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(54) **BLOOD OXYGEN AND ELECTROCARDIOGRAPHY MEASURING APPARATUS**

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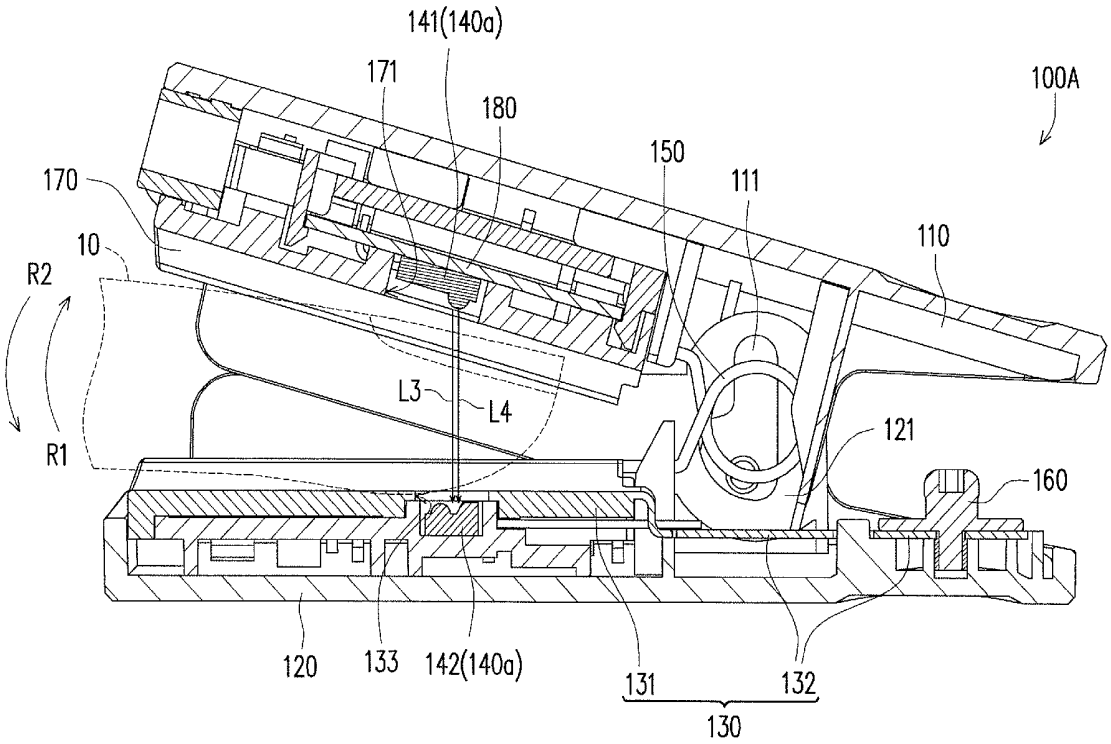
CPC ***A61B 5/14552*** (2013.01); ***A61B 5/0205*** (2013.01); ***A61B 5/6826*** (2013.01); ***A61B 5/02416*** (2013.01)

(57) **ABSTRACT**

A blood oxygen and electrocardiography measuring apparatus, including a first clipping component, a second clipping component, a heart rate sensing pad, and a blood oxygen sensing component, is provided. The second clipping component and the first clipping component are pivoted with each other. The heart rate sensing pad is disposed on the second clipping component and located between the first clipping component and the second clipping component. The blood oxygen sensing component is disposed on the second clipping component and located between the second clipping component and the heart rate sensing pad. The blood oxygen sensing component is exposed from the heart rate sensing pad.



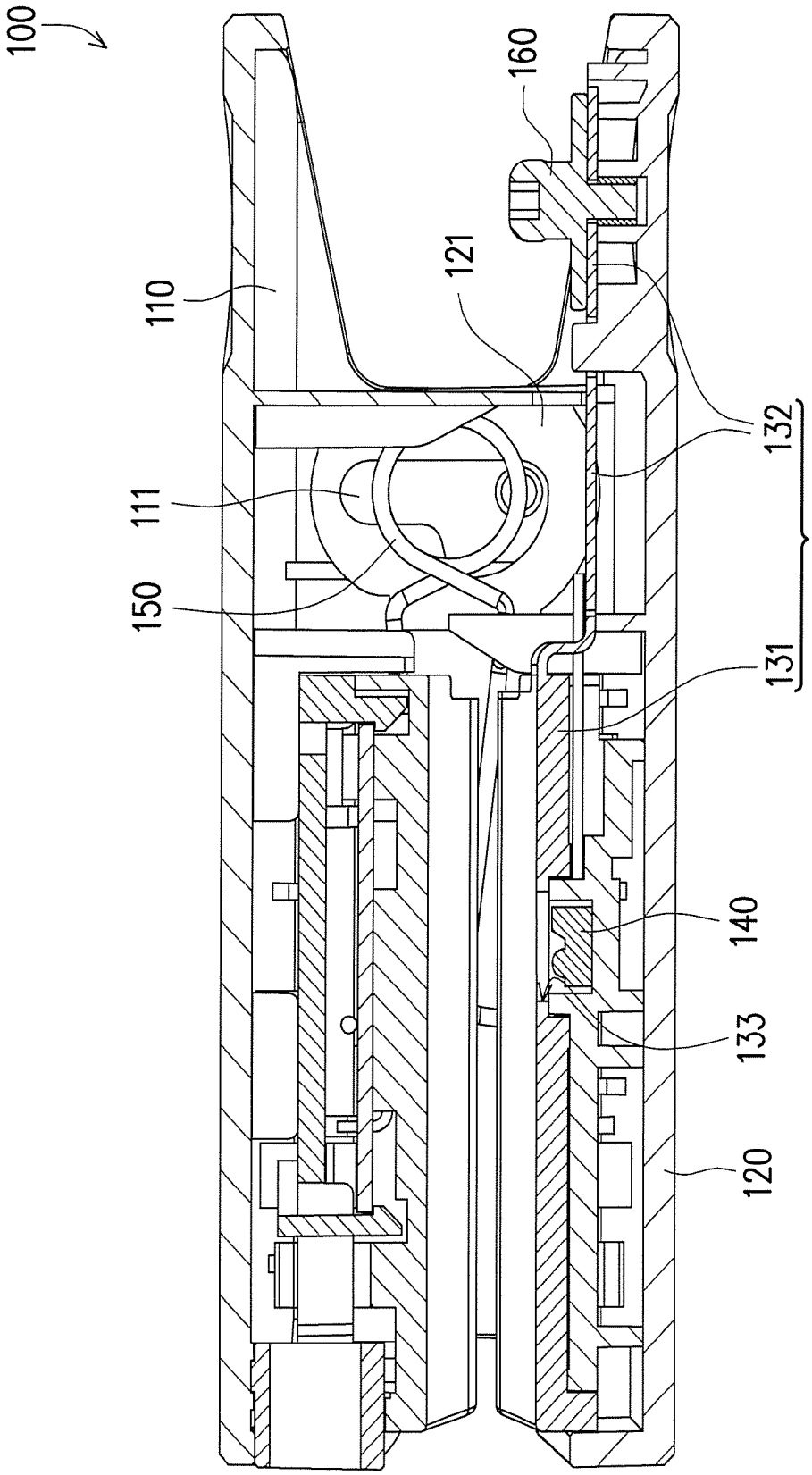


FIG. 1A

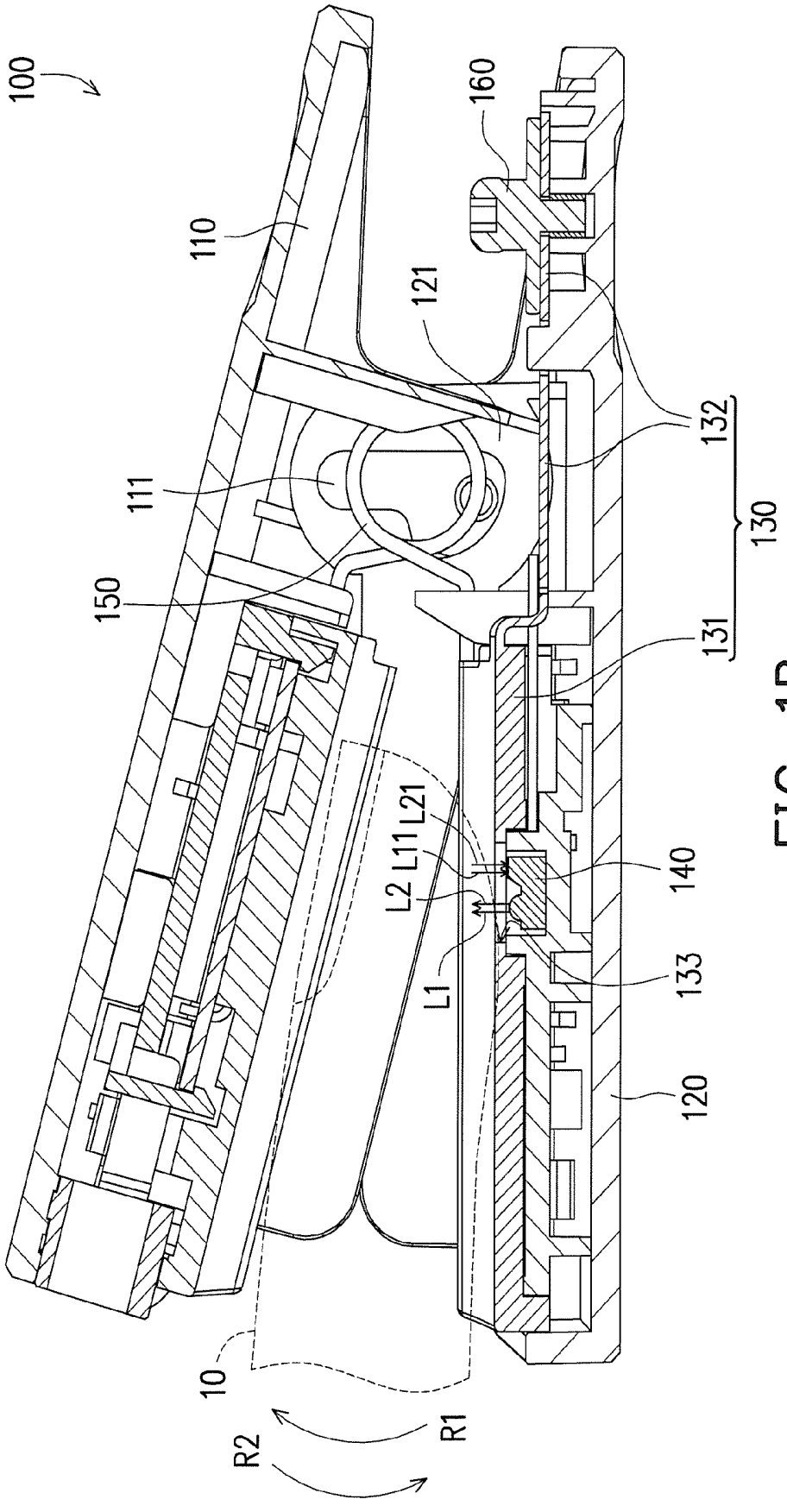

100
110
160
121
132
130
111
150
131
L21
L11
L2
140
L1
133
120
10
R2
R1

FIG. 1B

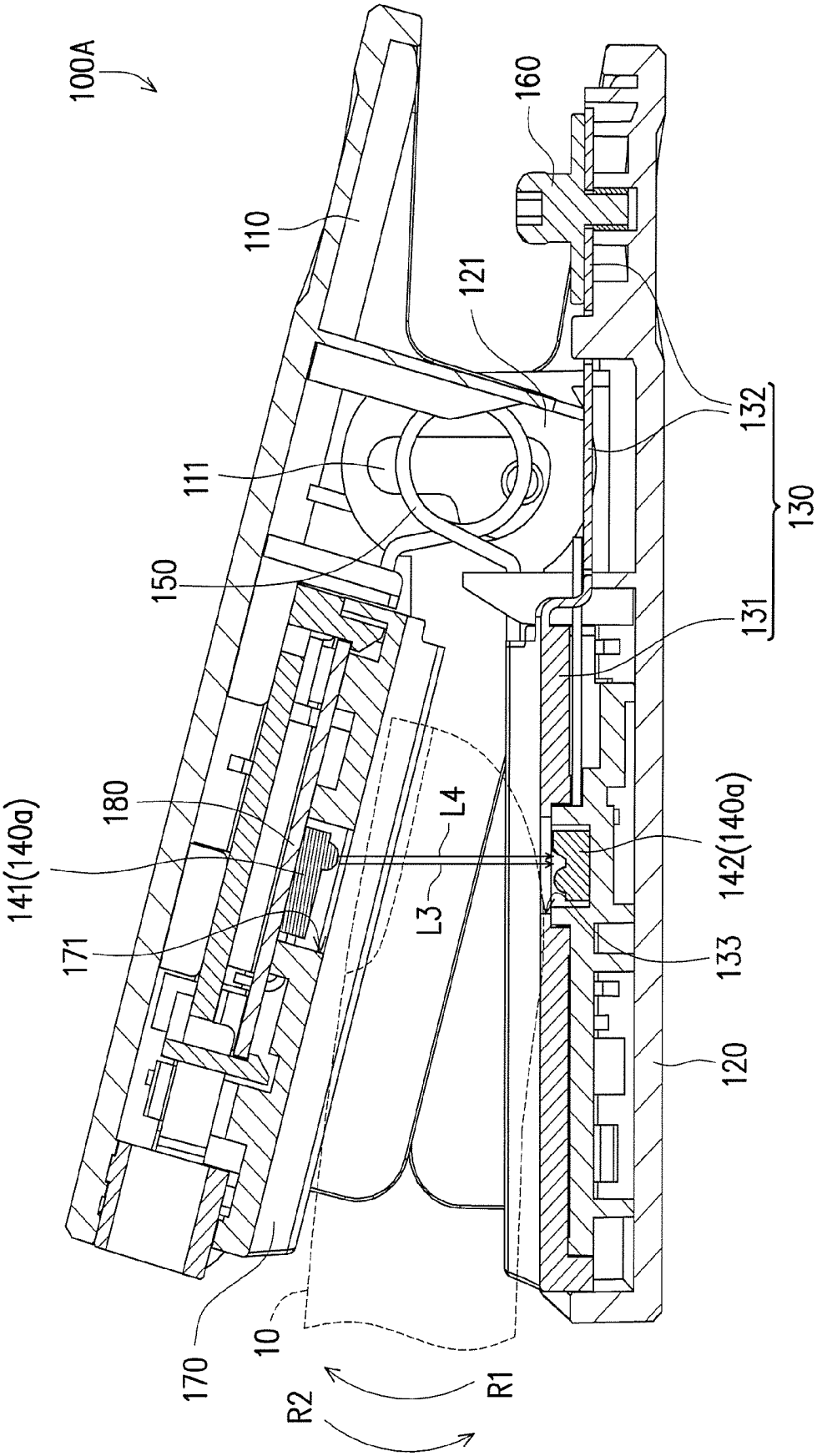

100A
160
110
121
132
111
130
150
131
180
L4
141(140a)
142(140a)
L3
171
133
120
170
10
R2
R1

FIG. 2

BLOOD OXYGEN AND ELECTROCARDIOGRAPHY MEASURING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefit of Taiwan application serial no. 104209464, filed on Jun. 12, 2015. The entirety of each of the above-mentioned patent applications is hereby incorporated by reference herein and made a part of this specification.

BACKGROUND OF THE INVENTION

[0002] Field of the Invention

[0003] The invention relates to a blood oxygen and electrocardiography measuring apparatus and particularly relates to a finger clip type blood oxygen and electrocardiography measuring apparatus.

[0004] Description of Related Art

[0005] There is an increasing awareness of the importance of health care. To meet the surging demand, a wide range of measuring apparatuses is available on the market. With use of such measuring apparatuses, the users are able to check their current physical conditions, such as blood oxygen concentration, heart rate, and other body-related data, instantly. Common non-invasive measuring apparatuses, e.g. finger clip type ECG (electrocardiography) probe, strap type ECG probe, finger clip type blood oxygen probe, and strap type blood oxygen probe, can only measure either of the user's heart rate and blood oxygen concentration. That is, in order to measure blood oxygen concentration and heart rate, the user will need to wear both the finger clip type ECG probe (or strap type ECG probe) and the finger clip type blood oxygen probe (or strap type blood oxygen probe).

[0006] Thus, how to integrate the functions of measurement of blood oxygen concentration and heart rate in one non-invasive measuring apparatus so as to be more convenient to use is an issue that needs to be addressed.

SUMMARY OF THE INVENTION

[0007] The invention provides a blood oxygen and electrocardiography measuring apparatus that is convenient to use.

[0008] The invention provides a blood oxygen and electrocardiography measuring apparatus, including a first clipping component, a second clipping component, a heart rate sensing pad, and a blood oxygen sensing component. The second clipping component and the first clipping component are pivoted with each other. The heart rate sensing pad is disposed on the second clipping component and located between the first clipping component and the second clipping component. The blood oxygen sensing component is disposed on the second clipping component and located between the second clipping component and the heart rate sensing pad. The blood oxygen sensing component is exposed from the heart rate sensing pad.

[0009] In an embodiment of the invention, the blood oxygen sensing component is an optical transceiver.

[0010] In an embodiment of the invention, the heart rate sensing pad includes a body portion, an extension portion connected with the body portion, and an opening located on the body portion. The blood oxygen sensing component is electrically connected with the extension portion. The opening exposes the blood oxygen sensing component.

[0011] In an embodiment of the invention, the blood oxygen and electrocardiography measuring apparatus further includes a connection terminal. The connection terminal is disposed in contact with the extension portion to be electrically connected with the heart rate sensing pad.

[0012] In an embodiment of the invention, the blood oxygen and electrocardiography measuring apparatus further includes at least one elastic member. The elastic member connects the first clipping component and the second clipping component.

[0013] The invention provides another blood oxygen and electrocardiography measuring apparatus, including a first clipping component, a second clipping component, a finger pad, a heart rate sensing pad, and a blood oxygen sensing module. The second clipping component and the first clipping component are pivoted with each other. The finger pad is disposed on the first clipping component and located between the first clipping component and the second clipping component. The heart rate sensing pad is disposed on the second clipping component and located between the first clipping component and the second clipping component. The blood oxygen sensing module is disposed on the second clipping component and located between the second clipping component and the heart rate sensing pad. The blood oxygen sensing module includes an optical transmitter and an optical receiver. The optical transmitter is disposed on the first clipping component and located between the first clipping component and the finger pad. The finger pad exposes the optical transmitter. The optical receiver is disposed on the second clipping component corresponding to the optical transmitter and located between the second clipping component and the heart rate sensing pad. The heart rate sensing pad exposes the optical receiver.

[0014] In an embodiment of the invention, the heart rate sensing pad includes a body portion, an extension portion connected with the body portion, and an opening located on the body portion. The optical receiver is electrically connected with the extension portion. The opening exposes the optical receiver.

[0015] In an embodiment of the invention, the blood oxygen and electrocardiography measuring apparatus further includes a circuit board. The circuit board is disposed between the first clipping component and the finger pad. The optical transmitter is electrically connected with the circuit board.

[0016] Based on the above, the blood oxygen and electrocardiography measuring apparatus of the invention clips the user's finger between the first clipping component and the second clipping component and measures the blood oxygen concentration and/or heart rate of the user by the heart rate sensing pad and/or the blood oxygen sensing component (or blood oxygen sensing module), thereby improving the convenience.

[0017] To make the aforementioned and other features and advantages of the invention more comprehensible, several embodiments accompanied with drawings are described in detail as follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification.

The drawings illustrate exemplary embodiments of the invention and, together with the description, serve to explain the principles of the invention.

[0019] FIG. **1**A is a cross-sectional schematic view depicting the blood oxygen and electrocardiography measuring apparatus in a closed state according to an embodiment of the invention.

[0020] FIG. **1**B is a cross-sectional schematic view of the blood oxygen and electrocardiography measuring apparatus of FIG. **1**A that has been converted to an expanded state.

[0021] FIG. **2** is a cross-sectional schematic view depicting the blood oxygen and electrocardiography measuring apparatus in the expanded state according to another embodiment of the invention.

DESCRIPTION OF THE EMBODIMENTS

[0022] FIG. **1**A is a cross-sectional schematic view depicting a blood oxygen and electrocardiography measuring apparatus in a closed state according to an embodiment of the invention. FIG. **1**B is a cross-sectional schematic view of the blood oxygen and electrocardiography measuring apparatus of FIG. **1**A that has been converted to an expanded state. With reference to FIG. **1**A and FIG. **1**B, in this embodiment, a blood oxygen and electrocardiography measuring apparatus **100** is a finger clip type blood oxygen and electrocardiography measuring probe, for example, which simultaneously measures the heart rate and blood oxygen concentration of the user or measures one of the heart rate and blood oxygen concentration by clipping a finger **10** of the user.

[0023] The blood oxygen and electrocardiography measuring apparatus **100** may include a first clipping component **110**, a second clipping component **120**, a heart rate sensing pad **130**, and a blood oxygen sensing component **140**. The first clipping component **110** has a first pivoting portion **111** while the second clipping component **120** has a second pivoting portion **121** disposed corresponding to the first pivoting portion **111**. The first clipping component **110** is pivoted with the second pivoting portion **121** of the second clipping component **120** by the first pivoting portion **111** for the first clipping component **110** to rotate with respect to the second clipping component **120** in a rotational direction R**1** or in a reverse direction (i.e. a rotational direction R**2**). Specifically, the blood oxygen and electrocardiography measuring apparatus **100** is adapted to change between a closed state shown in FIG. **1**A and an expanded state shown in FIG. **1**B. When the blood oxygen and electrocardiography measuring apparatus **100** is in the expanded state shown in FIG. **1**B, an angle between the first clipping component **110** and the second clipping component **120** is mainly determined by the thickness of the finger **10** of the user.

[0024] On the other hand, in order that the blood oxygen and electrocardiography measuring apparatus **100** in the expanded state shown in FIG. **1**B can automatically return to the closed state shown in FIG. **1**A, the blood oxygen and electrocardiography measuring apparatus **100** further includes at least one elastic member **150**. The elastic member **150** is a torsion spring, for example. An end of the elastic member **150** is fixed to the first clipping component **110** while the other end thereof is fixed to the second clipping component **120**. When the first clipping component **110** rotates with respect to the second clipping component **120** in the rotational direction R**1** to convert the blood oxygen and electrocardiography measuring apparatus **100** to the expanded state shown in FIG. **1**B, the elastic member **150** is elastically deformed and stores an elastic potential energy. When the finger **10** of the user is removed from the blood oxygen and electrocardiography measuring apparatus **100**, the elastic member **150** releases the elastic potential energy to drive the first clipping component **110** to rotate with respect to the second clipping component **120** in the rotational direction R**2**, so as to restore the blood oxygen and electrocardiography measuring apparatus **100** to the closed state shown in FIG. **1**A.

[0025] Referring to FIG. **1**B, the heart rate sensing pad **130** and the blood oxygen sensing component **140** are respectively disposed on the second clipping component **120**, wherein the heart rate sensing pad **130** is located between the first clipping component **110** and the second clipping component **120**, and the blood oxygen sensing component **140** is located between the second clipping component **120** and the heart rate sensing pad **130**. To be more detailed, the heart rate sensing pad **130** is composed of a conductive metal, for example, to be in contact with a pulp of the finger **10** of the user for measuring the heart rate of the user. In this embodiment, the heart rate sensing pad **130** may include a body portion **131**, an extension portion **132** connected with the body portion **131**, and an opening **133** located on the body portion **131**. The blood oxygen and electrocardiography measuring apparatus **100** further includes a connection terminal **160**. The connection terminal **160** is disposed in contact with the extension portion **132** to be electrically connected with the heart rate sensing pad **130**. The pulp of the finger **10** of the user clipped between the first clipping component **110** and the second clipping component **120** is in contact with the body portion **131**, wherein an ECG (electrocardiography) signal obtained through the body portion **131** is sequentially transmitted to the extension portion **132** and the connection terminal **160** and then transmitted to an external electronic apparatus (not shown) through an external signal line (not shown) connected on the connection terminal **160** for instantly showing the heart rate of the user through the external electronic apparatus (not shown).

[0026] The blood oxygen sensing component **140** is an optical transceiver, which is electrically connected with the extension portion **132**, for example. Since the opening **133** of the heart rate sensing pad **130** exposes the blood oxygen sensing component **140**, sensing light emitted by the blood oxygen sensing component **140** may pass through the finger **10** of the user through the opening **133**. The sensing light includes two light beams L**1** and L**2** that have different wavelengths, for example. When the light beams L**1** and L**2** reach capillaries in the finger **10** of the user, two reflected lights L**11** and L**21** are generated. The reflected lights L**11** and L**21** pass through the opening **133** in a direction reverse to the emission direction of the sensing light (not shown) and are received by the blood oxygen sensing component **140**. Then, the blood oxygen concentration of the user may be calculated by comparing the optical intensity or property of the reflected lights L**11** and L**21**. Further, data or signals related to the blood oxygen concentration may be sequentially transmitted to the extension portion **132** and the connection terminal **160** and then transmitted to the external electronic apparatus (not shown) through the external signal line (not shown) connected on the connection terminal **160** for instantly showing the blood oxygen concentration of the user through the external electronic apparatus (not shown).

[0027] To sum up, the user clips the finger with the blood oxygen and electrocardiography measuring apparatus **100** to simultaneously measure the user's heart rate and blood oxygen concentration by the heart rate sensing pad **130** and the blood oxygen sensing component **140**, or only measure the heart rate by the heart rate sensing pad **130** or only measure the blood oxygen concentration by the blood oxygen sensing component **140**, so as to improve the convenience and flexibility of use of the blood oxygen and electrocardiography measuring apparatus **100**.

[0028] Some other embodiments of the invention are provided as follows. It should be noted that the reference numerals and a portion of the contents in the previous embodiment are used in the following embodiment, in which identical reference numerals indicate identical or similar components, and repeated description of the same technical contents is omitted. Please refer to the description of the previous embodiment for the omitted contents, which will not be repeated hereinafter.

[0029] FIG. **2** is a cross-sectional schematic view depicting the blood oxygen and electrocardiography measuring apparatus in the expanded state according to another embodiment of the invention. Referring to FIG. **2**, a blood oxygen and electrocardiography measuring apparatus **100**A of FIG. **2** is similar to the blood oxygen and electrocardiography measuring apparatus **100** of the previous embodiment, and a difference lies in that: the blood oxygen and electrocardiography measuring apparatus **100**A further includes a finger pad **170** disposed on the first clipping component **110**, an optical transmitter **141** disposed on the first clipping component **110**, and an optical receiver **142** disposed on the second clipping component **120** corresponding to the optical transmitter **141**.

[0030] Specifically, the finger pad **170** is located between the first clipping component **170** and the second clipping component **120** and has an opening **171** disposed corresponding to the optical transmitter **141**. The finger pad **170** may be composed of a conductive metal or an insulating material. The optical transmitter **141** and the optical receiver **142** constitute a blood oxygen sensing module **140***a* of this embodiment. The optical transmitter **141** is located between the first clipping component **170** and the finger pad **170** and is exposed by the opening **171** of the finger pad **170**. The optical receiver **142** is located between the second clipping component **120** and the heart rate sensing pad **130** and is exposed by the opening **133** of the heart rate sensing pad **130**. Moreover, the blood oxygen and electrocardiography measuring apparatus **100**A further includes a circuit board **180** disposed between the first clipping component **110** and the finger pad **170**. The optical transmitter **141** is electrically connected with the circuit board **180**, such that a control unit (not shown) may control emission of a sensing light of the optical transmitter **141** through the circuit board **180**. The optical receiver **142** is electrically connected with the extension portion **132**.

[0031] Since the opening **171** of the finger pad **170** exposes the optical transmitter **141**, the sensing light emitted by the optical transmitter **141** may pass through the finger **10** of the user through the opening **171**. The sensing light includes two light beams L**3** and L**4** that have different wavelengths, for example. After the light beams L**3** and L**4** pass through capillaries in the finger **10** of the user, the light beams L**3** and L**4** travel along the emission direction of the sensing light and pass through the opening **133** corresponding to the opening **171** to be received by the optical receiver **142**. Then, the blood oxygen concentration of the user may be calculated by comparing the optical intensity or property of the light beams L**3** and L**4**. Further, data or signals related to the blood oxygen concentration may be sequentially transmitted to the extension portion **132** and the connection terminal **160** and then transmitted to the external electronic apparatus (not shown) through the external signal line (not shown) connected on the connection terminal **160** for instantly showing the blood oxygen concentration of the user through the external electronic apparatus (not shown).

[0032] In conclusion, the blood oxygen and electrocardiography measuring apparatus of the invention is a finger clip type blood oxygen and electrocardiography measuring probe, for example. When the user's finger is clipped between the first clipping component and the second clipping component, the heart rate sensing pad is in contact with the user's finger to measure the heart rate of the user and the blood oxygen sensing component (or blood oxygen sensing module) measures the blood oxygen concentration of the user through a non-contact optical sensing mode. In other words, simply by clipping the finger between the first clipping component and the second clipping component, the user is able to simultaneously measure the heart rate and blood oxygen concentration by the heart rate sensing pad and the blood oxygen sensing component, or only measure the heart rate by the heart rate sensing pad or only measure the blood oxygen concentration by the blood oxygen sensing component, so as to improve the convenience and flexibility of use of the blood oxygen and electrocardiography measuring apparatus.

[0033] It will be apparent to those skilled in the art that various modifications and variations can be made to the disclosed embodiments without departing from the scope or spirit of this invention. In view of the foregoing, it is intended that the invention covers modifications and variations provided that they fall within the scope of the following claims and their equivalents.

What is claimed is:

1. A blood oxygen and electrocardiography measuring apparatus, comprising:

a first clipping component;

a second clipping component pivoted with the first clipping component;

a heart rate sensing pad disposed on the second clipping component and located between the first clipping component and the second clipping component; and

a blood oxygen sensing component disposed on the second clipping component and located between the second clipping component and the heart rate sensing pad, wherein the blood oxygen sensing component is exposed from the heart rate sensing pad.

2. The blood oxygen and electrocardiography measuring apparatus according to claim **1**, wherein the blood oxygen sensing component is an optical transceiver.

3. The blood oxygen and electrocardiography measuring apparatus according to claim **1**, wherein the heart rate sensing pad comprises a body portion, an extension portion connected with the body portion, and an opening located on the body portion, wherein the blood oxygen sensing component is electrically connected with the extension portion and the opening exposes the blood oxygen sensing component.

4. The blood oxygen and electrocardiography measuring apparatus according to claim **3**, further comprising:

a connection terminal disposed in contact with the extension portion to be electrically connected with the heart rate sensing pad.

5. The blood oxygen and electrocardiography measuring apparatus according to claim **1**, further comprising:

at least one elastic member connecting the first clipping component and the second clipping component.

6. A blood oxygen and electrocardiography measuring apparatus, comprising:

a first clipping component;

a second clipping component pivoted with the first clipping component;

a finger pad disposed on the first clipping component and located between the first clipping component and the second clipping component;

a heart rate sensing pad disposed on the second clipping component and located between the first clipping component and the second clipping component; and

a blood oxygen sensing module, comprising:

an optical transmitter disposed on the first clipping component and located between the first clipping component and the finger pad, wherein the optical transmitter is exposed from the finger pad; and

an optical receiver disposed on the second clipping component corresponding to the optical transmitter and located between the second clipping component and the heart rate sensing pad, wherein the optical receiver is exposed from the heart rate sensing pad.

7. The blood oxygen and electrocardiography measuring apparatus according to claim **6**, wherein the heart rate sensing pad comprises a body portion, an extension portion connected with the body portion, and an opening located on the body portion, wherein the optical receiver is electrically connected with the extension portion and the opening exposes the optical receiver.

8. The blood oxygen and electrocardiography measuring apparatus according to claim **7**, further comprising:

a connection terminal disposed in contact with the extension portion to be electrically connected with the heart rate sensing pad.

9. The blood oxygen and electrocardiography measuring apparatus according to claim **6**, further comprising:

at least one elastic member connecting the first clipping component and the second clipping component.

10. The blood oxygen and electrocardiography measuring apparatus according to claim **6**, further comprising:

a circuit board disposed between the first clipping component and the finger pad, wherein the optical transmitter is electrically connected with the circuit board.

* * * * *

专利名称(译)	血氧和心电图测量仪器		
公开(公告)号	US20160361005A1	公开(公告)日	2016-12-15
申请号	US15/052830	申请日	2016-02-24
[标]申请(专利权)人(译)	丽台科技股份有限公司		
申请(专利权)人(译)	丽台科技股份有限公司.		
当前申请(专利权)人(译)	丽台科技股份有限公司.		
[标]发明人	CHUANG CHENG JUN		
发明人	CHUANG, CHENG-JUN		
IPC分类号	A61B5/1455 A61B5/00 A61B5/024 A61B5/0205		
CPC分类号	A61B5/14552 A61B5/02416 A61B5/6826 A61B5/0205 A61B5/02438 A61B5/0245 A61B5/6838		
优先权	104209464 2015-06-12 TW		
外部链接	Espacenet USPTO		

摘要(译)

提供一种血氧和心电图测量设备，包括第一剪切组件，第二剪切组件，心率感测垫和血氧感测组件。第二夹持部件和第一夹持部件彼此枢转。心率感测垫设置在第二夹持部件上并且位于第一夹持部件和第二夹持部件之间。血氧传感部件设置在第二夹持部件上，并位于第二夹持部件和心率传感垫之间。血氧传感部件从心率传感垫暴露。