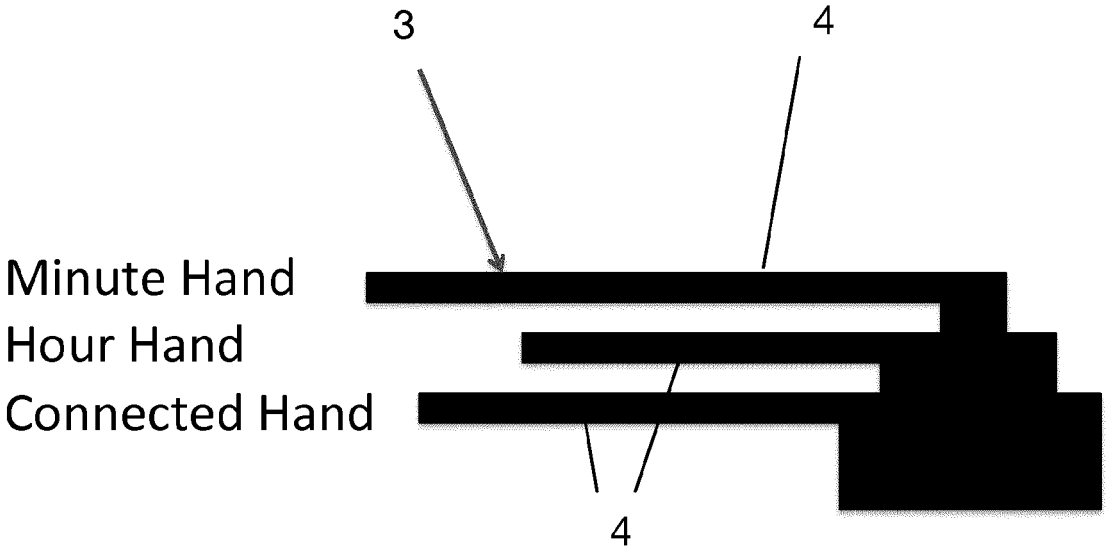


Fig. 3

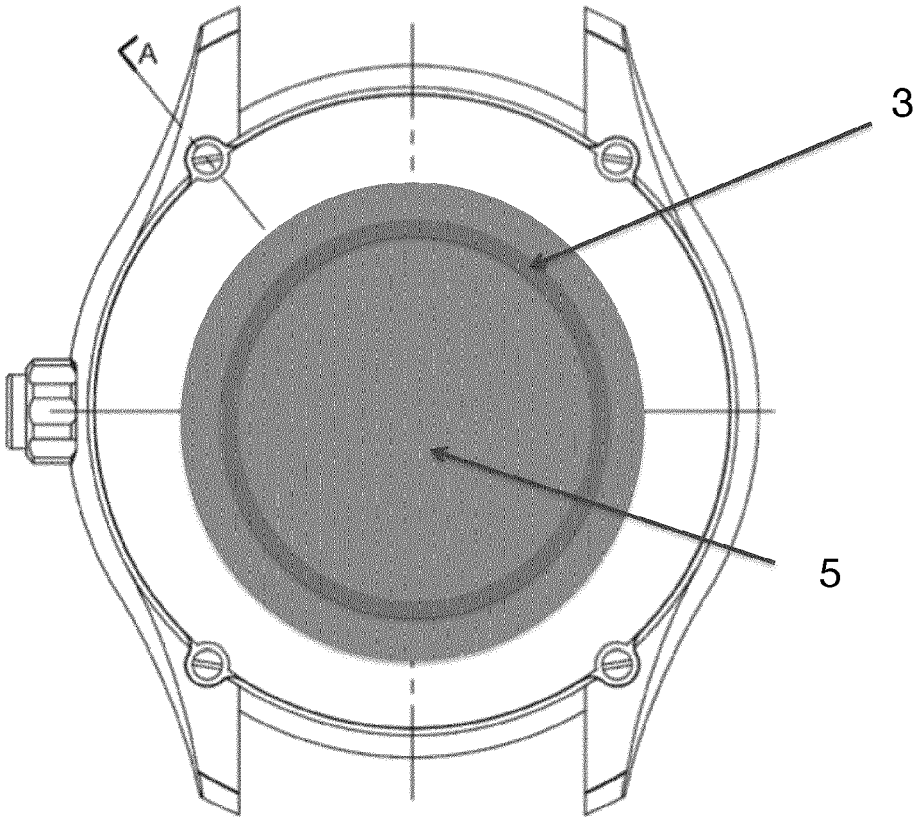


Fig. 4

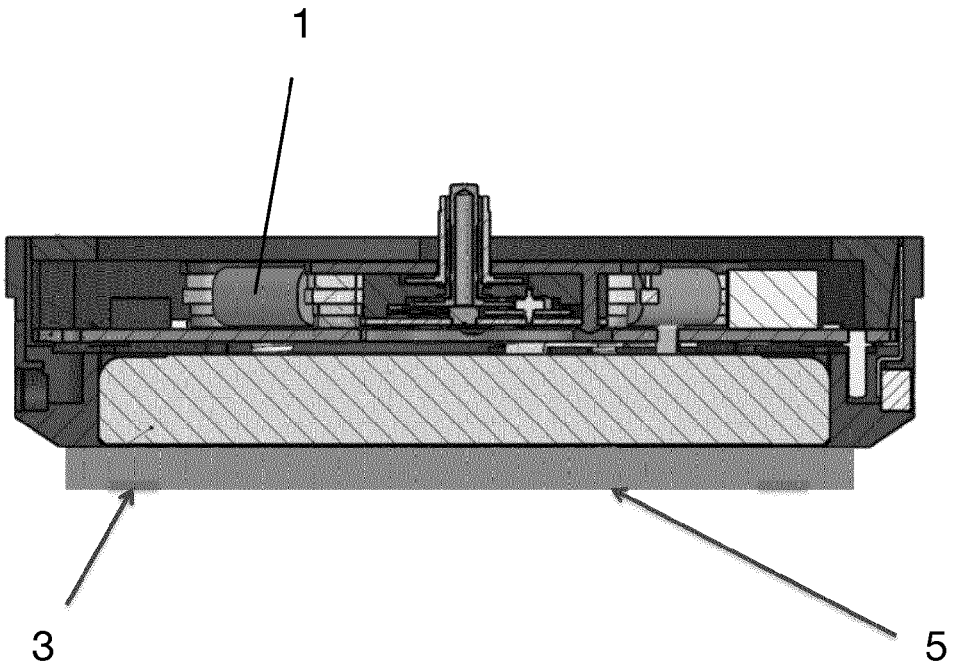


Fig. 5

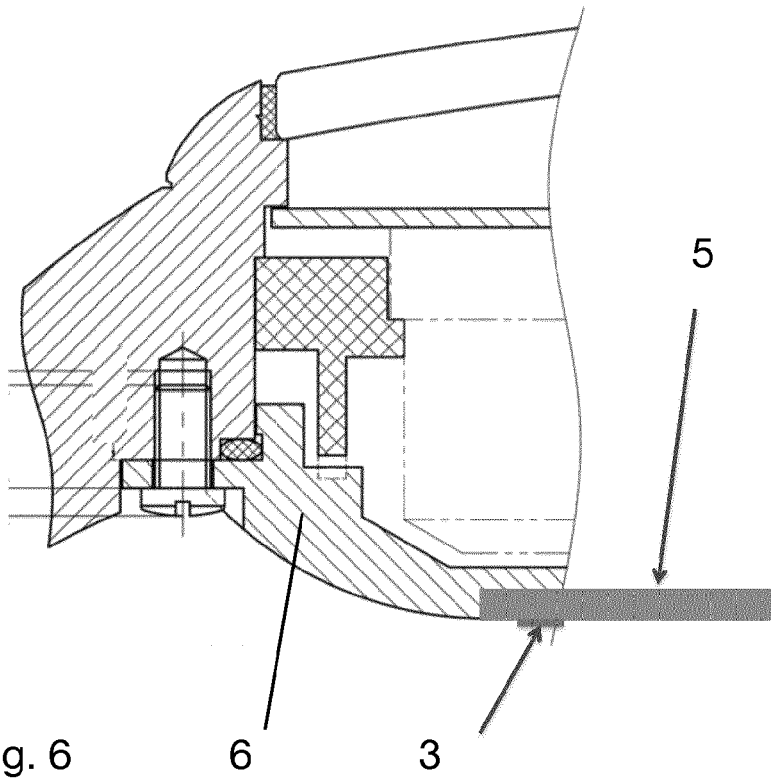


Fig. 6

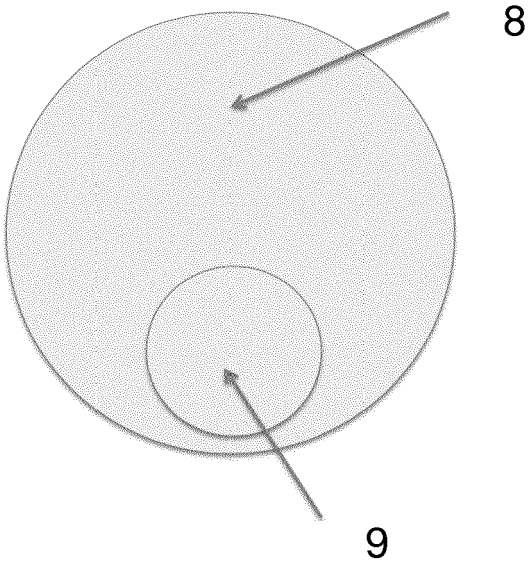


Fig. 8

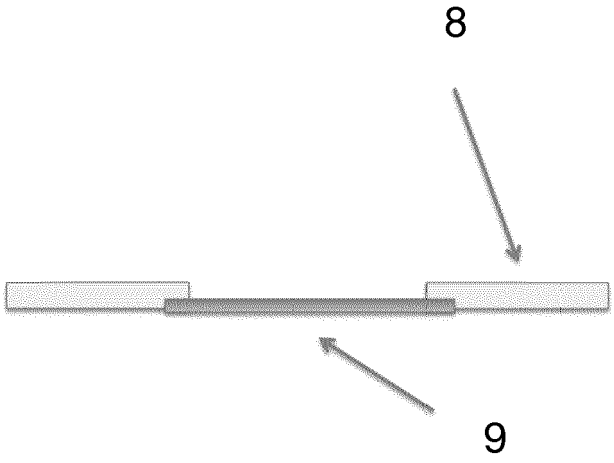


Fig. 9

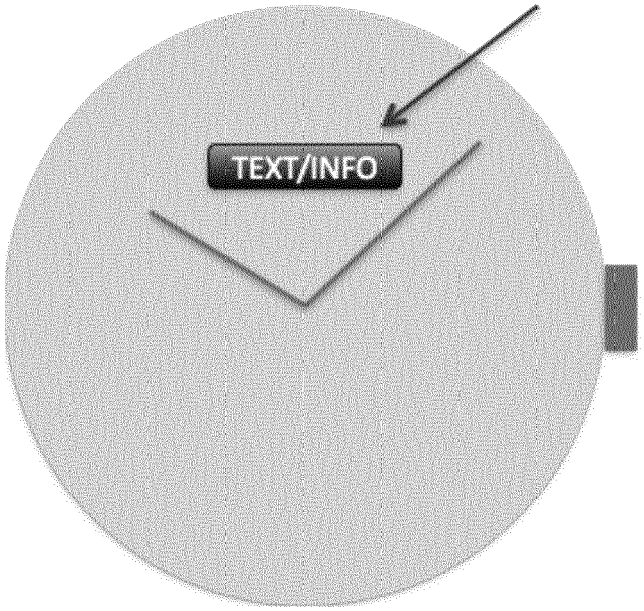


Fig. 10

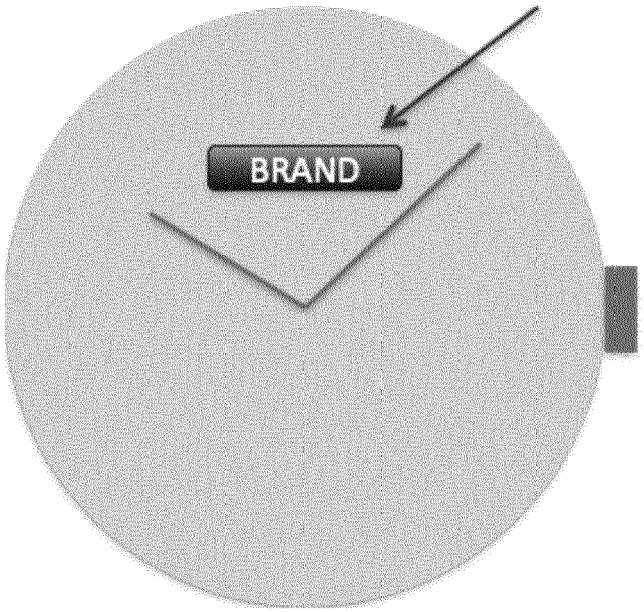


Fig. 11

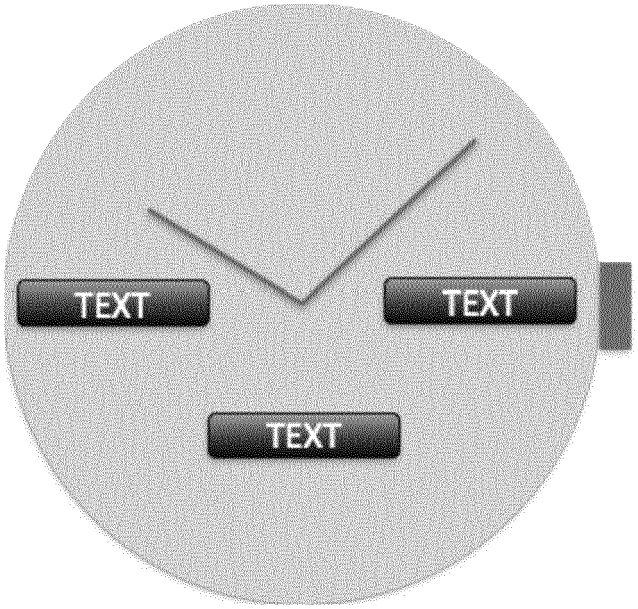


Fig. 12

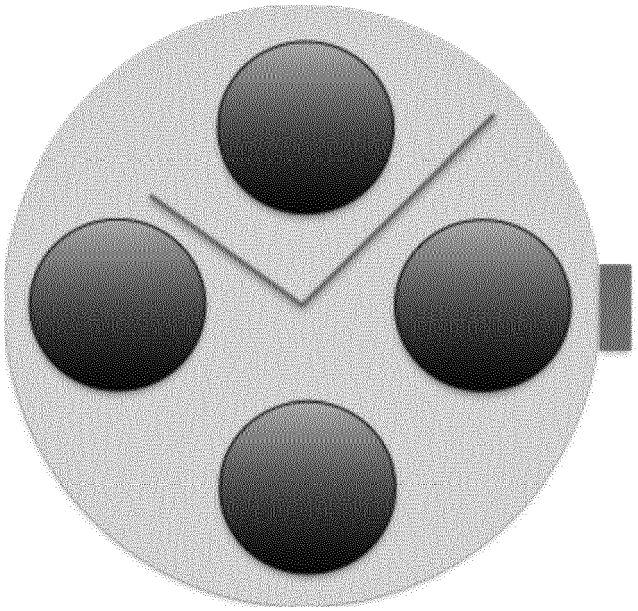


Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 9157

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/153009 A1 (MATOGE AKIHIRO [JP] ET AL) 13 July 2006 (2006-07-13) * abstract * * figures 1A, 1B, 6A * * paragraph [0001] * * paragraph [0010] - paragraph [0013] * * paragraph [0016] - paragraph [0017] * * paragraph [0032] - paragraph [0041] * * paragraph [0054] - paragraph [0056] * -----	1-6	INV. H01Q1/27 G04R60/12 G04G21/04

TECHNICAL FIELDS SEARCHED (IPC)

H01Q
G04R
G04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 February 2016	Yvonnet, Yannick

CATEGORY OF CITED DOCUMENTS

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15-02-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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