(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 040 792 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.07.2016 Bulletin 2016/27

(51) Int Cl.:
G04G 21/02 *(2010.01)* ***G04B 37/14*** *(2006.01)*
G04B 47/00 *(2006.01)*

(21) Application number: **15150110.3**

(22) Date of filing: **05.01.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) **Mechanical wristwatch having wristband**

(57) The present invention relates to a mechanical wristwatch (100) comprising a housing (1) and a wristband (5), wherein the wristband is connected to the housing (1) for wearing the mechanical wristwatch (100) on a wrist of a user, wherein the housing (1) comprising a mechanical watch movement, characterised in that at least one of an input/output module (19, 23, 24) and a data processor (50) are internally located within the wristband (5) such that the wristband (5) is able to: receiving data through the at least one input/output module (19, 23, 24), processing data by the at least one data processor (50), and transmitting processed data through the at least one input/output module (19, 23, 24), wherein the wristband (5) is functionally independent from the housing (1).

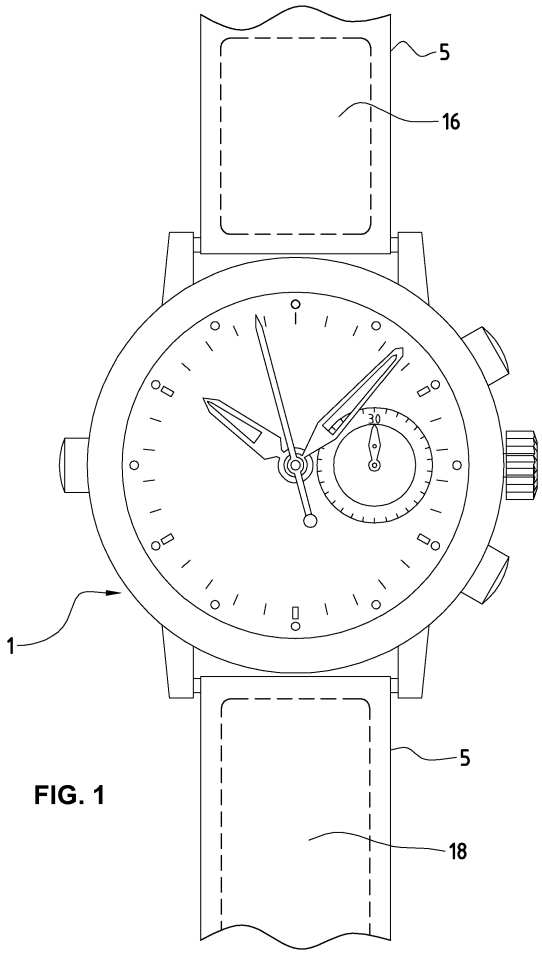

FIG. 1

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Description

Technical field of the invention

[0001] The present invention relates to a mechanical wristwatch having a wristband equipped with electronic functions. The term mechanical wristwatch as used in this application comprises all types of mechanical wristwatches, in particular watches that need to be wound up manually and watches with automatic winding.

[0002] In particular, the wristband of the mechanical wristwatch in the present invention is equipped with medical and health related biosensors and electronic components such as heart rate monitor, blood glucose monitor, skin temperature sensor, skin conductance sensor and oximetry sensor. In addition, the wristband is also equipped with data processor together with electronic components and modules such as one or various antennas, a printed circuit substrate, an accelerator, a pedometer, a gyroscope, a magnetometer, a wireless communication transceiver such as a GPS receiver module, a Bluetooth module or a NFC module, a display and/or a voice modules, etc.

Background of the invention

[0003] A mechanical wristwatch uses a mechanical mechanism to measure the passage of time. As already mentioned, a mechanical wristwatch can either be a so called "automatic mechanical watch" or a "manual wind watch". An automatic mechanical watch is a mechanical watch with a self-winding mechanism whereas a manual or "manual wind" watch needs to be wound by hand, using the crown, usually every day, to operate continuously. Mechanical watches are driven by a spring (called mainspring). Its force is transmitted through a series of gears to power the balance wheel, a weighted wheel which oscillates back and forth at a constant rate. A device called an escapement releases the watch's wheels to move forward a small amount with each swing of the balance wheel, moving the watch's hands forward at a constant rate. This makes the 'ticking' sound characteristic of all mechanical watches.

[0004] An electronic wristwatch including quartz watch, as opposed to the mechanical wristwatch, functions electronically and uses battery to power the movement of the wristwatch. A variety of electronic components and modules are typically mounted in the central housing portion of the wristwatch. In some very few instances, these electronic components may be positioned on the wristband near to the central housing position but these electronic components require the central housing to assist in carrying out their functions. In such a watch or bracelet, the central housing portion acts as a single crucial and main component to store, process and display information.

[0005] In such a mechanical and electronic wristwatch, the role of the wristband is primarily to attach the wristwatch to the wrist of the user. The wristband more often than not is only viewed as a decorative item of the wristwatch without having a real functionally important role. Hence, it is not surprising that the housing of the wristwatch has been the focus throughout the history of the timepiece industry, while the wristband of the wristwatch has been ignored.

[0006] Moreover, users may also possess different electronic devices such as personal healthcare or medical devices like heart rate monitor, non-invasive blood glucose monitor and blood pressure device. These personal healthcare devices often exist individually and may be worn on a wrist of a user. However, it is not practical to wear several different wrist devices such as wristwatch, electronic device and personal healthcare device at the same time. Hence, it could potentially obstruct users to constantly monitoring their health status.

[0007] For these reasons, there remains a need in the art to find an alternative wristband which have enhanced functions while maintaining the elegant, high quality feature of the mechanical wristwatch as a whole.

Summary of the present invention

[0008] The inventors of the present invention have found out effective remedies for the above-discussed problems by introducing new concept of wristband as presently claimed. While maintaining the conventional housing of the high quality mechanical wristwatch, the smart wristband of the present invention is herewith disclosed which functions independently from the housing portion of the mechanical wristwatch. Moreover, electronic components, sensors, modules and wireless communication transceiver are embedded within the smart wristband of the present invention so that additional information can be provided to the users to enhance the overal quality of the mechanical wristwatch. Also, these components are preferably embedded within the wristband as such and are not provided in a separate housing.

[0009] The mechanical wristwatch equipped with wristband according to the present invention revolutionises conventional mechanical wristwatches by providing additional electronic features through its smart wristband, as well as positioning biosensors within the typically-ignored wristband, thus rendering its users for an enhanced experience and providing for the users value-added data which is collected from the electronic components and sensors, while not sacrificing the high quality of mechanical wristwatch core component (the housing portion) that is known for its expression of elegance of design, attention-to-detail in finishing and assembly, and the art of hand-tweaking movements for optimum performance. At the same time, the preferred embodiment with all additional components embedded within the wristband as such renders a practically and aesthetically better solution, given that no extra housings are required.

[0010] In a first aspect, the present invention therefore relates to a mechanical wristwatch comprising a housing

and a wristband, wherein the wristband is connected to the housing for wearing the mechanical wristwatch on a wrist of a user, wherein the housing comprising a mechanical watch movement, characterised in that at least one of an input/output module and a data processor are internally located within the wristband such that the wristband is able to: receiving data through the at least one input/output module, processing data by the at least one data processor, and transmitting processed data through the at least one input/output module, wherein the wristband is functionally independent from the housing. Such mechanical wristwatch comprises electronic functions embedded within the wristband, thereby while maintaining the high-sought after feature of a mechanical wristwatch, it also enhances the users' experience by providing value-added information, such as personal health status that can be provided easily and effortlessly.

[0011] In a second aspect, the mechanical wristwatch of the present invention relates to a method of using said wristwatch according different embodiments of the present invention, comprising the steps of wearing the mechanical wrist watch on a wrist of a user, and activating the at least one input/output module that is located within the wristband. The operation of the wristwatch of the present invention is simple while a variety of information can be retrieved effortlessly. Importantly, the operation of the mechanical wristwatch having the wristband of the present invention does not disturb the operation of the mechanical wristwatch.

[0012] In a further embodiment, the mechanical wristwatch having the wristband of the present invention, wherein the input/output module and the data processor is located within a first band portion and/or a second band portion of the wrist band. The first and second band portion allows the smart wristband to appear to be a conventional mechanical wristwatch, thus maintaining the elegant appearance of the mechanical wristwatch. The band portions are suitable to accommodate the aforementioned electronic components including sensors, modules and wireless communication transceivers within the wristband. Typi-cally, the smart wristband portion appears to be thinner than the housing portion for aesthetic reason.

[0013] In addition, in a further embodiment, the electronic wristband portion according to the present invention is bendable, elastic stretchable or non-stretchable. The band portion may be elastic stretchable in order to allow the mechanical wristwatch to have different lengths and sizes in order to be worn on the wrist of the user. In contrary, the not stretchable smart wristband of the present invention forms a more rigid and stable wristband, thus reduces the chances of an overly-stretched wristband.

[0014] In another embodiment, the mechanical wristwatch having an electronic wristband of the present invention, wherein the first band portion and the second band portion are located opposite to each other and are physically separated by the housing of the mechanical wristwatch, wherein said first band portion and said second band portion are wirelessly communicated to each other. While the first band portion and the second band portion can function independently on its own, such feature allows the first portion and the second portion of the wristband to communicate and co-operate with each other when higher performance of the smart wristband is involved.

[0015] In another embodiment, the mechanical wristwatch of the present invention comprising at least one input/output module, wherein the input/output module is a sensor capable of measuring properties from the wrist of the user and/or environment surroundings, a communication transceiver capable of sending data to and/or receiving data from an external communication device and/or a power source capable of supplying energy to the input/output module and the data processor within the wristband. This features allows the mechanical wristwatch to be coupled with smart features. Such additional features allow the electronic wristband to provide for the users different additional information.

[0016] In a further embodiment, the electronic wristband of the present invention comprising a at least one of a sensor, wherein the at least one sensor is a biosensor, skin temperature sensor, oximetry sensor, skin conductance sensor, blood pressure sensor, non-invasive blood glucose sensor or heart rate sensor. These different biosensors are embedded within the otherwise ignored wristband in order to provide value-added personal health status and medical information to the user, while the user is wearing only a single mechanical wristwatch having the smart wristband on the wrist.

[0017] The mechanical wristwatch may also contain at least one communication transceiver, wherein the communication transceiver is a Bluetooth module, an NFC module or a GPS receiver module. The mechanical wristwatch is operatively connected to at least one electronic device. Such features allow the mechanical wristwatch to be connected to other external communication devices such as tablets, desktop computer, and smartphone or similar. The communication transceiver also allows for interaction between the wristband itself (within different portions of the wristband), for example, between a first band portion and a second band portion. The mechanical wristwatch can also contain a power source such as a battery to activate and operate different functions of the wristband.

[0018] In a next embodiment, the mechanical wristwatch has a display unit, wherein the display can be a touch screen display. Such feature would advantageously allow user to control the different functions of the electronic wristband easily and directly.

[0019] Furthermore, in one embodiment, the electronic wristband is operatively connected to at least one electronic device such as a mobile phone, a portable computer or a desktop computer. Such feature advantageously allows the mechanical wristwatch of the present invention to be controlled and communicated by those

electronic devices.

[0020] In a yet further embodiment, the smart wristband of the present invention comprises electronic components, sensor units, modules and/or wireless communication transceivers that are embedded within a first pocket portion of the first band portion, which is different to a second pocket portion of the second band portion. Such feature advantageously allows the smart wristband to be accommodated with different smart functions within the wristband as the smart wristband (having the first band portion and the second band portion) according to the present invention is assembled together and are worn by the same user.

Brief description of the drawings

[0021] The drawings are not necessarily drawn to scale, emphasis instead is generally being placed upon illustrating the principles of various embodiments. In the following description, various embodiments of the invention are described with reference to the following drawings.

Figure 1: A top view of a mechanical wristwatch having a wristwatch according to an embodiment of the present invention;

Figure 2: A block diagram showing internally embedded electronic components and their interactions with the data processor according to one embodiment of the present invention; and

Figure 3: A block diagram showing communication interactions between a mechanical wristwatch and electronic devices according to one embodiment of the present invention.

Detailed description of the preferred embodiment

[0022] A preferred embodiment of the present invention will now be described in details with reference to the accompanying drawings. In the following description, a detailed description of known functions and configurations incorporated herein has been omitted for conciseness.

[0023] A new mechanical wristwatch having a smart wristband is espoused. In particular, the wristband may comprise of a first, a second and/or a further wristband portion, wherein electronic components, sensors, modules, battery, antenna, wireless communication transceiver and other components are embedded within each of the aforementioned pocket portions, which is within the wristband portions. Said band portions may each function independently or may function together with another band portion through wireless communication to each other.

[0024] Specifically, in a first aspect of the invention, it relates to a mechanical wristwatch 100 comprising a housing 1 and a wristband 5, wherein the wristband is connected to the housing 1 for wearing the mechanical wristwatch 100 on a wrist of a user, wherein the housing 1 comprises a mechanical watch movement, characterised in that at least one of an input/output module 19, 23, 24 and a data processor 50 are internally located within the wristband 5 such that the wristband 5 is able to: receiving data through the at least one input/output module 19, 23, 24, processing data by the at least one data processor 50, and transmitting processed data through the at least one input/output module 19, 23, 24, wherein the wristband 5 is functionally independent from the housing 1.

[0025] Conventionally, the housing of an electronic wristwatch serves to accommodate a variety of electronic components as the housing is relatively spacious compared to the wristband. However, in a mechanical wristwatch, the housing of the mechanical wristwatch is used to accommodate hundreds or thousands of mechanical components, hence it is not possible to accommodate further input/output module, data processor and other components in the housing.

[0026] For these reasons, the mechanical wristwatch having the wristband of the present invention is advantageous compared to the conventional, monotonous mechanical and electronic wristwatches, as wristband of the mechanical wristwatch is utilised to accommodate at least one of an input/output module and data processor. In other words, the wristband is totally independent from the housing portion of the wristwatch when executing its electronic and electrical functions. Also, in a preferred embodiment, no additional housing is required for the additional elements embedded into the wristband.

[0027] As illustrated in Figure 1, a mechanical wristwatch having the wristband according to the present invention is worn in a wrist of a user. The mechanical wristwatch comprises a housing 1 and a wristband 5. For aesthetical reason, the electronic wristband 5 comprises a first band portion 16 and a second band portion 18 which are designed to appear as if a conventional mechanical wristwatch's wristband, wherein said wristband portions 16, 18 are attached to the housing 1 of the mechanical wristwatch, which is at a typical 12 o'clock and 6 o'clock positions of the wristwatch. Generally, at least one of an input/output module and a data processor are suitable to be embedded within the wristband, for instance in the first band portion 16 and/or the second band portion. An additional pocket may also exist at the wristband which is suitable for embedding electronic components such as sensors, antennas, batteries, displays and other electronic components. The pocket may further be subdivided into several compartments.

[0028] Noteworthy, the first band portion 16 and the second band portion 18 may function individually. For example, a heart rate monitor sensor may be located in a first band portion 16. The first band portion 16 and the second portion may wireless communicate to each other in order to carry out a specific task together. For example,

a biosensor may be located in the first band portion 16 while data being displayed at a display 34 that is located at the second band portion 18. This interaction can be achieved through a wireless communication. Furthermore, the wristband may be bendable, elastic stretchable or not stretchable. The wristband may also appear to be a rigid bracelet.

[0029] Figure 2 is a block diagram illustrating a mechanical wristwatch having the wristband according to one embodiment of the present invention. The electronic wristband of the present invention may comprise at least one of a input/output module 23, 24 including a communication transceiver 19 such as a GPS receiver module 20, a Bluetooth module 21 and/or a NFC module 22; a pedometer 25, an antenna 26, a time module 27, a voice module 28, a power source such as a battery 29, a sensor module 30, a magnetometer 31, a gyroscope 32, an accelerometer 33, a display 34 and other components that are suitable to be embedded in a wristband. The aforementioned electronic components may interact with at least one data processor/electronic circuitry 30. In the data processor 50, it comprises a control unit 51, a data storage unit 52 and other functional units which allow for the data processor to operate.

[0030] The aforementioned electronic components are suitable to be embedded into the wristband according to the present invention and such electronic components could substantially enhance its users experience and satisfaction. For instance, accelerometer measures body movement to track steps and sleep patterns. Gyroscope measures rotations for a variety of purposes. They feed data into exercise-tracking algorithms, and can sense when the user turns his wrist to look at the watch face, thus waking up the display. Time module allows the electronic components including quartz to be used to act as a clock, a voice module is used to record, recognise voice so that voice-activation is possible and Magnetometer is used for improved accuracy in motion tracking. Barometric pressure sensor measures changes in altitude, which is relevant to any runner or cyclist who climbs hills. Skin temperature sensor measures the body temperature of the user. Heart rate monitor measures the heart rate of the user. Oximetry sensor measures blood oxygen which is suitable for reporting accurate pulse rates. Skin conductance sensor measures exertion levels, sweat level and also calorie-burn numbers.

[0031] A variety of healthcare information can also be provided by the wristband according to one embodiment of the present invention. In order to achieve this, different biosensor units may be embedded in the wristband. For instance, skin temperature sensor, oximetry sensor, skin conductance sensor, blood pressure sensor or heart rate sensor or other sensors which may be useful in providing health-related information to the user.

[0032] According to one embodiment of the present invention, the top surface of the wristband portion may be a display unit while at least one of an input/output module and a data processor can be embedded beneath the display. Alternatively, the wristband may not comprise a display. The mechanical wristwatch having the wristband 100 according to the present invention may wireless communicate with the user's personal electronic devices such as a mobile phone 107, a portable computer 105 or a desktop computer 106. Hence, the user could obtain these information through such electronic devices. Figure 3 hence shows the example of interactions between the mechanical wristwatch and these electronic devices.

[0033] By "about" in relation to a given numerical value for amount, temperature or a period of time, it is meant to include numerical values within 10% of the specified value.

[0034] By "comprising" it is meant including, but not limited to, whatever follows the word "comprising". Thus, use of the term "comprising" indicates that the listed elements are required or mandatory, but that other elements are optional and may or may not be present. The terms "comprising" and "including" as used herein are interchangeable with each other.

[0035] By "consisting of" is meant including, and limited to, whatever follows the phrase "consisting of". Thus, the phrase "consisting of" indicates that the listed elements are required or mandatory, and that no other elements may be present.

[0036] The term "at least one" as used herein include 1, 2, 3, 4, 5, 6, 7, 8, 9 and more. Any function assigned to the "at least one" technical feature may be achieved independently or achieved in combination of different technical features.

[0037] The invention has been described broadly and generically herein. Each of the narrower species and subgeneric groupings falling within the generic disclosure also form part of the invention. This includes the generic description of the invention with a proviso or negative limitation removing any subject matter from the genus, regardless of whether or not the excised material is specifically recited herein.

[0038] Other embodiments are within the following claims and non-limiting examples. It is to be understood that these examples are for illustrative purposes only and are not to be construed to limit the scope of the present invention.

Claims

1. A mechanical wristwatch (100) comprising a housing (1) and a wristband (5), wherein the wristband is connected to the housing (1) for wearing the mechanical wristwatch (100) on a wrist of a user, wherein the housing (1) comprising a mechanical watch movement,
   characterised in that at least one of an input/output module (19, 23, 24) and a data processor (50) are internally located within the wristband (5) such that the wristband (5) is able to:

- receiving data through the at least one input/output module (19, 23, 24),
- processing data by the at least one data processor (50), and
- transmitting processed data through the at least one input/output module (19, 23, 24),

wherein the wristband (5) is functionally independent from the housing (1).

2. The mechanical wristwatch (100) according to claim 1, **characterised in that** the input/output module (19, 23, 24) and the data processor (50) are embedded within the wristband (5) as such.

3. The mechanical wristwatch (100) according to claim 2, **characterised in that** the input/output module (19, 23, 24) and the data processor (50) is located within a first band portion (16) and/or a second band portion (18) of the wrist band (5).

4. The mechanical wristwatch (100) according to claim 3, **characterised in that** the first band portion (16) and the second band portion (18) are located opposite to each other and are physically separated by the housing portion (1) of the mechanical wristwatch (100), wherein said first band portion (16) and said second band portion (18) are wirelessly communicated to each other.

5. The mechanical wristwatch (100) according to any one of the preceding claims, **characterised in that** the input/output module is

- a sensor (30) capable of measuring properties from the wrist of the user and/or environment surroundings,
- a communication transceiver (19) capable of sending data to and/or receiving data from an external communication device (105, 106, 107), and/or
- a power source capable of supplying energy to the input/output module and the data processor within the wristband.

6. The mechanical wristwatch (100) according to claim 5, **characterised in that** the sensor (30) is a biosensor, in particular a skin temperature sensor, an oximetry sensor, a skin conductance sensor, a blood pressure sensor, a non-invasive blood glucose sensor, or a heart rate sensor.

7. The mechanical wristwatch (100) according to claim 5, **characterised in that** the communication transceiver (19) is a Bluetooth module (21), an NFC module (22) or a GPS receiver module (20).

8. The mechanical wristwatch (100) according to claim 5, **characterised in that** the external communication device (105, 106, 107) is a tablet computer (105), a desktop computer (106), a smartphone (107) or similar.

9. The mechanical wristwatch (100) according to claim 5, **characterised in that** the power source is a battery.

10. The mechanical wristwatch (100) according to any one of the preceding claims, **characterised in that** the input/output module is a display (34) on the surface of the wristband (5).

11. The mechanical wristwatch (100) according to claim 10, **characterised in that** the display unit (34) is a touch screen.

12. The mechanical wristwatch (100) according to any one of the preceding claims, wherein the wristband (5) is bendable, elastic stretchable or nonstretchable.

13. The mechanical wristwatch (100) according to any one of the preceding claims, wherein the wristband (5) is operatively connected to at least one electronic device (105, 106, 107).

14. A method of using the mechanical wristwatch (100) according to any of the preceding claims, comprising the steps of:

- wearing the mechanical wrist watch on a wrist of a user,
- activating the at least one input/output module that is located on the wristband.

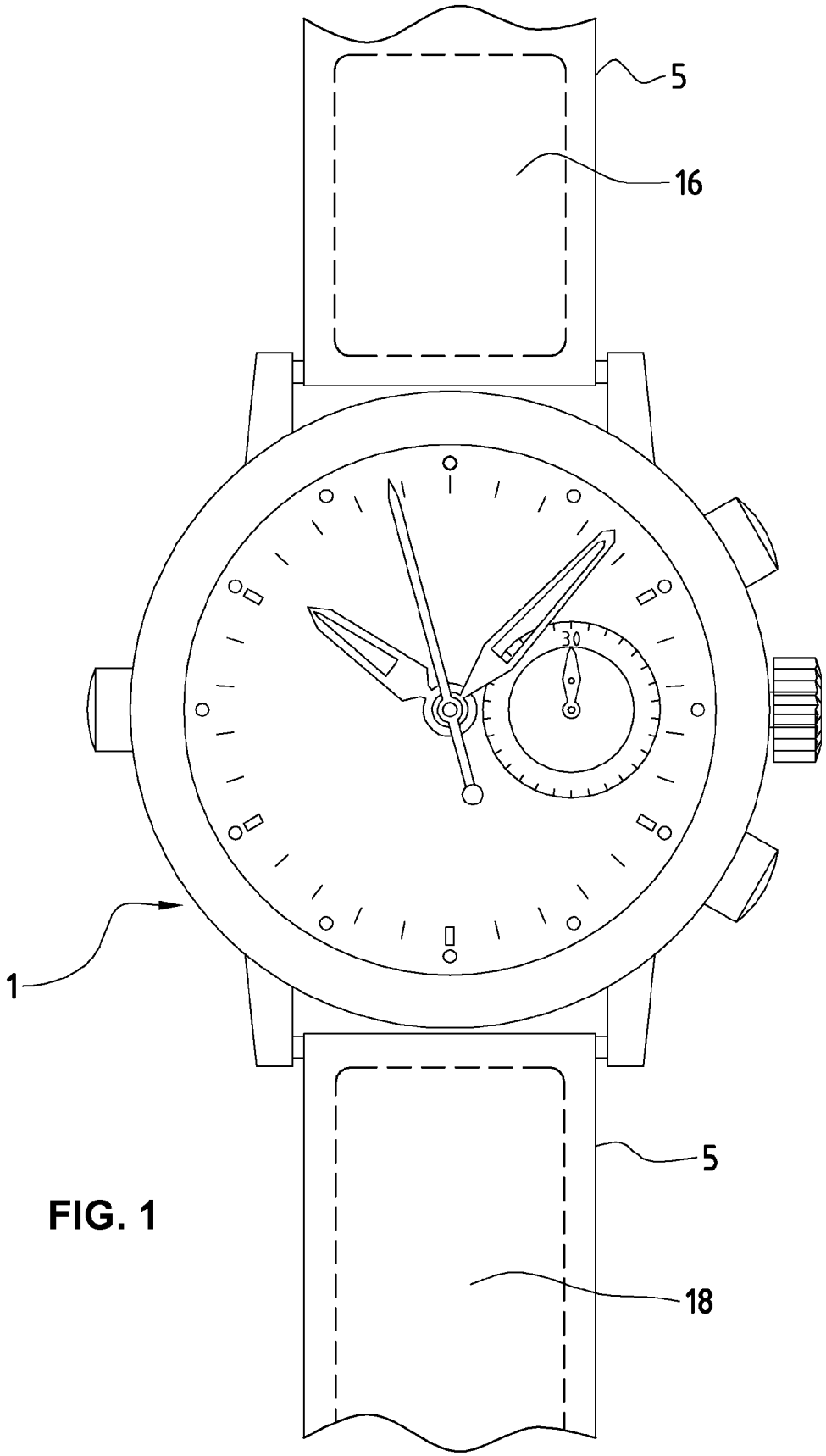

FIG. 1

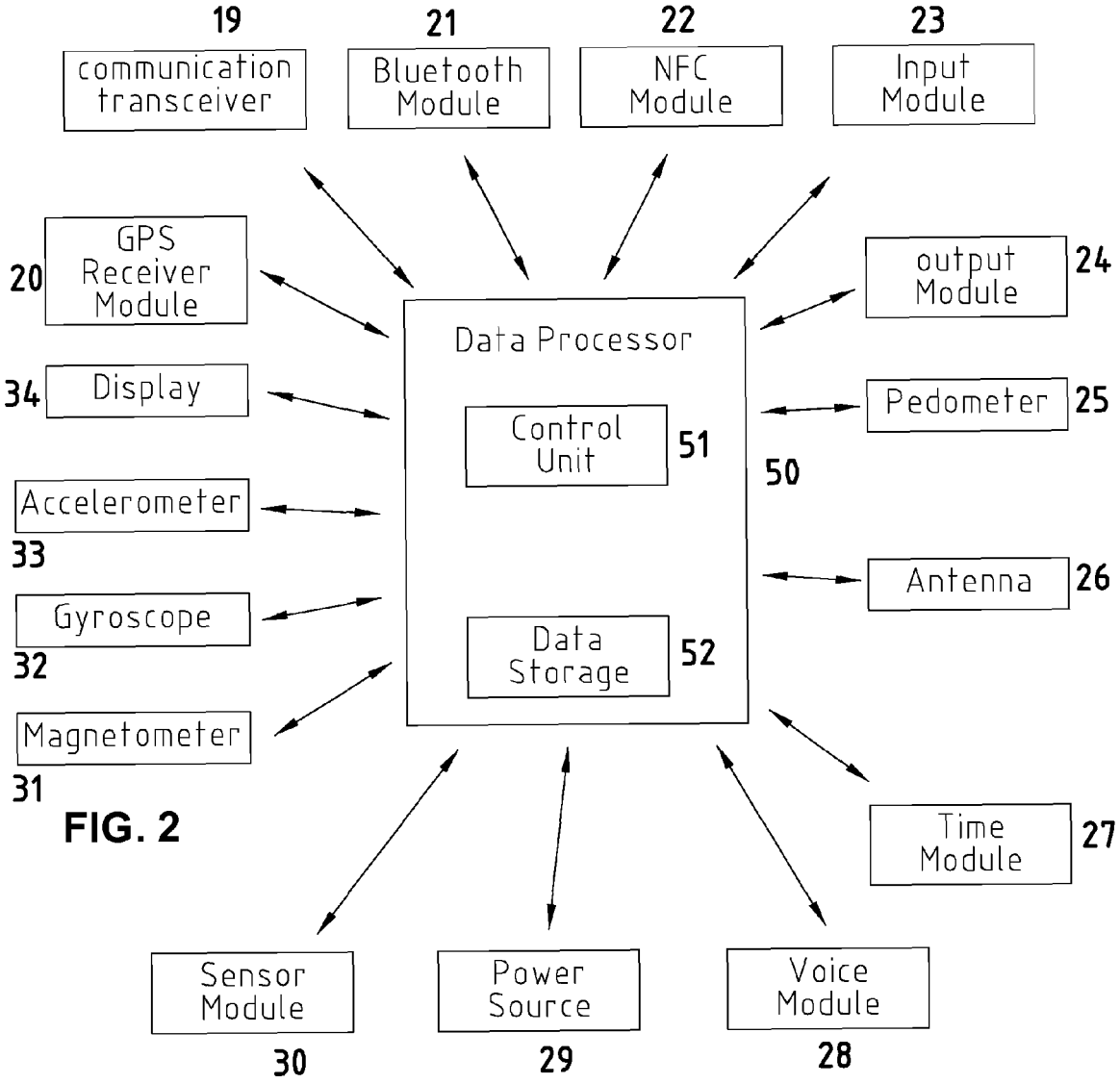
19
communication transceiver
21
Bluetooth Module
22
NFC Module
23
Input Module
20
GPS Receiver Module
output Module
24
Data Processor
34
Display
Pedometer
25
Control Unit
51
50
Accelerometer
33
Antenna
26
Gyroscope
32
Data Storage
52
Magnetometer
31
Time Module
27
Sensor Module
30
Power Source
29
Voice Module
28

FIG. 2

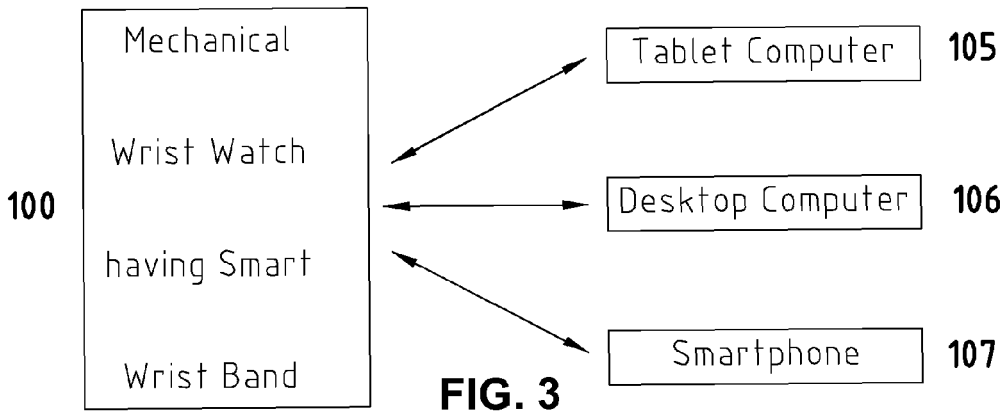
Mechanical
Wrist Watch
having Smart
Wrist Band
100
Tablet Computer
105
Desktop Computer
106
Smartphone
107

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 15 15 0110

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 2 789 254 A1 (MONTRES JAQUET DROZ SA [CH]) 15 October 2014 (2014-10-15) * paragraphs [0036] - [0051] * * paragraphs [0058] - [0060] * * paragraphs [0063] - [0066] * * figures 1,2,10 *	1-14	INV. G04G21/02 G04B37/14 G04B47/00
E	WO 2015/107523 A1 (REUVENI ERAN [IL]) 23 July 2015 (2015-07-23) * page 7, line 31 - page 8, line 11 * * page 10, line 1 - page 12, line 32 * * figures 1a-3,6 *	1-14	
A	FR 2 692 706 A1 (GUILLEMAN LIONEL [FR]; DAVILLE JEAN PIERRE) 24 December 1993 (1993-12-24) * abstract; figures 1-3 *	1-14	

TECHNICAL FIELDS SEARCHED (IPC)

G04B
G04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 August 2015	Pirozzi, Giuseppe

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 15 0110

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31-08-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82