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(54) **FINGER CLAMPING DEVICE AND OXIMETER USING THE SAME**

(71) Applicant: **Hangzhou Mega Inno of Health Technology Co. Ltd**, Hangzhou (CN)

(72) Inventors: **ZHAN-SHENG LU**, Shenzhen (CN); **YU-FENG ZHANG**, Shenzhen (CN)

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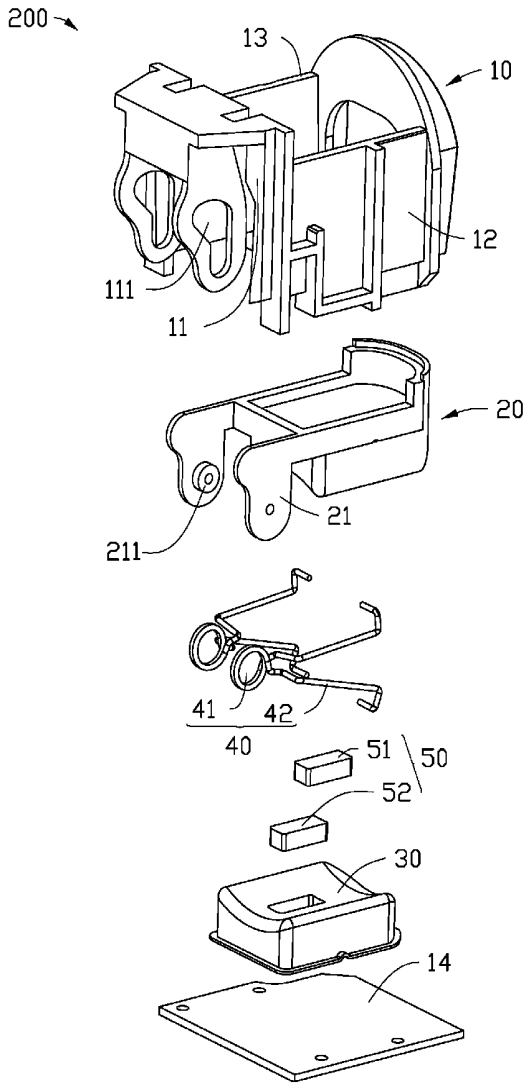
(57) **ABSTRACT**

An oximeter includes a main body defining an opening and a finger clamping device arranged in the opening. The finger clamping device includes a shell, an upper clamping member, and a lower clamping member. The shell includes an inner wall carrying a sliding rail. The upper clamping member is arranged in the shell and defines a spindle. A portion of the spindle is received in the sliding rail and can slide along the sliding rail. The lower clamping member faces the upper clamping member and is coupled to the upper clamping member by a torsion spring. A finger being inserted between the upper clamping member and the lower clamping member causes the torsion spring to stretch, the finger is thus clamped by the upper clamping member and the lower clamping member with an elastic restoring force.



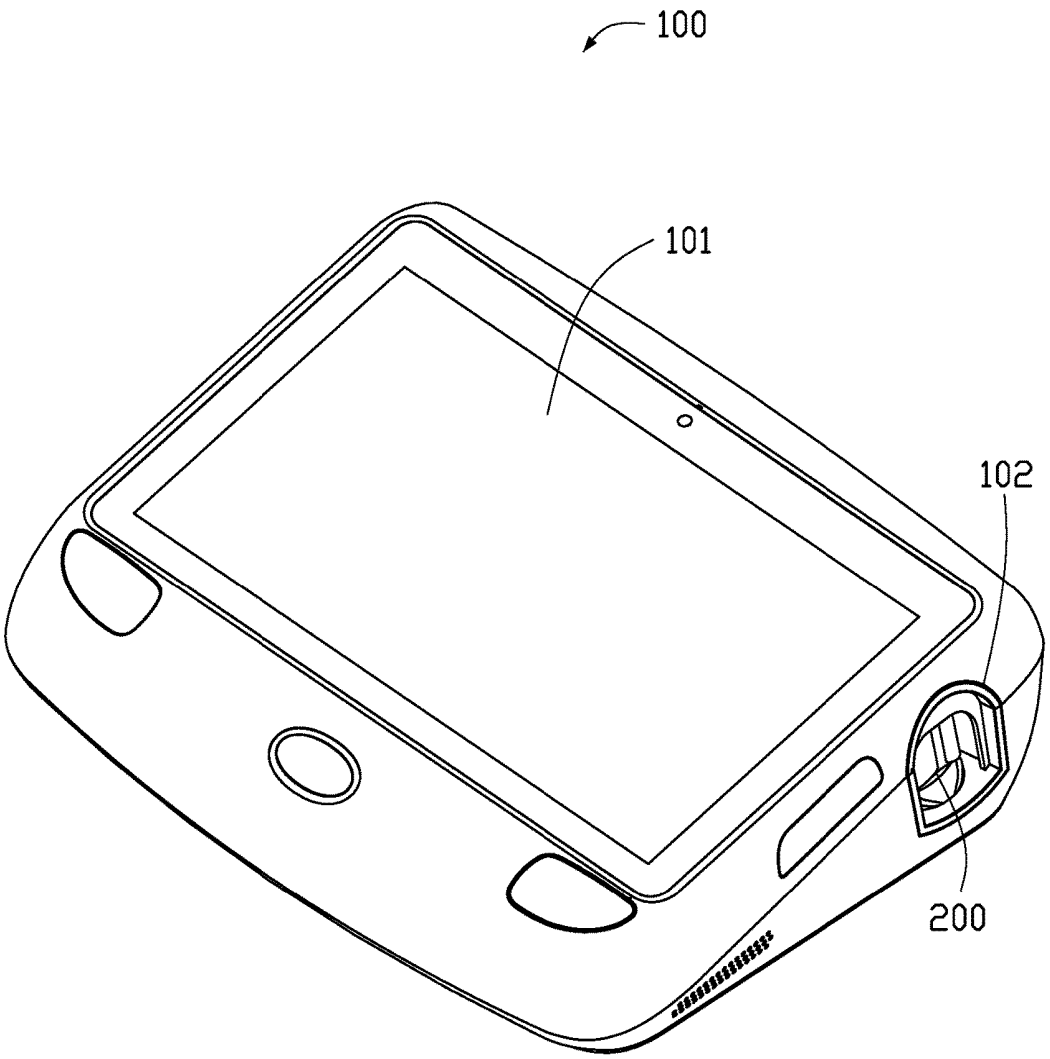


FIG. 1

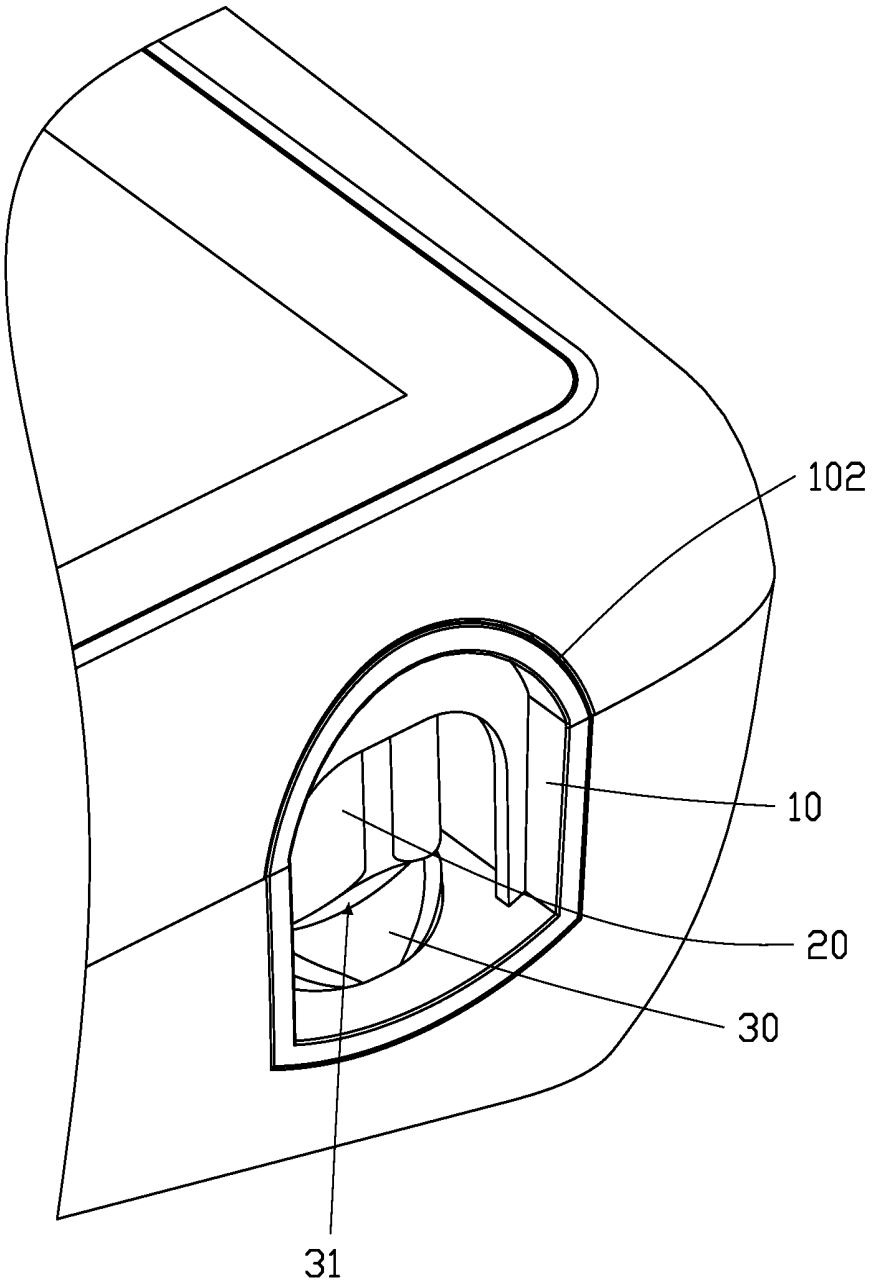


FIG. 2

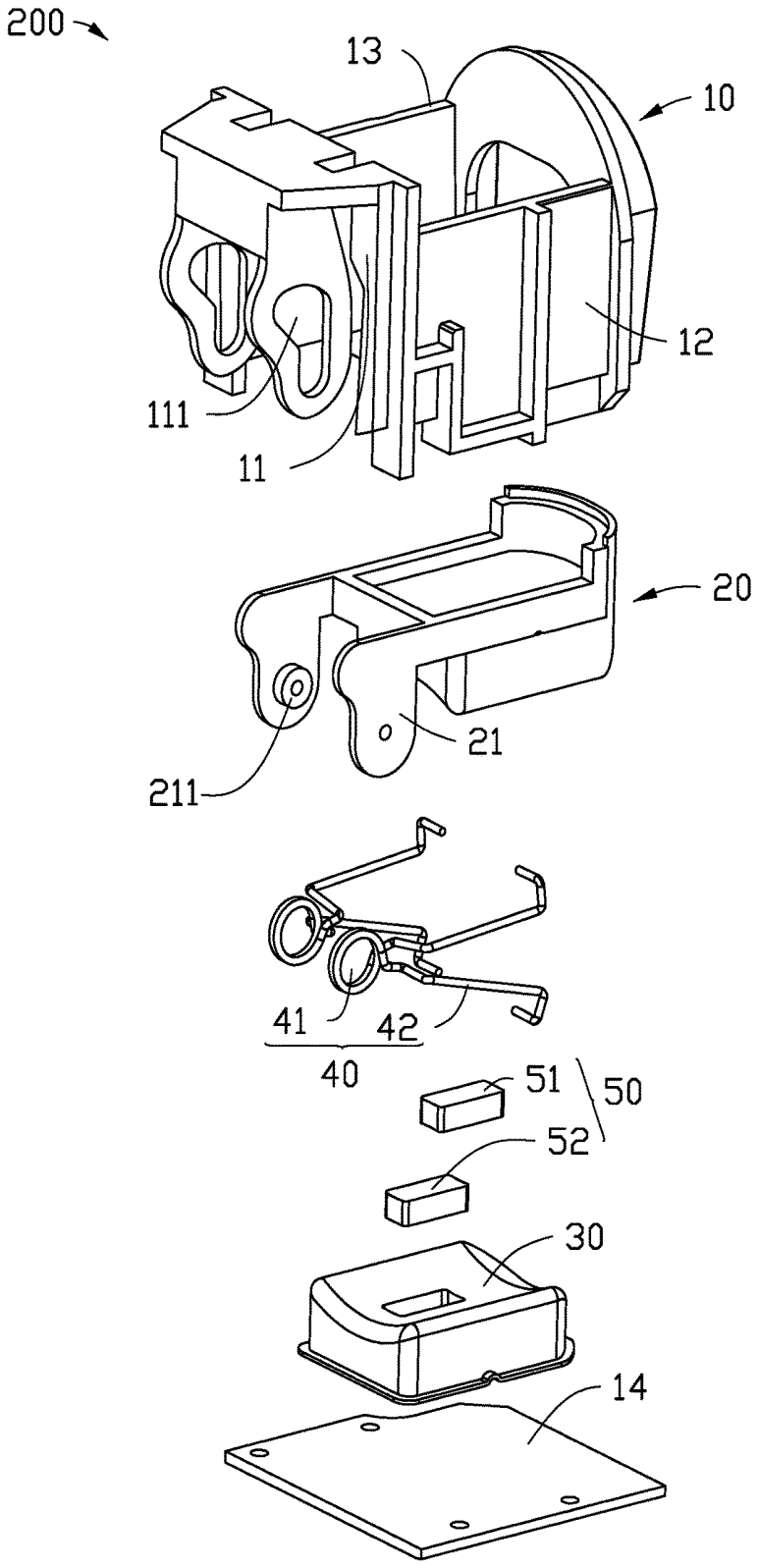


FIG. 3

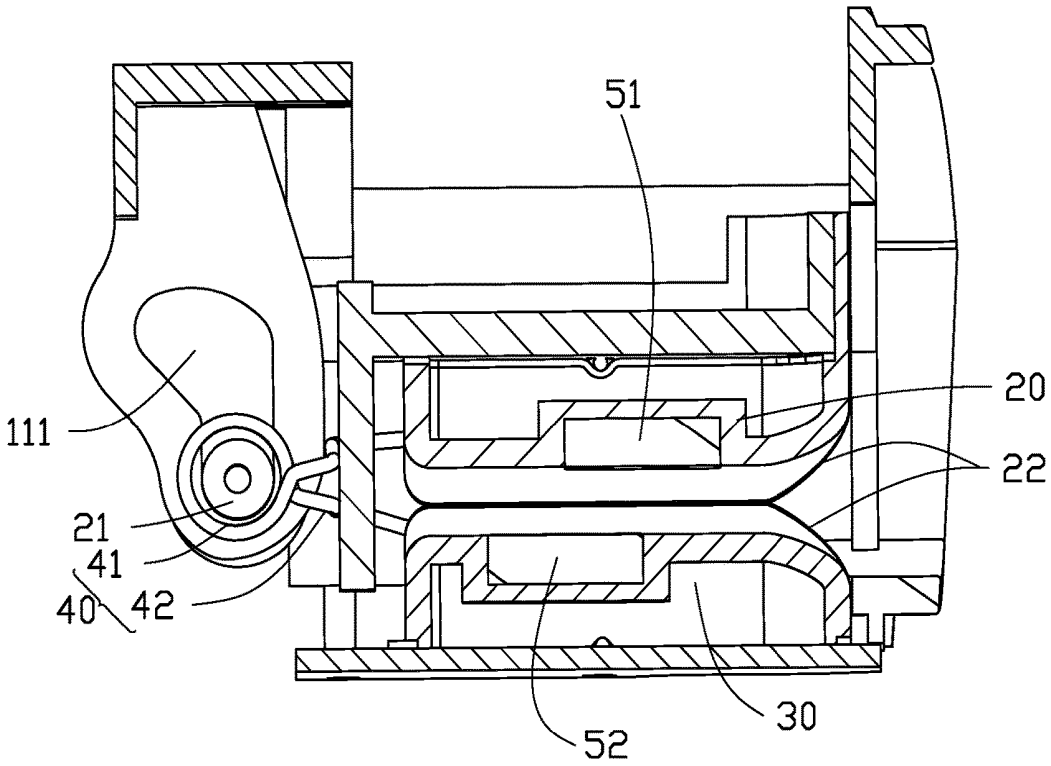


FIG. 4

FINGER CLAMPING DEVICE AND OXIMETER USING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application No. 201610351772.9 filed on May 24, 2016, the contents of which are incorporated by reference herein.

FIELD

[0002] The subject matter herein generally relates to medical apparatuses, and particularly to a finger clamping device and an oximeter using the same.

BACKGROUND

[0003] In medical field, an oximeter is used for measuring blood oxygen saturation of a human body and displaying pulse of a user. Generally, a finger clamping device needs to be manually pressed to clamp the finger of the user, which causes inconvenience.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0005] FIG. **1** is a schematic view illustrating an exemplary embodiment of an oximeter.

[0006] FIG. **2** is an enlarged view of a portion of the oximeter in FIG. **1**.

[0007] FIG. **3** is an exploded view illustrating an exemplary embodiment of a finger clamping device which can be used in the oximeter in FIG. **1**.

[0008] FIG. **4** is a cross-section view illustrating an exemplary embodiment of a finger clamping device which can be used in the oximeter in FIG. **1**.

DETAILED DESCRIPTION

[0009] It will be appreciated that for simplicity and clarity of illustration, where appropriate, reference numerals have been repeated among the different figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the exemplary embodiments described herein.

[0010] However, it will be understood by those of ordinary skill in the art that the exemplary embodiments described herein can be practiced without these specific details. In other instances, methods, procedures, and components have not been described in detail so as not to obscure the related relevant feature being described. Also, the description is not to be considered as limiting the scope of the exemplary embodiments described herein. The drawings are not necessarily to scale and the proportions of certain parts have been exaggerated to better illustrate details and features of the present disclosure.

[0011] The present disclosure, including the accompanying drawings, is illustrated by way of examples and not by way of limitation. Several definitions that apply throughout this disclosure will now be presented. It should be noted that references to "an" or "one" exemplary embodiment in this disclosure are not necessarily to the same exemplary embodiment, and such references mean "at least one".

[0012] The term "comprising" means "including, but not necessarily limited to", it specifically indicates open-ended inclusion or membership in a so-described combination, group, series, and the like.

[0013] FIG. **1** illustrates an exemplary embodiment of an oximeter **100**. In at least one exemplary embodiment, the oximeter **100** includes a main body **101** and a finger clamping device **200**. The main body **101** defines an opening **102**. The finger clamping device **200** is arranged in the opening **102**. The finger clamping device **200** is used for clamping at least one finger of a user to measure blood oxygen saturation of the user. FIG. **1** illustrates only one example of the oximeter **100**, another oximeter **100** can include more components than as illustrated.

[0014] Referring to FIGS. **2-4**, the finger clamping device **200** includes a shell **10**, an upper clamping member **20**, a lower clamping member **30**, two torsion springs **40**, and a measuring device **50**.

[0015] A shape of the shell **10** matches with a shape of the opening **102**. The shell **10** is received in the opening **102**. In at least one exemplary embodiment, the shell **10** includes an inner wall **11**, two sidewalls **12**, a top surface **13**, and a bottom surface **14** as shown in FIG. **3**. The inner wall **11** defines two sliding rails **111**.

[0016] The upper clamping member **20** and the lower clamping member **30** are arranged in the shell **10**. In at least one exemplary embodiment, the upper clamping member **20** and the lower clamping member **30** are elongated members, and match with a shape of a human finger, accordingly, the finger clamping device **200** provides more comfort when clamping the finger of the user.

[0017] The lower clamping member **30** is mounted on the bottom surface **14**. The upper clamping member **20** is connected to the lower clamping member **30** through the two torsion springs **40**. In at least one exemplary embodiment, each torsion spring **40** includes a circle member **41** and two supporting members **42** extended from the circle member **41**.

[0018] The upper clamping member **20** includes two spindles **21** extending from an end of the upper clamping member **20**, each spindle **21** has a guiding rod **211** extending from the spindle **21**, and the two guiding rods **211** of the upper clamping member **20** are respectively received in the sliding rails **111** and can slide or rotate along the sliding rails **111**.

[0019] The circle member **41** is sheathed on the guiding rod **211** and can move following the guiding rod **211**. The two supporting members **42** are respectively mounted on inner surface of one sidewall of the upper clamping member **20** and the lower clamping member **30**. In a natural state, the upper clamping member **20** and the lower clamping member **30** is in contact with each other under an elastic force of the torsion spring **40**.

[0020] In at least one exemplary embodiment, two opposite sides of the upper clamping member **20** and the lower clamping member **30** each define an inclined surface **22**. The inclined surface **22** of the upper clamping member **20** and the inclined surface **22** of the lower clamping member **30** are arranged away from the inner wall **11** and are oppositely facing, thus, an opening **31**, as shown in FIG. **2**, is formed

between the upper clamping member **20** and the lower clamping member **30**. In at least one exemplary embodiment, the opening **31** is trumpet-shaped, thus, the opening **31** enables the finger of the user to be conveniently and comfortably inserted into the finger clamping device **200**.

[0021] In at least one exemplary embodiment, the upper clamping member **20** and the lower clamping member **30** can be made from plastic or rubber material.

[0022] The measuring device **50** is arranged in the finger clamping device **200**, the measuring device **50** is used for measuring the blood oxygen saturation of the user. In at least one exemplary embodiment, the measuring device **50** includes an infrared transmitter **51** and an infrared receiver **52**. The infrared transmitter **51** is arranged on either the upper clamping member **20** or the lower clamping member **30**, the infrared receiver **52** is arranged on either the upper clamping member **20** or the lower clamping member **30**. For example, the upper clamping member **20** may carry the infrared transmitter **51**, and the lower clamping device **30** may carry the infrared receiver **52** or vice versa. The infrared transmitter **51** is arranged to oppositely face to the infrared receiver **52**.

[0023] When the finger of the user is clamped between the upper clamping member **20** and the lower clamping device **30**, the infrared transmitter **51** transmits infrared rays, the infrared receiver **52** receives the infrared rays after the infrared rays go through the clamped finger. The processor (not shown) of the oximeter **100** measures the blood oxygen saturation according to the infrared rays received by the infrared receiver **52**.

[0024] When the finger of the user is inserted into the opening **31** between the upper clamping member **20** and the lower clamping member **30**, the end having the inclined surface **22** of the upper clamping member **20** is driven to move away from the lower clamping member **30** by the finger. At this time, the upper clamping member **20** is driven to rotate about the guiding rod **211** of the spindle **21**. When the upper clamping member **20** keeps on moving away from the lower clamping member **30**, the spindle **21** slides towards the top surface **13** along the sliding rail **111**. At this time, the torsion springs **40** are stretched, the finger is tightly clamped by the upper clamping member **20** and the lower clamping member **30** with an elastic restoring force of the stretched torsion springs **40**, thus, the oximeter **100** can conveniently measure the blood oxygen saturation of the user.

[0025] When the finger of the user is clamped by the upper clamping member **20** and the lower clamping member **30**, external light is blocked out by the shell **11**, and cannot reach the measuring device **50**, thereby measurements are more accurate. When the finger of the user is withdrawn from the opening **31** between the upper clamping member **20** and the lower clamping member **30**, the upper clamping member **20** is driven to return to an initial position by the elastic restoring force of the torsion springs **40**.

[0026] It is believed that the present embodiments and their advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the disclosure or sacrificing all of its material advantages, the examples hereinbefore described merely being exemplary embodiments of the present disclosure.

What is claimed is:

1. A finger clamping device comprising:
a shell comprising an inner wall, the inner wall defining at least one sliding rail;
an upper clamping member arranged in the shell and defining at least one spindle, wherein a potion of the spindle is received in the sliding rail and slides along the sliding rail;
at least one torsion spring coupled to the spindle; and
a lower clamping member oppositely facing to the upper clamping member and coupled to the upper clamping member through the at least one torsion spring;
wherein when a finger is inserted between the upper clamping member and the lower clamping member, the at least one torsion spring is stretched, the finger is clamped by the upper clamping member and the lower clamping member with an elastic restoring force.

2. The finger clamping device according to claim **1**, wherein the upper clamping member comprises two spindles extending from an end of the upper clamping member, each spindle has a guiding rod, and the two guiding rods of the upper clamping member are respectively received in the sliding rails and slides or rotates along the sliding rails.

3. The finger clamping device according to claim **2**, wherein the torsion spring comprises a circle member and two supporting members, the circle member is sheathed on the guiding rod and moves following the guiding rod, the two supporting members are respectively mounted on inner surface of one sidewall of the upper clamping member and the lower clamping member.

4. The finger clamping device according to claim **1**, wherein two opposite sides of the upper clamping member and the lower clamping member each define an inclined surface, thus, an opening is formed between the upper clamping member and the lower clamping member, the opening is used for inserting the finger.

5. The finger clamping device according to claim **1**, wherein the upper clamping member and the lower clamping member are made from plastic or rubber material.

6. The finger clamping device according to claim **1**, further comprising a measuring device, wherein the measuring device comprises an infrared transmitter and an infrared receiver, when the infrared transmitter is arranged the upper clamping member, the infrared receiver is arranged on the lower clamping member, when the infrared transmitter is arranged the lower clamping member, the infrared receiver is arranged on the upper clamping member.

7. An oximeter comprising:
a main body defining an opening; and
a finger clamping device arranged in the opening, the finger clamping device comprising:
a shell comprising an inner wall, the inner wall defining at least one sliding rail;
an upper clamping member arranged in the shell and defining at least one spindle, wherein at least one spindle is received in the sliding rail and slides along the sliding rail;
at least one torsion spring coupled to the spindle; and
a lower clamping member oppositely facing to the upper clamping member and coupled to the upper clamping member through the at least one torsion spring;
wherein when a finger is inserted between the upper clamping member and the lower clamping member, the at least one torsion spring is stretched, the finger is clamped by the upper clamping member and the lower clamping member with an elastic restoring force.

8. The oximeter according to claim **7**, wherein the upper clamping member comprises two spindles extending from an end of the upper clamping member, each spindle has a guiding rod, and the two guiding rods of the upper clamping member are respectively received in the sliding rails and slides or rotates along the sliding rails.

9. The oximeter according to claim **8**, wherein the torsion spring comprises a circle member and two supporting members, the circle member is sheathed on the guiding rod and moves following the guiding rod, the two supporting members are respectively mounted on inner surface of one sidewall of the upper clamping member and the lower clamping member.

10. The oximeter according to claim **7**, wherein two opposite sides of the upper clamping member and the lower clamping member each define an inclined surface, thus, an opening is formed between the upper clamping member and the lower clamping member, the opening is used for inserting the finger.

11. The oximeter according to claim **7**, wherein the upper clamping member and the lower clamping member are made from plastic or rubber material.

12. The oximeter according to claim **7**, further comprising a measuring device, wherein the measuring device comprises an infrared transmitter and an infrared receiver, when the infrared transmitter is arranged the upper clamping member, the infrared receiver is arranged on the lower clamping member, when the infrared transmitter is arranged the lower clamping member, the infrared receiver is arranged on the upper clamping member.

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专利名称(译)	手指夹紧装置和使用其的血氧计		
公开(公告)号	US20170340281A1	公开(公告)日	2017-11-30
申请号	US15/603485	申请日	2017-05-24
[标]发明人	LU ZHAN SHENG ZHANG YU FENG		
发明人	LU, ZHAN-SHENG ZHANG, YU-FENG		
IPC分类号	A61B5/00 A61B5/1455		
CPC分类号	A61B5/6838 A61B2562/0238 A61B5/6826 A61B5/14552 A61B5/0075 A61B5/14551		
优先权	201610351772.9 2016-05-24 CN		
其他公开文献	US10582893		
外部链接	Espacenet USPTO		

摘要(译)

血氧计包括限定开口的主体和布置在开口中的手指夹紧装置。手指夹紧装置包括壳体，上夹紧构件和下夹紧构件。壳体包括承载滑轨的内壁。上夹紧构件布置在壳体中并且限定主轴。主轴的一部分容纳在滑轨中并可沿滑轨滑动。下夹紧构件面向上夹紧构件并通过扭转弹簧联接到上夹紧构件。插入上夹紧构件和下夹紧构件之间的手指使扭转弹簧伸展，因此手指由上夹紧构件和下夹紧构件以弹性恢复力夹紧。