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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.

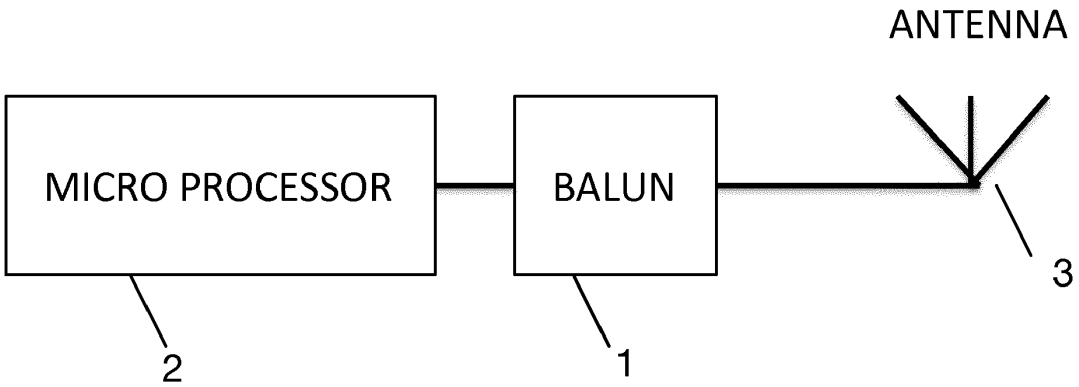


Fig. 1

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Description

Technical field

[0001] The invention relates to smart wristwatches.

Background

[0002] 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.

[0003] 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.

[0004] 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

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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 receving coil for inductive reception of electrical power.

[0010] 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.

Brief description of the drawings

[0011] The invention will be better understood in light of the description of preferred embodiment and the drawings, wherein

figure 1 shows a schematic representaion 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 an other preferred embodiment of the invention;

figure 3 shows a transversal cut through a wristwatch module according to yet an other 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; and

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

Detailed description of preferred embodiments

[0012] 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.

[0013] 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 insultated inside the wristwatch module and connected to the balun (not illustrated in figure 2).

[0014] 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 lenght of the center axe appropriately arranged for driv-

ing 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.

[0015] Figures 4-6 illustrate preferred embodiments in which the antenna 3, instead of being in a hand 4, is realised on a ceramic disc 5 as a coil.

[0016] 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

[0017] 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, realised 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).

[0018] 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 wristwach 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.

[0019] 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.

Claims

1. A smart wristwatch comprising
   an antenna configured to receive radio signals carrying information; at least a hand and a dial to display at least the time of the day in an analogue manner; whereby the antenna is comprised in the at least one hand.

2. The smart wristwatch of claim 1, wherein
   a center axe driving the at least one hand (4) is insulated inside the wristwatch and connected to a balun of the wristwatch.

3. A smart wristwatch comprising
   an antenna configured to receive signals carrying information;
   an encasing made out of metal and enclosing at least a balun;
   the smart wristwatch further comprising
   a ceramic plate (5) configured to be fixed on an opening of the encasing;
   whereby the antenna is configured as a coil and is further arranged on the surface of the ceramic plate.

4. The smart wristwatch of claim 3, wherein 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.

5. The smart wristwatch of any one of claims 3 and 4, wherein the coil is further connected to a charging circuitry for an electric capacitor inside the wristwatch, and arranged to operate as a receving coil for inductive reception of electrical power.

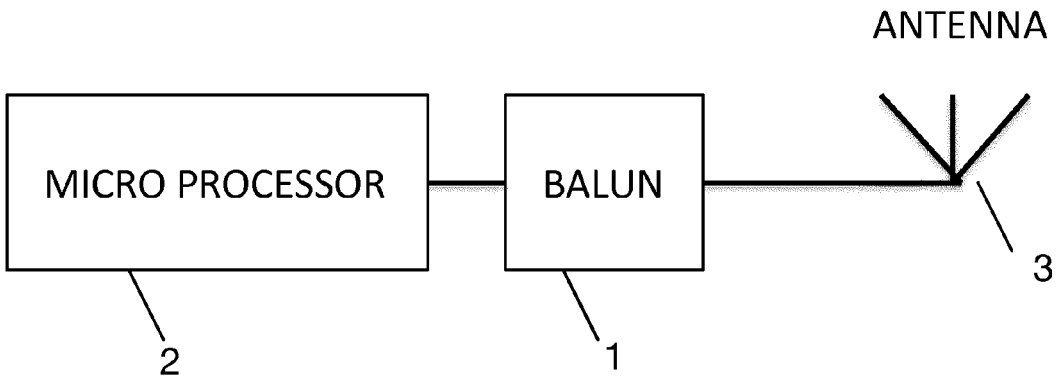


Fig. 1

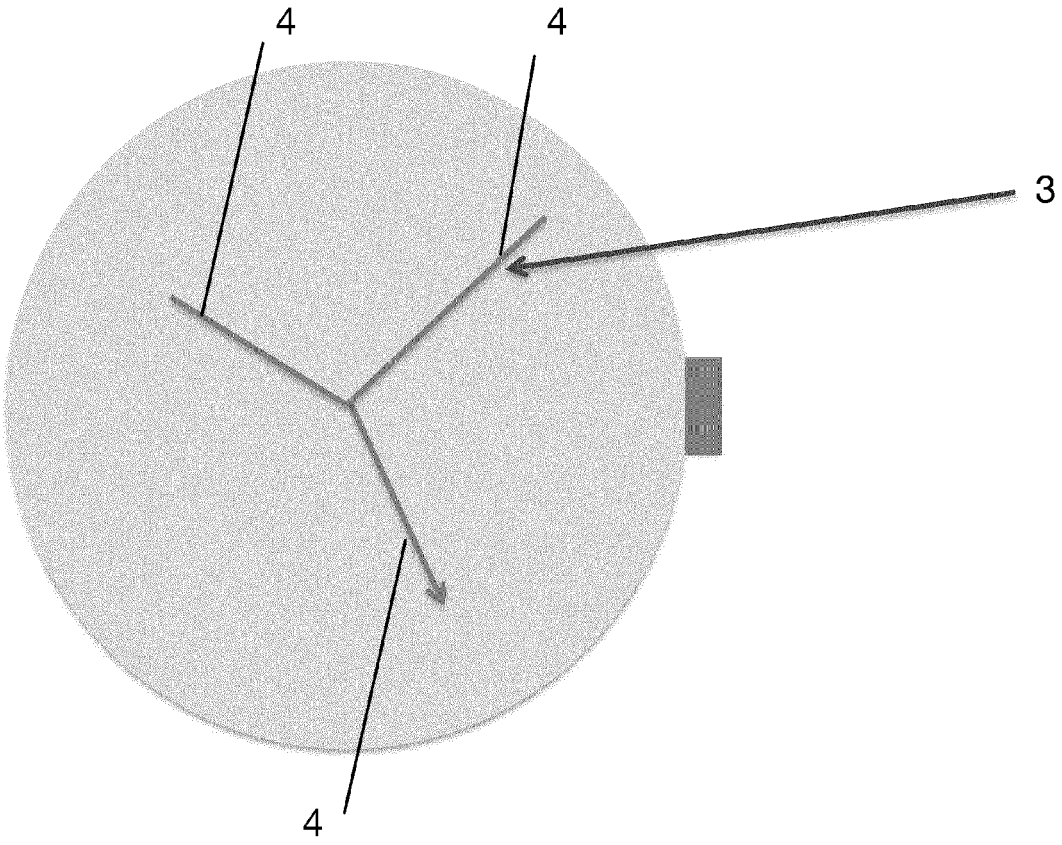


Fig. 2

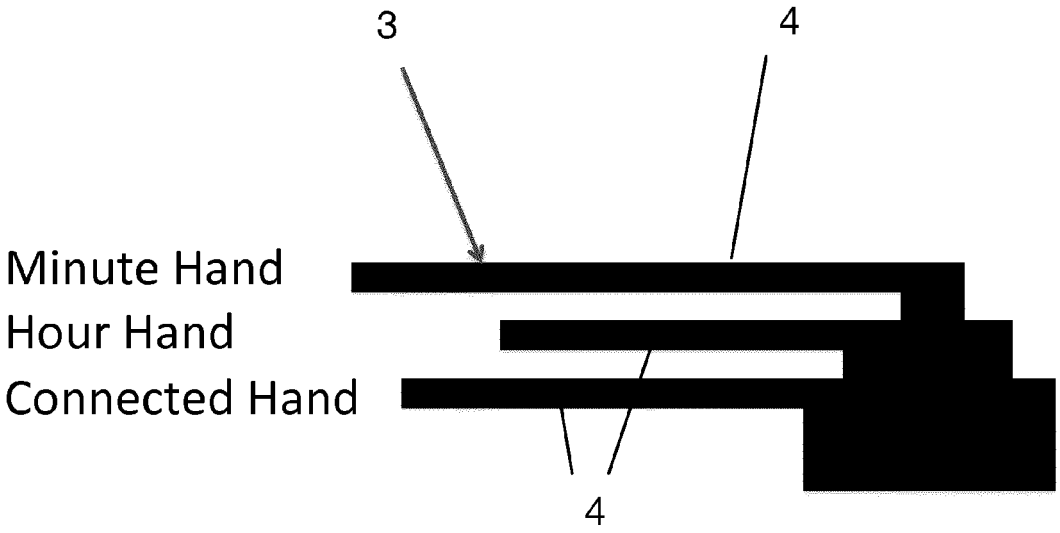


Fig. 3

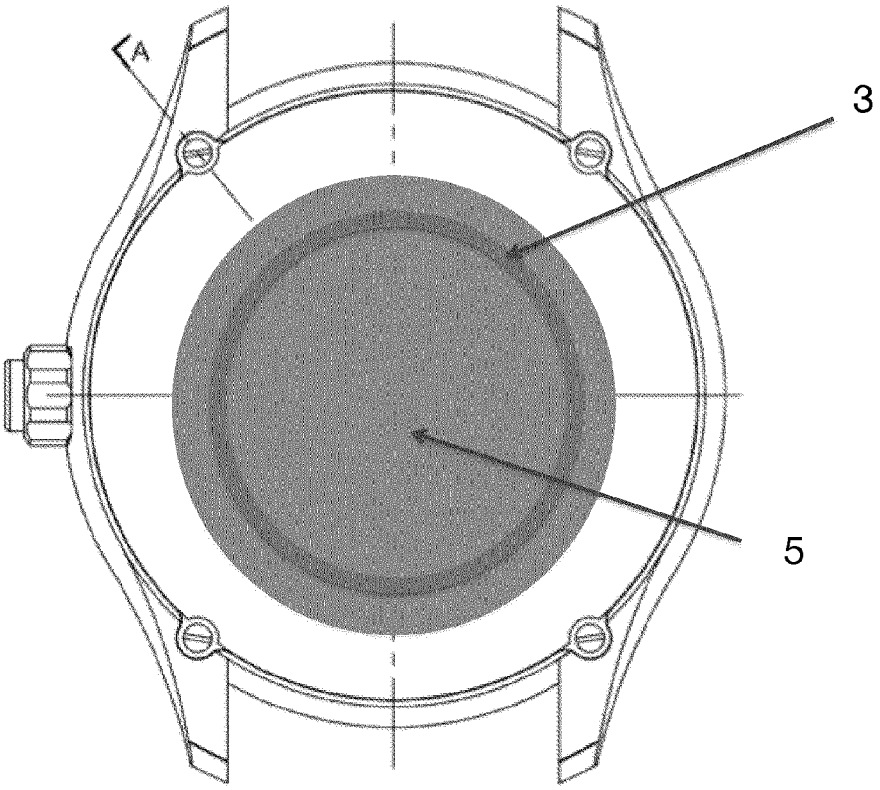


Fig. 4

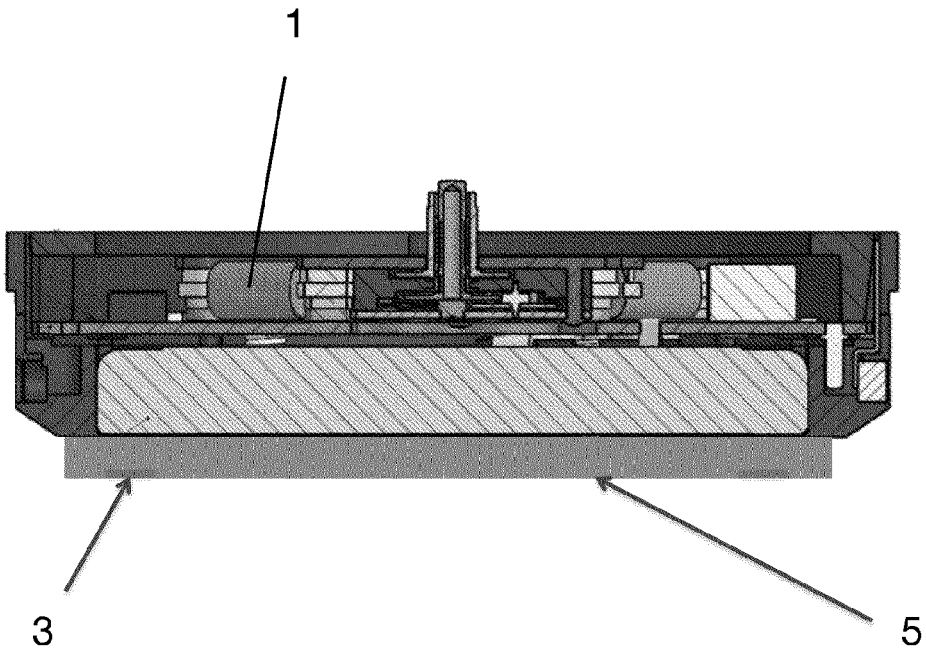


Fig. 5

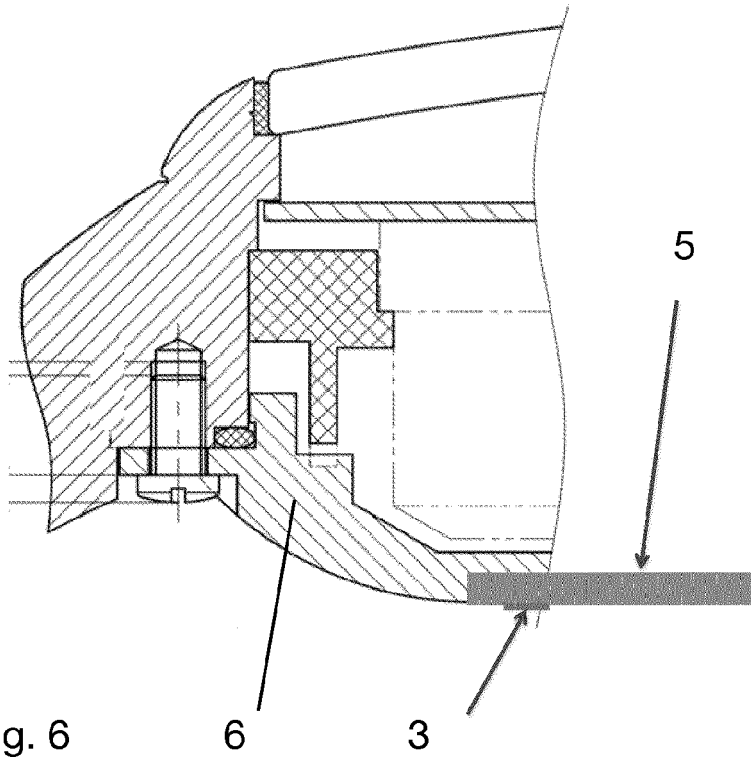


Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 14 18 9576

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	EP 1 679 562 A1 (WINWATCH SA [CH]) 12 July 2006 (2006-07-12) * figures 1-3 * * paragraph [0001] * * column 1, line 3 - line 11 * * column 5, line 46 - line 53 *	1,2	INV. H01Q1/27 G04R60/12 G04R60/10 G04G21/04
X	JP 2005 274359 A (CITIZEN WATCH CO LTD) 6 October 2005 (2005-10-06) * figure 2 * * paragraph [0003] - paragraph [0005] * * paragraph [0028] *	1,2	
X	US 2014/233358 A1 (FUJISAWA TERUHIKO [JP]) 21 August 2014 (2014-08-21) * figure 3 * * paragraph [0069] * * paragraph [0075] * * paragraph [0087] * * paragraph [0093] *	3-5	

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	22 July 2015	Yvonnet, Yannick

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 14 18 9576

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 14 18 9576

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1, 2

   The wristwatch has an antenna integrated in the at least one hand

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2. claims: 3-5

   The wristwatch has an encasing made out of metal. An antenna is integrated on the surface of a ceramic plate configured to be fixed on an opening of the encasing.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 18 9576

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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22-07-2015

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