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(54) **AN OPTICAL DEVICE FOR NON-INVASIVE MEASUREMENT OF BLOOD-RELATED SIGNALS
UTILIZING A FINGER HOLDER**

OPTISCHE VORRICHTUNG ZUR NICHTINVASIVEN MESSUNG VON BLUTBEZÜGLICHEN
SIGNALEN MITTELS EINES FINGERHALTERS

DISPOSITIF OPTIQUE SERVANT A MESURER DES SIGNAUX ASSOCIES AU SANG, DE
MANIERE NON INVASIVE ET AU MOYEN D'UN DOIGTIER

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(56) References cited:
WO-A-99/63884 **FR-A- 2 524 792**
US-A- 4 927 264 **US-A- 5 833 602**

Description**FIELD OF THE INVENTION**

[0001] This invention is generally in the field of non-invasive optical measurement techniques for measuring blood parameters and relates to an optical device for measuring blood-related parameters utilizing a finger holder.

BACKGROUND OF THE INVENTION

[0002] Non-invasive techniques for measurement of various blood parameters, such as blood oxygen saturation and the concentration of substances contained in the blood, have become very popular, since they advantageously do not require the withdrawal of a blood sample from a patient's body. Optical monitoring techniques of the kind specified typically utilize the detection of light transmitted or reflected from the location on the patient's body under measurement. Most of the known techniques utilize a measurement optical device or probe, designed in a manner to be attached to the patient's finger, which includes an optical assembly for irradiating the finger with light and detecting its light response.

[0003] US Patent No. 5,810,723 discloses an apparatus for the non-invasive monitoring of a patient's carboxyhemoglobin level. The patient breathes oxygen to saturate his blood hemoglobin prior to detection. The apparatus utilizes a clamp with arms which hold the patient's finger: one arm supports a light emitting source and the other supports a detector. A microprocessor controls the measurements and processes the detected signals.

[0004] US Patent 5,638,816 and its continuation, US Patent 5,860,919, disclose an apparatus for the non-invasive monitoring of blood parameters by applying pressure to the patient's finger, thus inducing an active pulse therein. The induced change of blood volume enables a better signal-to-noise ratio to be obtained.

[0005] US 5,782,757 discloses a measuring devices in the form of disposable, folded adhesive sensors with optics embedded therein. The probe is designed so as to fit comfortably onto a patient's fingertip.

[0006] US Patent 4,927,264, discloses an apparatus for the non-invasive monitoring of blood parameters.

[0007] All the conventional devices of the kind specified are aimed at measuring enhanced optical pulsatile signals caused by the changes in the volume of the blood containing medium (finger). It is known that a regular optical pulsatile signal is typically 2-3% of the total transmission. The above devices are capable of obtaining the enhanced pulsatile signal that reach 8-10% of the total light transmission intensity. This enhancement of the natural pulsatile signal is a boundary of all conventional techniques of the kind specified.

SUMMARY OF THE INVENTION

[0008] The present invention utilizes a non-invasive measurement technique disclosed in international patent application WO-99/65384, assigned to the assignee of the present application, where the measured signals are not pulsatile. This is an occlusion based technique, according to which a state of blood flow cessation is created at a measurement location in a blood-perfused fleshy medium, and measurements are taken during this state. Measurements taken during the state of blood flow cessation allow for a significant increase of the blood-related signals, as compared to those taken during the state of normal blood flow. To create such a state of blood flow cessation at a measurement location in a patient's organ, over-systolic pressure is applied to the organ at a location upstream of the measurement location with respect to the direction of normal blood flow.

[0009] It is a major feature of the present invention to provide a finger holder for use in an optical measurement device for non-invasive measurements of patient's blood parameters capable of providing the desired substantially stationary position of the finger during measurements, when over-systolic pressure is applied to the finger.

[0010] It is a preferred feature of the present invention to provide such a finger holder whose dimensions are adjustable to the finger of a specific patient.

[0011] The finger holder according to the invention comprises a first member constructed for securing a fingertip and for supporting a measuring unit so as to apply measurements to a first location of the finger, and a second member associated with a pressurizing assembly for applying pressure to a second location of the finger spaced-apart from the first location. The first and second members are coupled to each other through a substantially rigid connector engaging the finger along its middle phalanx and proximal interphalangeal joint.

[0012] The provision of the rigid connector is associated with the following. The occlusion-based measurements are non-volumetric, the changes in volume of blood in the finger portion under measurements being undesirable for such measurements. However, it is a natural tendency of the finger under pressure to fold at the proximal interphalangeal joint, thereby causing undesirable changes in blood volume. By providing a substantially rigid support for the finger at the region of the middle phalanx during measurement, such undesirable folding can be avoided.

[0013] The measuring unit and the pressurizing assembly are connectable to a control unit, which operates them and analyzes data generated by the measuring unit indicative of a light response of the medium at the measurement location.

[0014] Generally, the measurement device may be associated with any other suitable patient's organ, such as his hand or wrist. If the patient's hand is considered, the rigid connector engages the patient's arm to prevent

its folding at the elbow joint. It is more practical, however, to apply the device to the patient's finger.

[0015] Preferably, the first member is designed as a clip that secures the fingertip between its legs (either one pair or two pairs of legs). The provision of two pairs of legs advantageously enables to provide four-sided support for the finger, thereby preventing its folding at the distal phalanx. The pressurizing assembly preferably comprises an air cushion cuff presenting the second member of the finger holder, and a pneumatic drive coupled to the cuff for operating inflation/deflation thereof.

[0016] The finger holder to be used in an optical measurement device for the non-invasive measurement of patient's blood parameters comprises:

- a first member for securing a fingertip and supporting an optical measuring unit mounted so as to apply measurements to a first location of the patient's finger;
- a second member associated with a pressurizing assembly mounted so as to apply desired over-systolic pressure to a second location of the finger located upstream of said first location with respect to a normal blood flow direction; and
- a substantially rigid connector between the first and second member adapted to engage the finger along its middle phalanx and proximal interphalangeal joint, thereby preventing it from folding during measurements.

[0017] According to preferred embodiment of the present invention, there is provided a control unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic illustration of a device for non-invasive measurement of patient's blood parameters utilizing a finger holder constructed according to one embodiment of the invention; and

Fig. 2 illustrates another embodiment of the finger holder.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0019] Referring to Fig. 1, there is illustrated a measurement device, generally designated **10**, for the non-invasive measurement of patient's blood parameters, such as oxygen saturation, blood pressure, or the concentration of various substances, such as hemoglobin, glucose, cholesterol and other analyte concentrations. The device **10** includes a finger holder **12** to be mounted

on a patient's finger **F**, and a control unit **14** coupled to the finger holder either through wires or wireless. The finger holder **12** includes a clip member **16** (constituting a first member) with a measuring unit **18** installed therein for applying measurements to a measurement location (constituting a first location), a second member in the form of an air cushion cuff **26** of a pressurizing assembly **20** for applying pressure to a second location upstream of the measurement location (with respect to the direction of normal blood flow), and a substantially rigid connector **22**.

[0020] In the present example, the clip member **16** is a two-legged member for securing the patient's finger **F** between its legs **16A** and **16B** that engage the finger **F** at both its top and bottom, respectively. A flexible thermoconductive pad **24**, made, for example, of rubber or silicone, is provided at the inner surfaces of the legs **16A** and **16B**. The pad **24** is coupled to a power source (not shown) which is operated by the control unit **14** for applying appropriate, substantially low voltages, for example in the range 1V-24V to the pad **24**, enabling heating of the finger portion located between the clip legs **16A** and **16B** (i.e., the location under measurements) up to 37-38°. The heating ability of the device increases the accuracy of the non-invasively derived blood-related parameters. The substantially low voltage supply is, on the one hand, acceptable for medical devices, and, on the other hand, requires low power supply (e.g., 6-9V) that allows for using batteries, thereby rendering the entire device conveniently portable.

[0021] The measuring unit **18**, which is partly shown in the figure, does not form part of the present invention, and therefore need not be specifically illustrated and described, except to note the following. The measuring unit **18** comprises both an illumination and detection means that could be accommodated either at one side of the finger when operating in a reflection mode, or at opposite sides of the finger when operating in a transmission mode. These reflected or transmitted signals present light response of the finger to incident radiation. In the present example, the measuring unit **18** provides illumination of the finger **F** with at least two different wavelengths, and detects light transmitted therethrough. Data indicative of the detected light (light response) is transmitted to the control unit **14** (typically through analog-to-digital converter and data processing unit) that includes a processor operated by a suitable software model for determining and analyzing the time dependency of the detected light for each incident wavelength to determine a relation between the time variations corresponding to different wavelengths, and to calculate the desired parameter of blood based on this relation.

[0022] As indicated above, the present invention utilizes the measurement of blood-related signals at a state of blood flow cessation at the measurement location. To this end, the pressurizing assembly **20** is capable of applying over-systolic pressure, e.g., 270-300mmHg (generally, adjustable for each specific

patient) at the second location upstream of the measuring unit **18** with respect to the direction of normal blood flow. The pressurizing assembly **20** includes the air cushion cuff **26** in the form of a ring wrapping the respective location on the patient's finger **F**, and a pneumatic drive **28** coupled to the cuff **26** and to the control unit **14**.

[0023] Hence, the drive **28**, whilst being actuated by the control unit **14**, operates to apply over-systolic pressure to the finger portion (second location on the finger) underneath the cuff-ring **26**. The application of pressure is maintained for a period of time so as not to cause irreversible changes in the finger, e.g., 4 seconds (generally, lasting from one second to one minute and more). Then, the control unit operates the drive **28** to release the pressure. The effective measurements, i.e., the results which have to be analyzed, are those taken at the state of blood flow cessation, as will be described more specifically further below.

[0024] As clearly seen in Fig. 1, the connector **22** is shaped like a plate, and is formed with an elongated slot **22A**. The cuff-ring **26** is formed with a projection **26A** installed in the slot **22A** for reciprocating sliding movement along its axis. This enables to adjust the length of the finger holder **12** to that of the finger of a specific patient. The rigid plate-like connector **22** engages the finger along its middle phalanx, preventing its folding at the proximal interphalangeal joint, thereby avoiding undesirable changes in blood volume.

[0025] The operational mode of the device **10** may be such that the control unit **14** actuates the measuring unit **18** for performing continuous measurements starting prior to the application of over-systolic pressure. In this case, only those signals which are associated with the state of blood flow cessation are taken into consideration. Measurements taken during the time period prior to the establishment of this state should be disregarded, due to the unavoidable influence of motional and/or other artifacts causing non-monotonic fluctuations of the light transmission. According to an alternative operational mode of the device **10**, the control unit **14** actuates the measuring unit **18** approximately 0.5 sec after the application of the over-systolic pressure. During the time period corresponding to the existence of the state of blood flow cessation, relative light transmission of blood is observed, which reaches its maximum and may last for about 2-5.5 sec (generally, from one second to one minute and more).

[0026] To obtain meaningful results, either one of at least two timely separated measurement sessions should be considered, at least one of them occurring during the state of blood flow cessation, or a single long continuous measurement session is considered starting after the establishment of the state of blood flow cessation. During the first measurement session, the control unit **14** operates to maintain the cuff **26** in its squeezed position. The control unit **14** then operates the pressurizing assembly **20** to release the over-systolic pressure.

The squeezing action of the cuff **26** is ceased, and after a short delay of about 0.5sec, the blood flow gradually increases during approximately 5sec. Then, the control unit **14** actuates the second measurement session at a state of the transitional blood flow. The illumination unit continues to illuminate the finger, but squeezing is halted. The detection unit, being synchronized by the control unit **14**, detects the light response of the finger.

[0027] In other words, the control unit **14** selectively operates the measuring unit **18** and the pressurizing assembly **20**, and analyzes data coming from the measuring unit. The construction and operation of the control unit do not form part of the present invention, and may be of any known kind capable of running an appropriate software model.

[0028] Reference is made to Fig. 2 illustrating a finger holder **112** having somewhat different construction of its clip member **116**, as compared to that of the finger holder **12**. The clip member **116** is a four-leg member, wherein two opposite legs **116A** and **116B** engage the finger at its top and bottom thereof, and the other opposite legs **116C** and **116D** engage the opposite sides of the finger, respectively. Such four-sided support of the fingertip prevents its folding at the distal phalanx, thereby avoiding undesirable blood volume changes..

[0029] It should be noted that the connector **22** may be located at either side of the patient's finger. Alternatively, a pair of such connectors can be used located at opposite sides of the finger. Additionally, the processor may be accommodated within the cuff, and the wires, if any, connecting the processor to the output circuit of the measuring unit, may pass through the rigid connector.

[0030] Those skilled in the art will readily appreciate that various modifications and changes may be applied to the preferred embodiments of the invention as herein before exemplified without departing from its scope defined in and by the appended claims. For example, the cuff **26** may be a band formed with Velcro-like fasteners, so as to form a ring wrapping the patient's finger when in the operational position of the device. Alternatively, a band composed of a set of various air cushions pressuring on the finger. In this case, the pressurizing assembly fits itself to each finger size without any additional adjusting means.

Claims

1. A finger holder (12) to be used in an optical measurement device for non-invasive measurement of patient's blood parameters, the finger holder (12) comprising:
 - a first member (16) for securing a fingertip and supporting an optical measuring unit mounted so as to apply measurements to a first location of the patient's finger;
 - a pressurizing assembly comprising a second

member (26) mounted so as to apply pressure to a second location of the finger upstream of said first location with respect to a normal blood flow direction;
the finger holder (12) being **characterized in that:**

said pressurizing assembly (20) comprises a drive coupled to said second member and adapted to apply over-systolic pressure to said second location, to thereby create a state of blood flow cessation at said first location and enable the measurements to be taken during the state of blood flow cessation;

the finger holder (12) comprises a substantially rigid connector (22) between the first and second members, the arrangement being such that, when the finger holder is applied to the patient's finger, the connector extends along the finger and engages the finger along its middle phalanx and proximal interphalangeal joint, thereby providing substantially rigid support for the finger at the region of the middle phalanx thereof, and preventing the finger from folding during the operation of the pressurizing assembly when the over-systolic pressure is applied to the finger, resulting in a substantially stationary position of the finger during the measurements.

2. The finger holder according to Claim 1, wherein said first member is a clip securing the fingertip between its legs.
3. The finger holder according to Claim 1, wherein said second member is an air cushion cuff-ring of the pressurizing assembly wrapping said second location, the pressurizing assembly comprising a pneumatic drive coupled to the cuff-ring so as to apply said over-systolic pressure to said second location.
4. The device according to Claim 1, wherein said connector is shaped like a plate and has an elongated slot extending the finger's axis, said second member having a projection installed in the slot for sliding movement along its axis.
5. The finger holder according to Claim 3, wherein said cuff-ring is a band having Velcro-like fasteners so as to form the ring on the patient's finger.
6. The finger holder according to Claim 2, wherein said clip member has two clamping legs for securing the finger therebetween in a manner allowing the optical measurements.

7. The finger holder according to Claim 1, wherein said first member is provided at inner surface thereof facing the finger with a flexible member for wrapping the first location of the finger.
8. The finger holder according to Claim 7, wherein said flexible member is made of a thermoconductive material for heating said first location under measurements up to desired temperature.
9. The finger holder according to Claim 8, wherein said desired temperature is approximately 37°-38°.
10. The finger holder according to Claim 8, wherein the flexible thermoconductive material is rubber.
11. The finger holder according to Claim 8, wherein the flexible thermoconductive material is silicone.
12. The finger holder according to Claim 1, wherein said over-systolic pressure is in the range 270-300mmHg.
13. A device for non-invasive measurements of patient's blood parameters, the device comprising:

the finger holder of Claim 1 and
a control unit for operating the measuring unit and the pressurizing assembly to determine and analyze a time dependency of the detected light for calculating the desired parameter of blood.

35 Patentansprüche

1. Fingerhalter (12) zur Verwendung in einer optischen Meßeinrichtung für nichtangreifende Messung von Patientenblut-Parametern, wobei der Fingerhalter (12)
 - ein erstes Teil (16) zur Befestigung einer Fingerspitze und zum Tragen einer optischen Meßeinheit, die so befestigt ist, daß sie Messungen an einer ersten Stelle des Patientenfingers durchführt,
 - eine unter Druck setzende Anordnung, die ein zweites Teil umfaßt, welches so befestigt ist, daß es Druck auf eine zweite Stelle des Fingers aufstromwärts von der ersten Stelle in Bezug auf die normale Blutflußrichtung umfaßt, hat,

dadurch gekennzeichnet, daß die unter Druck setzende Anordnung (20) einen an das zweite Teil gekoppelten und derart gestalteten Antrieb umfaßt, daß er übersystolischen Druck auf die zweite Stelle ausübt, um dadurch einen Zustand von Blutflußunterbrechung an der ersten Stelle zu erzeugen und

- es zu ermöglichen, daß die durchzuführenden Messungen während des Zustandes der Blutflußunterbrechung durchgeführt werden, der Fingerhalter (12) eine im wesentlichen starre Verbindung (22) zwischen dem ersten und dem zweiten Teil umfaßt, wobei die Anordnung derart ist, daß, wenn der Fingerhalter an des Patienten Finger angelegt wird, das Verbindungsteil sich entlang dem Finger erstreckt und an dem Finger entlang der Mittelachse und der proximalen Zwischenfinger Verbindung eingreift und dabei im wesentlichen starre Unterstützung für den Finger in dem Bereich des Mittelfingergliedes desselben ergibt und den Finger während des Arbeitens der unter Druck gesetzten Anordnung am Krümmen des Fingers hindert, wenn der übersystolische Druck an den Finger angelegt wird, was zu einer im wesentlichen stationären Position des Fingers während der Messungen führt.
2. Fingerhalter nach Anspruch 1, bei dem das erste Teil ein die Fingerspitze zwischen seinen Schenkeln festlegender Halter ist.
 3. Fingerhalter nach Anspruch 1, bei dem das zweite Teil ein Luftkissenmanschettenring der unter Druck setzenden Anordnung ist, welcher die zweite Stelle umgibt, wobei die unter Druck setzende Anordnung einen pneumatischen Antrieb umfaßt, der mit dem Manschettenring so gekoppelt ist, daß der übersystolische Druck auf die zweite Stelle ausgeübt wird.
 4. Vorrichtung nach Anspruch 1, bei der die Verbindungseinrichtung wie eine Platte geformt ist und einen länglichen Schlitz hat, der sich entlang der Fingerachse erstreckt, und das besagte zweite Teil mit einem Vorsprung hat, der in dem Schlitz für eine Gleitbewegung entlang seiner Achse gebaut ist.
 5. Fingerhalter nach Anspruch 3, bei dem der Manschettenring ein Band mit Velcroähnlichen Befestigungseinrichtungen ist, um so den Ring auf dem Patientenfinger auszubilden.
 6. Fingerhalter nach Anspruch 2, bei dem das Klemmteil zwei Klemmschenkel zur Befestigung des Fingers dazwischen in einer Weise, die optische Messungen erlaubt, hat.
 7. Fingerhalter nach Anspruch 1, bei dem das erste Teil an seiner Innenoberfläche, die zu dem Finger hin gerichtet ist, mit einem flexiblen Teil für das Umhüllen der ersten Stelle des Fingers versehen ist.
 8. Fingerhalter nach Anspruch 7, bei dem das flexible Teil aus einem wärmeleitfähigen Material zum Erhitzen der ersten Stelle unter Messungen bis auf die erwünschte Temperatur besteht.
 9. Fingerhalter nach Anspruch 8, bei dem die erwünschte Temperatur etwa 37° - 38° Celsius beträgt.
 10. Fingerhalter nach Anspruch 8, bei dem das flexible wärmeleitfähige Material Gummi ist.
 11. Fingerhalter nach Anspruch 8, bei dem das flexible wärmeleitfähige Material Silikon ist.
 12. Fingerhalter nach Anspruch 1, bei dem der übersystolische Druck im Bereich von 270 - 300 mmHg liegt.
 13. Vorrichtung für nichtangreifende Messungen der Parameter von Patientenblut, wobei die Vorrichtung den Fingerhalter nach Anspruch 1, eine Kontrolleinheit zum Arbeiten der Meßeinheit und eine unter Druck setzende Anordnung umfaßt, um eine Zeitabhängigkeit des ermittelten Lichtes zur Berechnung des erwünschten Parameters von Blut zu bestimmen und zu analysieren.

25 Revendications

1. Doigtier (12) destiné à être utilisé dans un dispositif de mesure optique pour une mesure non effractive de paramètres du sang de patients, le doigtier (12) comprenant :

- un premier élément (16) pour fixer l'extrémité d'un doigt et supporter une unité de mesure optique montée de manière à appliquer des mesures à un premier emplacement du doigt du patient ;
- un ensemble de pressurisation comprenant un deuxième élément (26) monté de manière à appliquer une pression à un deuxième emplacement du doigt en amont dudit premier emplacement par rapport à un sens de circulation du sang normal ;

le doigtier (12) étant **caractérisé en ce que** :

ledit ensemble de pressurisation (20) comprend un entraînement couplé audit deuxième élément et adapté à appliquer une pression supérieure à la pression systolique audit deuxième emplacement, de manière à créer une condition d'arrêt de circulation sanguine audit premier emplacement et permettre que les mesures soient prises durant la condition d'arrêt de circulation sanguine ;

le doigtier (12) comprend un raccord (22) sensiblement rigide entre les premier et deuxième éléments, l'agencement étant tel que, lorsque le doigtier est appliqué sur le doigt du patient,

- le raccord s'étend le long du doigt et engage le doigt le long de sa deuxième phalange et près de l'articulation interphalangienne ; de manière à offrir un support sensiblement rigide au doigt dans la région de sa deuxième phalange et empêcher le doigt de plier durant le fonctionnement de l'ensemble de pressurisation lorsque la pression supérieure à la pression systolique est appliquée sur le doigt, ce qui aboutit à une position sensiblement fixe du doigt durant les mesures.
2. Doigtier selon la revendication 1, dans lequel ledit premier élément est une pince fixant le doigt entre ses branches. 5
 3. Doigtier selon la revendication 1, dans lequel ledit deuxième élément est un manchon annulaire à coussin d'air de l'ensemble de pressurisation enveloppant ledit deuxième emplacement, l'ensemble de pressurisation comprenant un entraînement par commande pneumatique couplé au manchon annulaire de manière à appliquer ladite pression supérieure à la pression systolique audit deuxième emplacement. 10
 4. Dispositif selon la revendication 1, dans lequel ledit raccord a la forme d'une plaque et comporte une fente allongée s'étendant selon l'axe du doigt, ledit deuxième élément comportant une protubérance disposée dans la fente pour un mouvement coulissant le long de son axe. 15
 5. Doigtier selon la revendication 3, dans lequel ledit manchon annulaire est une bande comportant des attaches du type Velcro de manière à former l'anneau sur le doigt du patient. 20
 6. Doigtier selon la revendication 2, dans lequel ladite pince comporte deux branches de serrage pour fixer le doigt entre les branches d'une manière permettant les mesures optiques. 25
 7. Doigtier selon la revendication 1, dans lequel ledit premier élément est doté, à sa surface interne donnant sur le doigt, d'un élément flexible pour envelopper le premier emplacement du doigt. 30
 8. Doigtier selon la revendication 7, dans lequel ledit élément flexible est fait d'un matériau thermoconducteur pour chauffer ledit premier emplacement subissant des mesures jusqu'à une température souhaitée. 35
 9. Doigtier selon la revendication 8, dans lequel ladite température souhaitée est d'environ 37°C-38°C. 40
 10. Doigtier selon la revendication 8, dans lequel le ma- 45
- tériau thermoconducteur flexible est du caoutchouc.
11. Doigtier selon la revendication 8, dans lequel le matériau thermoconducteur flexible est du silicone. 50
 12. Doigtier selon la revendication 1, dans lequel ladite pression supérieure à la pression systolique est comprise entre 270 et 300 mmHg. 55
 13. Dispositif pour des mesures non effractives de paramètres du sang de patients, le dispositif comprenant :
 - le doigtier de la revendication 1 ; et
 - une unité de commande pour actionner l'unité de mesure et l'ensemble de pressurisation pour déterminer et analyser la variation dans le temps de la lumière détectée afin de calculer le paramètre souhaité du sang.

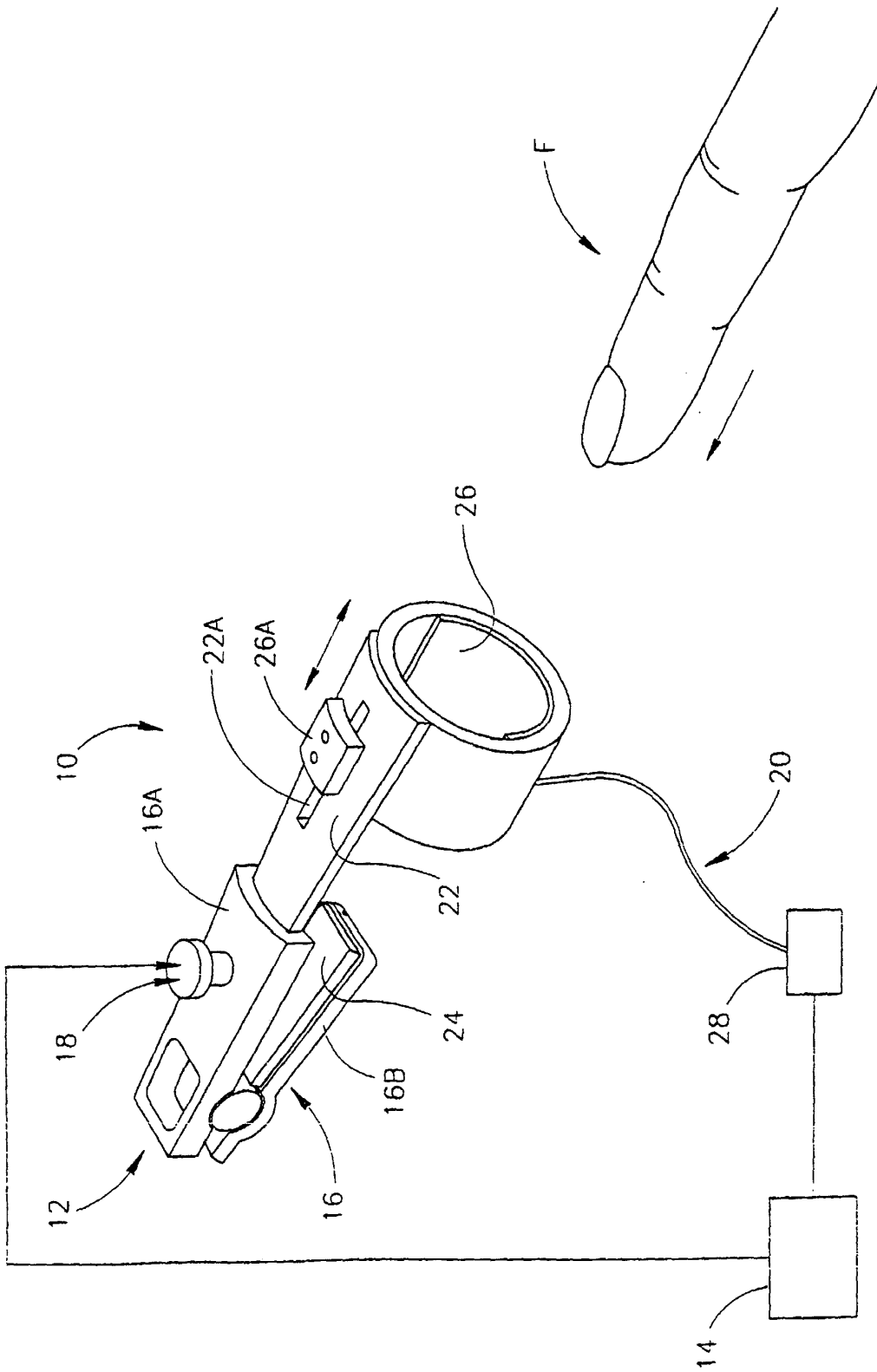


FIG.1

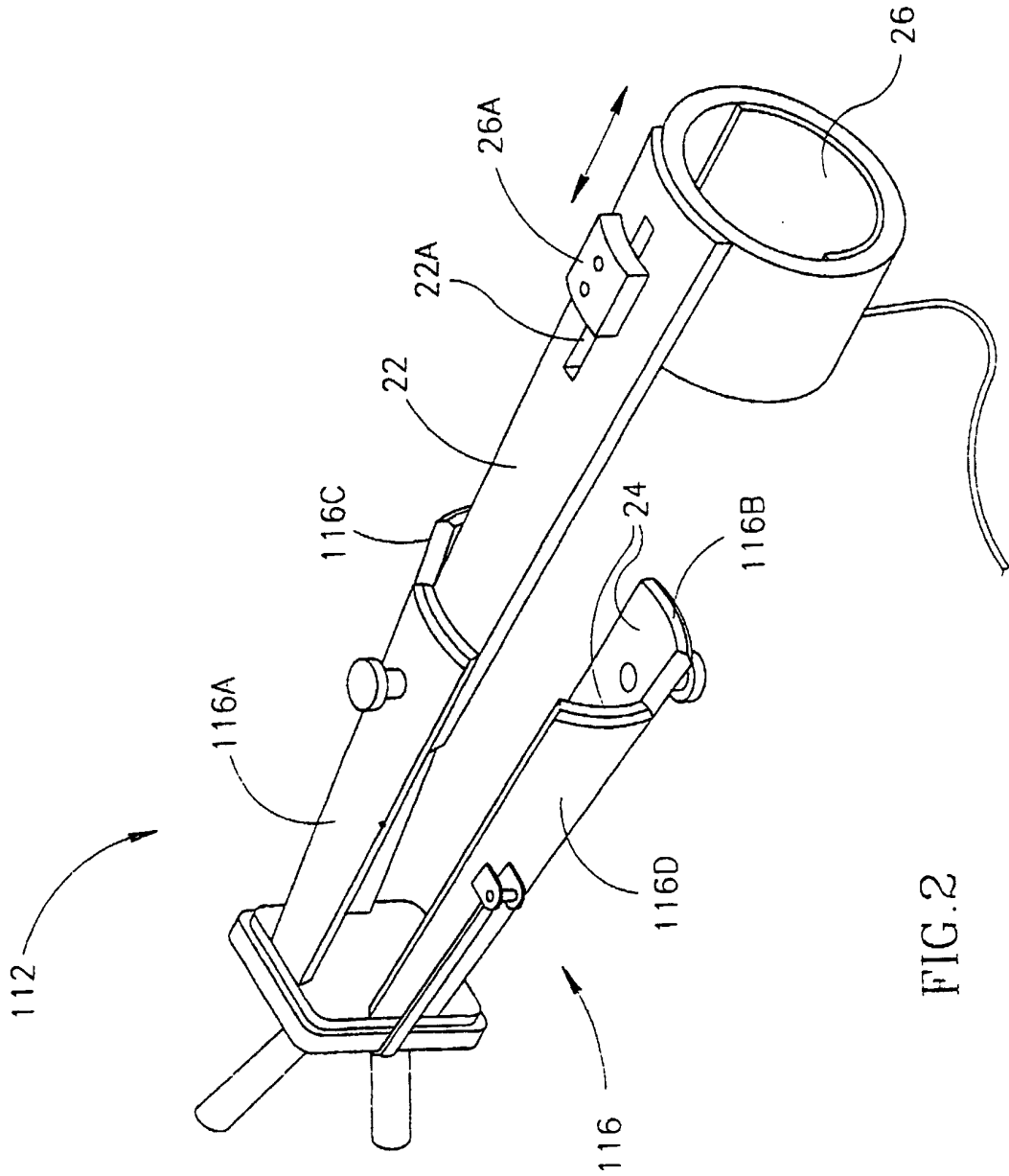


FIG. 2

专利名称(译)	一种利用手指支架无创测量血液相关信号的光学装置		
公开(公告)号	EP1217941B1	公开(公告)日	2003-06-25
申请号	EP2000964598	申请日	2000-09-27
申请(专利权)人(译)	ORSENSE LTD.		
当前申请(专利权)人(译)	ORSENSE LTD.		
[标]发明人	FINAROV ALEXANDER KLEINMAN YOSSIE FINE ILYA		
发明人	FINAROV, ALEXANDER KLEINMAN, YOSSIE FINE, ILYA		
IPC分类号	A61B5/00 A61B5/022 A61B5/145 A61B5/1455		
CPC分类号	A61B5/6826 A61B5/02241 A61B5/14552 A61B5/6838		
优先权	09/407390 1999-09-28 US		
其他公开文献	EP1217941A1		
外部链接	Espacenet		

摘要(译)

提出了用于附接到患者手指 (F) 的手指保持器 (12) 和利用手指保持器 (12) 用于执行患者血液参数的非侵入式测量的光学测量 (18) 装置。手指保持器 (12) 包括彼此间隔开的第一构件 (16) 和第二构件 (26) 。第一构件 (16) 设计成固定指尖并支撑安装的测量单元 (18) ，以便将光学测量值应用于手指 (F) 的第一位置。第二构件与加压组件 (26) 相关联，加压组件 (26) 安装成将期望的过度收缩压力相对于正常血流方向施加到第一位置上游的患者手指上的第二位置。基本上刚性的连接器 (22) 将第一 (16) 和第二 (26) 构件彼此连接，并设计成沿着其中节指骨和近端指间接头接合手指 (F) ，从而防止其在测量期间折叠当过度收缩压施加到手指上时。

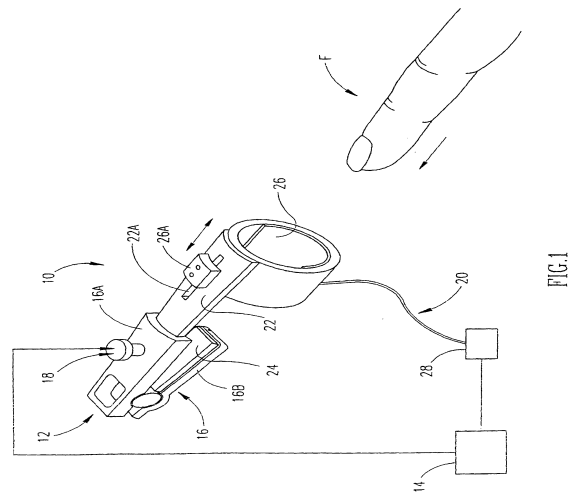


FIG.1