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(54) **MEDICAL SENSOR**

MEDIZINISCHER SENSOR

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Description

[0001] The present invention relates to a medical sensor for measuring pulse, blood, tissue and/or skin parameters by means of electromagnetic waves in the transmission or reflection method, having the features of the precharacterizing clause of claim 1.

[0002] During an operation or during a stay in intensive care, it may be expedient to check and monitor, inter alia, the lung function, metabolism and heart rate of a patient. This may be carried out, for example, by measuring the oxygen saturation and the pulse rate. For this, sensors of the type mentioned above are used, by means of which a measurement, derived from the pulse, of the arterial oxygen saturation can be carried out using an optoelectronic transmission measurement or reflection measurement. Such a sensor usually comprises at least one transmitter, for example a light-emitting diode LED which can emit infrared light and an LED which can emit red light, and also at least one receiver, usually a photodiode. Furthermore, such a sensor comprises a carrier assembly which positions the transmitter and receiver in the desired manner on a body part of the patient, for example on the finger, toe, hand or foot.

[0003] With sensors, a distinction is made between single-use sensors, which can be used only once, semi-reusable sensors, in which a throwaway part can be replaced after each use, and reusable sensors, which can be used to carry out a number of measurements. With reusable sensors, a distinction can also be made between those which can be used for different patients one after the other and those which can be used a number of times but only for the same patient.

[0004] EP 0 127 947 B1 and US 5,891,026 disclose sensors of the abovementioned type which in each case have a strip- or band-shaped carrier part which for the respective measurement is wound around the finger, toe, hand or foot.

[0005] In the case of the sensor disclosed in US 5,891,026, the sensor is attached to the respective body part by means of a Velcro fastening (hook and loop fastening). An inner side of the carrier part, which bears against the respective body part, is in this case designed to be completely non-adhesive. By virtue of this design, this sensor can be used a number of times on the same patient. With this sensor, there is no direct fixing of the carrier part to the respective body part, so that in the event of voluntary or involuntary movements of the patient there is a risk that the carrier part will slip in relation to the body part and the measurements will be impaired as a result.

[0006] In the case of the sensor disclosed in EP 0 127 947 B1, an inner side of the carrier part, which bears against the respective body part, is designed in its entirety as an adhesive surface which fixes the carrier part directly to the body part. This sensor, which is also referred to as an adhesive sensor, is securely fixed to the body part for the respective measurement. However, such an adhesive sensor can be used only once. Furthermore, during removal of such an adhesive sensor from the respective body part, there is the risk of damage to the skin, in particular in the case of neonatal or geriatric patients.

[0007] US 3,810,460 and US 4,685,464 disclose sensors which are designed as clip sensors, the carrier part of which in each case has two legs mounted such that they can pivot in relation to one another about an axis of pivoting. These clip legs are prestressed in the closing direction by means of an appropriate spring, so that the clip sensor can be clipped, for example, to a finger in a self-retaining manner. Such sensors are relatively expensive to produce, so that they can be provided only as reusable sensors.

[0008] DE 37 03 458 C2 and US 4,109,643 disclose further sensors which are designed as cuff sensors, the carrier part of which forms a sleeve which can be pushed onto the finger or toe. Such sleeve sensors are also relatively expensive to produce, so that they can only be provided as reusable sensors.

[0009] US5054488 discloses an optoelectronic sensor for producing electrical signals representative of measurements of physiological values, especially the circulation parameters of a person. The sensor has at least one radiation transmitter and at least one receiver for radiation influenced by the physiological values being measured. The transmitter and receiver are covered with a transparent adhesive layer on their sides turned toward the object to be measured. The layer is transparent and adhesive at least on its side turned toward to the object to be measured. This transparent layer engages directly on the radiation outlet surface of the radiation transmitter and the radiation admission surface of the radiation receiver.

[0010] It is an object of the present invention to specify an improved embodiment for a medical sensor of the type mentioned above, which in particular allows multiple use on the same patient and is held on the respective body part in an improved manner.

[0011] This object is achieved according to the invention by the subject matter of the independent claim. Advantageous embodiments form the subject matter of the dependent claims.

[0012] The invention is based on the general concept of forming two or more locally defined adhesive zones on the inner side of the carrier part, which adhesive zones have increased friction and/or adhesion in relation to the body part compared with the rest of the inner side of the carrier part. In this context, the invention makes use of the knowledge that, for adequate attachment of the carrier part to the respective body part, it is sufficient to adhere the carrier part to more locations on the body part, said locations being spaced apart from one another. Since, according to the invention, it is not the entire inner side of the carrier part that is designed to be adhesive, the risk of damage to the skin when removing the sensor is reduced, even in the case of patients with sensitive skin. Furthermore, the sensor according to the invention

does not become unusable upon removal from the body part, so that it can be used a number of times on the same patient.

[0013] According to the invention a first adhesive body covers the at least one transmitter element while a second adhesive body covers the at least one receiver element. The two adhesive bodies are designed to be permeable to the electromagnetic waves used for measurement. This development is based on the knowledge that for the quality of the measurements it is of primary importance that transmitter and receiver do not change their relative position with respect to the body part, whereas relative movements of other components of the sensor have little or no influence on the measurements. Accordingly, this embodiment comprises only two adhesive bodies, one of which is positioned in the region of the transmitter and the other of which is positioned in the region of the receiver.

[0014] Further, according to the present invention the at least one transmitter element is arranged inside the carrier part, with a transmitter opening being made in the carrier part, through which transmitter opening the at least one transmitter element emits waves during measurement, the first adhesive body being arranged in this transmitter opening.

[0015] In addition or as an alternative, the at least one receiver element is arranged in the carrier part, with a receiver opening being made in the carrier part, through which receiver opening the at least one receiver element receives waves during measurement, the second adhesive body being arranged in this receiver opening. By virtue of this construction, the inner side of the carrier part can be designed to be particularly skin-friendly, so that the attached sensor in particular does not generate any uncomfortable pressure points. Furthermore, by virtue of this construction, the handling of the sensor is simplified, since its carrier part can be attached to the respective body part in a simpler manner.

[0016] The adhesive bodies may consist for example of a gel-like adhesive compound. As an alternative or in addition, the adhesive bodies may consist of an adhesive that is not hardened and does not harden during the service life of the sensor - if used correctly. By virtue of these configurations, it is possible to achieve for the adhesive bodies, in a particularly simple manner, an adhesive action which on the one hand ensures sufficiently secure fixing of the carrier part to the body part and on the other hand can be regularly removed from the respective body part without any damage to the skin.

[0017] Other important features and advantages of the invention emerge from the subclaims, the drawings and the associated description of the figures, which is given with reference to the drawings.

[0018] It will be understood that the features mentioned above and those that are yet to be mentioned below can be used not only in the combination indicated in each case but also in other combinations or on their own, without departing from the scope of the present invention.

[0019] The invention will be further described with reference to examples of embodiments shown in the drawings to which, however, the invention is not restricted. In the drawings, the same reference numerals refer to identical or functionally identical or similar components.

Fig. 1 schematically shows a perspective view of the individual parts of a sensor according to the invention.

Fig. 2 schematically shows a perspective view of the sensor according to the invention in the assembled state.

[0020] As shown in Fig. 1, a medical sensor 1 according to the invention comprises a carrier part 2 which is designed in the shape of a strip or band. The sensor 1 is used to measure pulse, blood, tissue or skin parameters, where the sensor 1 operates using electromagnetic waves and in this case uses a transmission or reflection method. For this purpose, the carrier part 2 carries a transmitter unit 3, which comprises at least one transmitter element. The transmitter unit 3 usually comprises an LED that emits red light and an LED that emits infrared light. Furthermore, the carrier part 2 carries a receiver unit 4, which comprises at least one receiver element, preferably a photodiode. The transmitter unit 3 or its transmitter element and the receiver unit 4 or its receiver element are connected to a plug 6 via cables 5, the cables 5 being gathered together in a composite cable 7 outside the carrier part 2.

[0021] The carrier part 2 is constructed in a multilayer fashion. In order to be able to better illustrate the individual layers, these are shown on an overproportionally enlarged scale in the direction of their thickness in Figs. 1 and 2.

[0022] As shown in Fig. 1, the carrier part 2 comprises an inner half 2a and an outer half 2b, which may be produced independently of one another. The inner half 2a in this case consists of a first textile layer 8 which forms an inner side 9 of the carrier part 2. This inner side 9, during use of the sensor 1, is applied to a body part of a patient, in particular to a finger, a toe or, in small patients, a foot or a hand. The first textile layer 8 consists, for example, of velour and is designed such that it essentially does not adhere to the body part, that is to say to human skin and hairs.

[0023] On the side facing away from the inner side 9, the first textile layer 8 is connected, in particular adhesively or thermally bonded, to a first layer of foamed material 10. The first layer of foamed material 10 consists, for example, of PE and is elastically compressible. In the embodiment shown here, a first adhesive film 11 is attached, in particular adhesively or thermally bonded, to the first layer of foamed material 10 on a side facing away from the inner side 9. The first adhesive film 11 has an adhesive coating on its side facing away from the inner side 9. Once the inner half 2a has been finished, this adhesive coating is covered with a peelable protective

film, which is only peeled off for the purpose of assembling the sensor 1. In Fig. 1, this protective film has already been peeled off. The inner half 2a and its components, that is to say the first textile layer 8, the first layer of foamed material 10 and - where present - the first adhesive film 11, comprise a transmitter opening 12 and a receiver opening 13. The transmitter opening 12 and the receiver opening 13 are in each case arranged approximately on a longitudinal center line 14 of the carrier part 2 and are spaced apart from one another in the longitudinal direction of the carrier part 2.

[0024] The outer half 2b consists of a similar multilayer construction and comprises an outer side 15 of the carrier part 2, said outer side 15 facing away from the inner side 9 and being formed by a second textile layer 16. The second textile layer 16 may also consist essentially of a skin-friendly material, such as velour for example. On its side facing away from the outer side 15, the second textile layer 16 has a second layer of foamed material 17, which likewise consists of an elastically compressible foamed material, for example PE. Optionally, the second layer of foamed material 17 may have, on its side facing away from the outer side 15, a second adhesive film 18 which on its side facing away from the outer side 15 has an adhesive coating. The connections between the individual layers may also in this case be realized by adhesively bonded connections or thermally bonded connections. After production of the outer half 2b, the adhesive coating of the adhesive film 18 is expediently covered with an appropriate protective film which can be peeled off for assembly purposes, as in Fig. 1.

[0025] For assembly of the sensor 1, the transmitter unit 3, the receiver unit 4 and the cables 5 and 7 are then positioned. In order to obtain fixing of the composite cable 7 to the carrier part 2 with good tensile strength, a retaining plate 19 may be provided which is fitted to the outer part 2b and is fixedly attached to the end section 21 of the composite cable 7 remote from the plug 6. Adhesively bonded connections are also preferred here for attachment purposes. If the second adhesive film 18 is provided, the retaining plate 19 can simply be placed on the second adhesive film 18 at the appropriate location. The retaining plate 19 may also be provided with an adhesive layer which makes it possible to fix the end section 21 of the composite cable 7 to the retaining plate 19. The retaining plate 19 expediently has two tabs 28 which fold around the end section 21 for better fixing.

[0026] In order to further improve the fixing of the cables 5 and of the composite cable 7 to the carrier part 2, a projection 20 which sticks out to the side is formed on the carrier part 2, which projection 20 in this case likewise consists of an inner half 20a and an outer half 20b. The projection halves 20a and 20b are integrally formed on the carrier inner half 2a and on the carrier outer half 2b or on the components thereof. During assembly of the halves 2a, 2b of the carrier part 2, the end section 21 of the composite cable 7 with the tabs 28 of the retaining plate 19 is arranged between the halves 20a, 20b of the projection 20 and there adhesively and/or thermally bonded to the carrier part 2. As a result, effective strain relief of the optoelectronic components 3, 4 is achieved.

[0027] In the preferred embodiment shown here, the carrier part 2 is moreover equipped with a Velcro fastening 22, which has a hook element 23 having hooks and a loop element 24 having loops. The loop element 24 is in this case formed by an appropriate configuration of the outer side 15 of the carrier part 2, that is to say that an upper side of the second textile layer 16, which forms the outer side 15 of the carrier part 2, serves as a loop element 24 for the Velcro fastening 22. Such a Velcro fastening 22 may also be referred to as a hook and loop fastening.

[0028] In the embodiment shown here, the hook element 23 is designed as a tongue which upon assembly of the sensor 1 is arranged at an end section between the halves 2a, 2b of the carrier part 2. After assembly of the sensor 1, the hook element 23 is thus arranged at one end between the layers of foamed material 10, 17 or between the adhesive films 11, 18. As shown in Fig. 2, after assembly of the sensor 1, the hook element 22 projects in the longitudinal direction of the carrier part 2, beyond the textile layers 8, 16 thereof.

[0029] As shown in Figs. 1 and 2, the sensor 1 according to the invention, on the inner side 9 of the carrier part 2, has at least two adhesive bodies 25, 26. In the preferred embodiment shown here, precisely two such adhesive bodies are provided, and these will be referred to below as the first adhesive body 25 and the second adhesive body 26. The adhesive bodies 25, 26 are spaced apart from one another and thereby form two locally defined adhesive zones within the inner side 9 of the carrier part 2, which inner side 9 is designed to be non-adhesive per se. The adhesive bodies 25, 26 are in this case dimensioned and positioned such that in the assembled state the first adhesive body 25 covers the transmitter unit 3 while the second adhesive body 26 covers the receiver unit 4. In order not to impair the operability of the optoelectronic components of the transmitter unit 3 and of the receiver unit 4, the adhesive bodies 25, 26 are made of a material which is permeable to the electromagnetic waves that are emitted by the transmitter elements of the transmitter unit 3.

[0030] The adhesive bodies 25, 26 consist, for example, of a gel-like adhesive. This adhesive may be designed, for example, such that it is not completely hardened when it forms the adhesive bodies 25, 26 and such that it also does not harden during the entire predetermined service life of the sensor 1 provided that the sensor 1 is not exposed to unacceptable environmental conditions. In this way, the sensor 1 can be used on the same patient almost as often as desired. This patient-related reusability of the sensor 1 is aided by the Velcro fastening 22, which can likewise be opened and closed almost as often as desired.

[0031] During application of the sensor 1, the carrier part 2 thereof is wound around the respective body part

of the patient. If the sensor 1 operates in accordance with the transmission method, the carrier part 2 is attached to the body part such that transmitter unit 3 and receiver unit 4 lie opposite one another on opposite sides of the body part. The adhesive bodies 25, 26 then come to rest on the body part and by virtue of their adhesion at the measurement location produce adequate fixing of the carrier part 2 to the body part.

[0032] In order to be able to carry out optimal measurement of the pulse rate, it is desired that the carrier part 2 bears against the body part with a slight pressure. In the case of the sensor 1 according to the invention, the carrier part 2 is designed to be elastically compressible in the direction of its thickness. This is achieved in this case by the correspondingly compressible layers of foamed material 10, 17. The compressibility of the carrier part 2 is designed such that the carrier part 2, during application to the respective body part, can be compressed to the extent that resulting restoring forces press the inner side 9 of the carrier part 2 against the body part. Upon winding around the respective body part, a prestressed bearing of the carrier part 2 on the body part is thus generated, which prestressing can be fixed with the aid of the Velcro fastening 22.

[0033] In order to be able to wind the multilayer carrier part 2 in a particularly simple manner such that transmitter element 3 and receiver element 4 can be positioned on opposite sides of the body part, in accordance with the embodiment shown here the carrier part 2 may have lateral notches 27 that lie opposite one another and are arranged in the center, with respect to the longitudinal direction of the carrier part 2, between transmitter element 3 and receiver element 4. The notches 27 are V-shaped and run inward to form a point. The notches 27 may be formed during production of the halves 2a, 2b of the carrier part 2, so that the carrier part halves 2a, 2b or their layers 8, 10, 11 and 16, 17, 18 are accordingly provided with the notches 27.

[0034] As can be seen particularly clearly in Fig. 2, the first adhesive body 25 is preferably inserted in the transmitter opening 12, with the first adhesive body 25 expediently completely filling the transmitter opening 12. In this embodiment, in a corresponding manner, the second adhesive body 26 is inserted in the receiver opening 13 and expediently dimensioned such that it completely fills the receiver opening 13. The adhesive bodies 25, 26 may be designed such that they adhere to the transmitter element 3 and to the receiver element 4, respectively. The adhesive bodies 25, 26 may consist, for example, of a gel-like adhesive compound which is poured into the openings 12, 13 during production of the sensor 1. This adhesive compound then solidifies or hardens to a defined extent, with the adhesive compound being designed such that, on the inner side 9 of the carrier part 2, it has a surface which adheres at least to human skin. In order to be able to transport the finished sensor 1, it is expedient to apply a peelable protective film (not shown) to the inner side 9 of the carrier part 2 also in the region of the adhesive bodies 25, 26. This protective film may then be removed directly before use of the sensor 1.

[0035] On account of the arrangement of the optoelectronic components 3, 4 of the sensor 1 between the carrier part halves 2a, 2b, following assembly of the sensor 1 the transmitter unit 3 and the receiver unit 4 are housed in a protected manner inside the carrier part 2.

LIST OF REFERENCES:

[0036]

1	sensor
2	carrier part
3	transmitter unit
4	receiver unit
5	cable
6	plug
7	composite cable
8	first textile layer
9	inner side of 2
10	first layer of foamed material
11	first adhesive film
12	receiver opening
13	transmitter opening
14	longitudinal center line of 2
15	outer side of 2
16	second textile layer
17	second layer of foamed material
18	second adhesive film
19	retaining plate
20	projection on 2
21	end section of 7
22	Velcro fastening
23	hook element of 22
24	loop element of 22
25	first adhesive body
26	second adhesive body
27	notch
28	tab

Claims

1. A medical sensor for measuring pulse, blood, tissue and/or skin parameters by means of electromagnetic waves in the transmission or reflection method, having a strip-and/or band-shaped carrier part (2) which carries at least one transmitter element (3) and at least one receiver element (4), wherein the carrier part (2), on an inner side (9) provided to make contact with a body part of a patient, has at least two adhesive bodies (25, 26) which are spaced apart from one another and during measurement adhere to the body part, where the rest of the inner side (9) is designed to be essentially non-adhesive with respect to the body part, wherein the first adhesive body (25) covers the at least one transmitter element (3), wherein

the second adhesive body (26) covers the at least one receiver element (4), and wherein the two adhesive bodies (25, 26) are permeable to the waves emitted by the at least one transmitter element, **characterized in that** the at least one transmitter element is arranged in the carrier part (2), with a transmitter opening (12) being made in the carrier part (2), through which transmitter opening (12) the at least one transmitter element emits waves during measurement, the first adhesive body (25) being arranged in the transmitter opening (12) and/or the at least one receiver element is arranged in the carrier part (2), with a receiver opening (13) being made in the carrier part (2), through which receiver opening (13) the at least one receiver element receives waves during measurement, the second adhesive body (26) being arranged in the receiver opening (13).

2. A sensor as claimed in claim 1, **characterized**

- **in that** the first adhesive body (25) adheres to the at least one transmitter element and/or
- **in that** the second adhesive body (26) adheres to the at least one receiver element.

3. A sensor as claimed in claim 1 or 2, **characterized**

- **in that** the first adhesive body (25) completely fills the transmitter opening (12) and/or
- **in that** the second adhesive body (26) completely fills the receiver opening (13).

4. A sensor as claimed in any one of claims 1 to 3, **characterized in that** the adhesive bodies (25, 26) consist of a gel-like adhesive compound.

5. A sensor as claimed in any one of claims 1 to 4, **characterized in that** the adhesive bodies (25, 26) consist of an adhesive that is not hardened and does not harden during the service life of the sensor (1).

6. A sensor as claimed in any one of claims 1 to 5, **characterized in that** the carrier part (2) is designed to be elastically compressible in the direction of its thickness, such that the carrier part (2) can be compressed at the time of application to the body part, such that restoring forces press the inner side (9) of the carrier part (2) against the body part.

7. A sensor as claimed in any one of claims 1 to 6, **characterized in that** the carrier part (2) has a multilayer structure and, between two textile layers (8, 16), one of which forms the inner side (9) of the carrier part (2) and the other of which forms an outer side (15) of the carrier part (2), has at least one layer of foamed material (10, 17) that can be elastically compressed in the direction of the thickness.

8. A sensor as claimed in any one of claims 1 to 7, **characterized**

- **in that** the carrier part (2) has a first textile layer (8) that forms the inner side (9) of the carrier part (2), on which there is arranged a first layer of foamed material (10) that can be elastically compressed in the direction of the thickness, on which there is arranged a second layer of foamed material (17) that can be elastically compressed in the direction of the thickness, on which there is arranged a second textile layer (16) that forms an outer side (15) of the carrier part (2),
- where the at least one transmitter element and the at least one receiver element are arranged between the layers of foamed material (10, 17),
- where the first textile layer (8) and the first layer of foamed material (10) have a transmitter opening (12) and a receiver opening (13) through which the at least one transmitter element emits waves during transmission and the at least one receiver element receives waves.

9. A sensor as claimed in claim 8, **characterized**

- **in that** the at least one transmitter element and the at least one receiver element are arranged between a first adhesive film (11) and a second adhesive film (18),
- **in that** the adhesive films (11, 18) are arranged between the layers of foamed material (10, 17),
- **in that** the first adhesive film (11) has a transmitter opening (12) and a receiver opening (13).

10. A sensor as claimed in any one of claims 7 to 9, **characterized in that** the layers (8, 10, 11, 16, 17, 18) of the multilayer carrier part (2) are adhesively and/or thermally bonded to one another.

11. A sensor as claimed in any one of claims 1 to 10, **characterized in that** the carrier part (2) has a Velcro fastening (22) with a hook element (23) having hooks and a loop element (24) having loops.

12. A sensor as claimed in claim 11, **characterized in that** the hook element (23) is designed as a tongue which at one end is arranged between the layers of foamed material (10, 17) or between the adhesive films (11, 18) and at the other end projects beyond the layers of foamed material (10, 17).

13. A sensor as claimed in claim 11 or 12, **characterized in that** the loop element (24) is formed by an upper side of the second textile layer (16) which forms the outer side (15) of the carrier part (2).

14. A sensor as claimed in any one of claims 1 to 13,

characterized

- **in that** the at least one transmitter element and the at least one receiver element are arranged on the carrier part (2) on a longitudinal center line (14) of the carrier part (2) and spaced apart from one another in the longitudinal direction of the carrier part (2).
- **in that** the carrier part (2) has two lateral notches (27) that lie opposite one another in the center, with respect to its longitudinal direction, between the at least one transmitter element and the at least one receiver element.

15. A sensor as claimed in any one of claims 1 to 14, **characterized in that** a projection (20) which sticks out to the side is formed on the carrier part (2), to which projection cables (5, 7) are attached which lead to the at least one transmitter element and to the at least one receiver element.

Patentansprüche

1. Medizinischer Sensor zum Messen von Puls-, Blut-, Gewebe- und/oder Hautparametern mit Hilfe von elektromagnetischen Wellen im Transmissions- oder Reflexionsverfahren, mit einem streifen- und/oder bandförmigen Trägerteil (2), das mindestens ein Senderelement (3) und mindestens ein Empfängerelement (4) trägt, wobei das Trägerteil (2) auf einer Innenseite (9), die vorgesehen ist, um Kontakt mit einem Körperteil eines Patienten herzustellen, mindestens zwei adhäsive Körper (25, 26) hat, die in einem Abstand voneinander angeordnet sind und während der Messung an dem Körperteil haften, wobei der Rest der Innenseite (9) so konzipiert ist, dass er im Wesentlichen in Bezug auf das Körperteil nichtadhäsiv ist, wobei der erste adhäsive Körper (25) das mindestens eine Senderelement (3) abdeckt, wobei der zweite adhäsive Körper (26) das mindestens eine Empfängerelement (4) abdeckt, und wobei die beiden adhäsiven Körper (25, 26) für die Wellen durchlässig sind, die durch das mindestens eine Senderelement emittiert werden,
dadurch gekennzeichnet, dass das mindestens eine Senderelement in dem Trägerteil (2) angeordnet ist, wobei eine Senderöffnung (12) in dem Trägerteil (2) hergestellt ist, durch die das mindestens eine Senderelement während der Messung Wellen emittiert, wobei der erste adhäsive Körper (25) in der Senderöffnung (12) angeordnet ist, und/oder dass das mindestens eine Empfängerelement in dem Trägerteil (2) angeordnet ist, wobei eine Empfängeröffnung (13) in dem Trägerteil (2) hergestellt ist, durch die das mindestens eine Empfängerelement während der Messung Wellen empfängt, wobei der zweite adhäsive Körper (26) in der Empfängeröffnung (13) angeordnet ist.

2. Sensor nach Anspruch 1, **dadurch gekennzeichnet,**

- **dass** der erste adhäsive Körper (25) an dem mindestens einen Senderelement haftet und/oder
- **dass** der zweite adhäsive Körper (26) an dem mindestens einen Empfängerelement haftet.

3. Sensor nach Anspruch 1 oder 2, **dadurch gekennzeichnet,**

- **dass** der erste adhäsive Körper (25) die Senderöffnung (12) vollständig ausfüllt und/oder
- **dass** der zweite adhäsive Körper (26) die Empfängeröffnung (13) vollständig ausfüllt.

4. Sensor nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die adhäsiven Körper (25, 26) aus einer gelartigen adhäsiven Masse bestehen.

5. Sensor nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die adhäsiven Körper (25, 26) aus einem Klebemittel bestehen, das nicht gehärtet ist und während der Nutzlebensdauer des Sensors (1) nicht aushärtet.

6. Sensor nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** das Trägerteil (2) so konzipiert ist, dass es in der Richtung seiner Dicke elastisch komprimierbar ist, so dass das Trägerteil (2) beim Anlegen an das Körperteil so komprimiert werden kann, dass Rückstellkräfte die Innenseite (9) des Trägerteils (2) gegen das Körperteil drücken.

7. Sensor nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** das Trägerteil (2) eine Mehrschichtstruktur hat und zwischen zwei Textilschichten (8, 16), von denen eine die Innenseite (9) des Trägerteils (2) bildet und die andere eine Außenseite (15) des Trägerteils (2) bildet, mindestens eine Schicht aus Schaumstoff (10, 17) aufweist, die in der Richtung der Dicke elastisch komprimiert werden kann.

8. Sensor nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet,**

- **dass** das Trägerteil (2) eine erste Textilschicht (8) hat, die die Innenseite (9) des Trägerteils (2) bildet, auf der eine erste Schicht aus Schaumstoff (10) angeordnet ist, die in der Richtung der Dicke elastisch komprimiert werden kann, auf der eine zweite Schicht aus Schaumstoff (17) angeordnet ist, die in der Richtung der Dicke elastisch komprimiert werden kann, auf der eine

zweite Textilschicht (16) angeordnet ist, die eine Außenseite (15) des Trägerteils (2) bildet,
- wobei das mindestens eine Senderelement und das mindestens eine Empfängerelement zwischen den Schichten aus Schaumstoff (10, 17) angeordnet sind,
- wobei die erste Textilschicht (8) und die erste Schicht aus Schaumstoff (10) eine Senderöffnung (12) und eine Empfängeröffnung (13) haben, durch die das mindestens eine Senderelement während des Sendens Wellen emittiert und wobei das mindestens eine Empfängerelement Wellen empfängt.

9. Sensor nach Anspruch 8, **dadurch gekennzeichnet,**

- **dass** das mindestens eine Senderelement und das mindestens eine Empfängerelement zwischen einem ersten adhäsiven Film (11) und einem zweiten adhäsiven Film (18) angeordnet sind,
- **dass** die adhäsiven Filme (11, 18) zwischen den Schaumstoffschichten (10, 17) angeordnet sind,
- **dass** der erste adhäsive Film (11) eine Senderöffnung (12) und eine Empfängeröffnung (13) hat.

10. Sensor nach einem der Ansprüche 7 bis 9, **dadurch gekennzeichnet, dass** die Schichten (8, 10, 11, 16, 17, 18) des mehrschichtigen Trägerteils (2) adhäsiv sind und/oder thermisch miteinander gebondet sind.

11. Sensor nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** das Trägerteil (2) einen Klettverschluss (22) mit einem Hakenelement (23) mit Haken und einem Schlaufenelement (24) mit Schlaufen hat.

12. Sensor nach Anspruch 11, **dadurch gekennzeichnet, dass** das Hakenelement (23) als eine Zunge konzipiert ist, deren eines Ende zwischen den Schaumstoffschichten (10, 17) oder zwischen den adhäsiven Filmen (11, 18) angeordnet ist und deren anderes Ende über die Schaumstoffschichten (10, 17) herausragt.

13. Sensor nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** das Schlaufenelement (24) durch eine Oberseite der zweiten Textilschicht (16) gebildet ist, die die Außenseite (15) des Trägerteils (2) bildet.

14. Sensor nach einem der Ansprüche 1 bis 13, **dadurch gekennzeichnet,**

- **dass** das mindestens eine Senderelement und das mindestens eine Empfängerelement auf dem Trägerteil (2) auf einer in Längsrichtung verlaufenden Mittellinie (14) des Trägerteils (2) und in Längsrichtung des Trägerteils (2) in einem Abstand zueinander angeordnet sind,
- **dass** das Trägerteil (2) zwei seitliche Kerben (27) hat, die einander mittig in Bezug auf ihre Längsrichtung gegenüberliegen und zwischen dem mindestens einen Senderelement und dem mindestens einen Empfängerelement liegen.

15. Sensor nach einem der Ansprüche 1 bis 14, **dadurch gekennzeichnet, dass** an dem Trägerteil (2) ein an der Seite hervorstehender Vorsprung (20) gebildet ist, an dem Vorsprungkabel (5, 7) befestigt sind, die zu dem mindestens einen Senderelement und dem mindestens einen Empfängerelement führen.

Revendications

1. Capteur médical pour mesurer les paramètres du pouls, du sang, du tissu et/ou de la peau au moyen d'ondes électromagnétiques dans le procédé de transmission ou de réflexion, comprenant une partie de support en forme de ruban et/ou en forme de bande (2) qui contient au moins un élément d'émetteur (3) et au moins un élément de récepteur (4), dans lequel la partie de support (2) qui est prévue d'un côté intérieur (9) pour établir le contact avec une partie du corps d'un patient présente au moins deux corps adhésifs (25, 26) qui sont espacés l'un de l'autre et qui s'adhèrent, lors de la mesure, à la partie du corps où le reste du côté intérieur (9) est conçu de manière à être essentiellement non adhésive par rapport à la partie du corps, dans lequel le premier corps adhésif (25) couvre au moins un élément d'émetteur (3), dans lequel le deuxième corps adhésif (26) couvre au moins un élément de récepteur (4) et dans lequel les deux corps adhésifs (25, 26) sont perméables aux ondes qui sont émises par l'au moins un élément d'émetteur,
caractérisé en ce que l'au moins un élément d'émetteur est disposé dans la partie de support (2), avec une ouverture d'émetteur (12) étant pratiquée dans la partie de support (2), ouverture d'émetteur (12) à travers laquelle l'au moins un élément d'émetteur émet des ondes lors de la mesure, le premier corps adhésif (25) étant disposé dans l'ouverture d'émetteur (12) et/ou l'au moins un élément de récepteur étant disposé dans la partie de support (2), avec une ouverture de récepteur (13) étant pratiquée dans la partie de support (2), ouverture de récepteur (13) à travers laquelle l'au moins un élément de récepteur reçoit des ondes lors de la mesure, le deuxième corps adhésif (26) étant disposé dans l'ouverture de récepteur (13).

2. Capteur selon la revendication 1, **caractérisé**

- **en ce que** le premier corps adhésif (25) s'adhère à l'au moins un élément d'émetteur et/ou
- **en ce que** le deuxième corps adhésif (26) s'adhère à l'au moins un élément de récepteur.

3. Capteur selon la revendication1 ou 2, **caractérisé**

- **en ce que** le premier corps adhésif (25) remplit complètement l'ouverture d'émetteur (12) et/ou
- **en ce que** le deuxième corps adhésif (26) remplit complètement l'ouverture de récepteur (13).

4. Capteur selon l'une quelconque des revendications précédentes 1 à 3, **caractérisé en ce que** les corps adhésifs (25, 26) sont constitués d'un composé adhésif sous forme de gel.

5. Capteur selon l'une quelconque des revendications précédentes 1 à 4, **caractérisé en ce que** les corps adhésifs (25, 26) sont constitués d'un adhésif qui n'est pas durci et qui ne se durcit pas au cours de la durée de vie en service du capteur (1).

6. Capteur selon l'une quelconque des revendications précédentes 1 à 5, **caractérisé en ce que** la partie de support (2) est conçue de manière à être d'une manière élastique compressible dans le sens de son épaisseur de telle façon que la partie de support (2) puisse être comprimée au moment de l'application à la partie du corps de manière à ce que des forces de reconstitution serrent le côté intérieur (9) de la partie de support (2) contre la partie du corps.

7. Capteur selon l'une quelconque des revendications précédentes 1 à 6, **caractérisé en ce que** la partie de support (2) présente une structure multicouche et présente, entre deux couches de textile (8, 16) dont une constitue le côté intérieur (9) de la partie de support (2) et dont l'autre constitue un côté extérieur (15) de la partie de support (2), au moins une couche constituée de matériau-mousse (10, 17) qui peut d'une manière élastique être comprimée dans le sens de l'épaisseur.

8. Capteur selon l'une quelconque des revendications précédentes 1 à 7, **caractérisé**

- **en ce que** la partie de support (2) présente une première couche de textile (8) qui constitue le côté intérieur (9) de la partie de support (2) sur laquelle il est déposé une première couche constituée de matériau-mousse (10) qui peut d'une manière élastique être comprimée dans le sens de l'épaisseur, sur laquelle il est déposé une deuxième couche constituée de matériau-mousse (17) qui peut d'une manière élastique être comprimée dans le sens de l'épaisseur, sur laquelle il est déposée une deuxième couche de textile (16) qui constitue un côté extérieur (15) de la partie de support (2),
- où l'au moins un élément d'émetteur et l'au moins un élément de récepteur sont disposés entre les couches constituées de matériau-mousse (10, 17),
- où la première couche de textile (8) et la première couche constituée de matériau-mousse (10) présentent une ouverture d'émetteur (12) et une ouverture de récepteur (13) à travers laquelle l'au moins un élément d'émetteur émet des ondes lors de la transmission et l'au moins un élément de récepteur reçoit des ondes.

9. Capteur selon la revendication 8, **caractérisé**

- **en ce que** l'au moins un élément d'émetteur et l'au moins un élément de récepteur sont disposés entre un premier film adhésif (11) et un deuxième film adhésif (18),
- **en ce que** les films adhésifs (11, 18) sont disposés entre les couches constituées de matériau-mousse (10, 17),
- **en ce que** le premier film adhésif (11) présente une ouverture d'émetteur (12) et une ouverture de récepteur (13).

10. Capteur selon l'une quelconque des revendications précédentes 7 à 9, **caractérisé en ce que** les couches (8, 10, 11, 16, 17, 18) de la partie de support multicouche (2) sont d'une manière adhésive et/ou thermique liées les unes aux autres.

11. Capteur selon l'une quelconque des revendications précédentes 1 à 10, **caractérisé en ce que** la partie de support (2) présente une fixation Velcro (22) avec un élément de crochet (23) ayant des crochets et avec un élément de boucle (24) ayant des boucles.

12. Capteur selon la revendication 11, **caractérisé en ce que** l'élément de crochet (23) est conçu en tant qu'une languette qui est disposé, à une extrémité, entre les couches constituées de matériau-mousse (10, 17) ou entre les films adhésifs (11, 18) et qui s'étend, à l'autre extrémité, au-delà des couches constituées de matériau-mousse (10, 17).

13. Capteur selon la revendication 11 ou 12, **caractérisé en ce que** l'élément de boucle (24) est formé par un côté supérieur de la deuxième couche de textile (16) qui constitue le côté extérieur (15) de la partie de support (2).

14. Capteur selon l'une quelconque des revendications précédentes 1 à 13, **caractérisé**

- **en ce que** l'au moins un élément d'émetteur et l'au moins un élément de récepteur sont disposés sur la partie de support (2) sur un axe central longitudinal (14) de la partie de support (2) et en ce qu'ils sont espacés l'un de l'autre dans le sens longitudinal de la partie de support (2),
- **en ce que** la partie de support (2) présente deux encoches latérales (27) qui se situent l'une à l'opposite de l'autre dans le centre, par rapport à son sens longitudinal, entre l'au moins un élément d'émetteur et l'au moins un élément de récepteur.

15. Capteur selon l'une quelconque des revendications précédentes 1 à 14, **caractérisé en ce qu'**une saillie (20) qui s'étend vers le côté est formée sur la partie de support (2) à laquelle des câbles de projection sont attachés qui mènent à l'au moins un élément d'émetteur et à l'au moins un élément de récepteur.

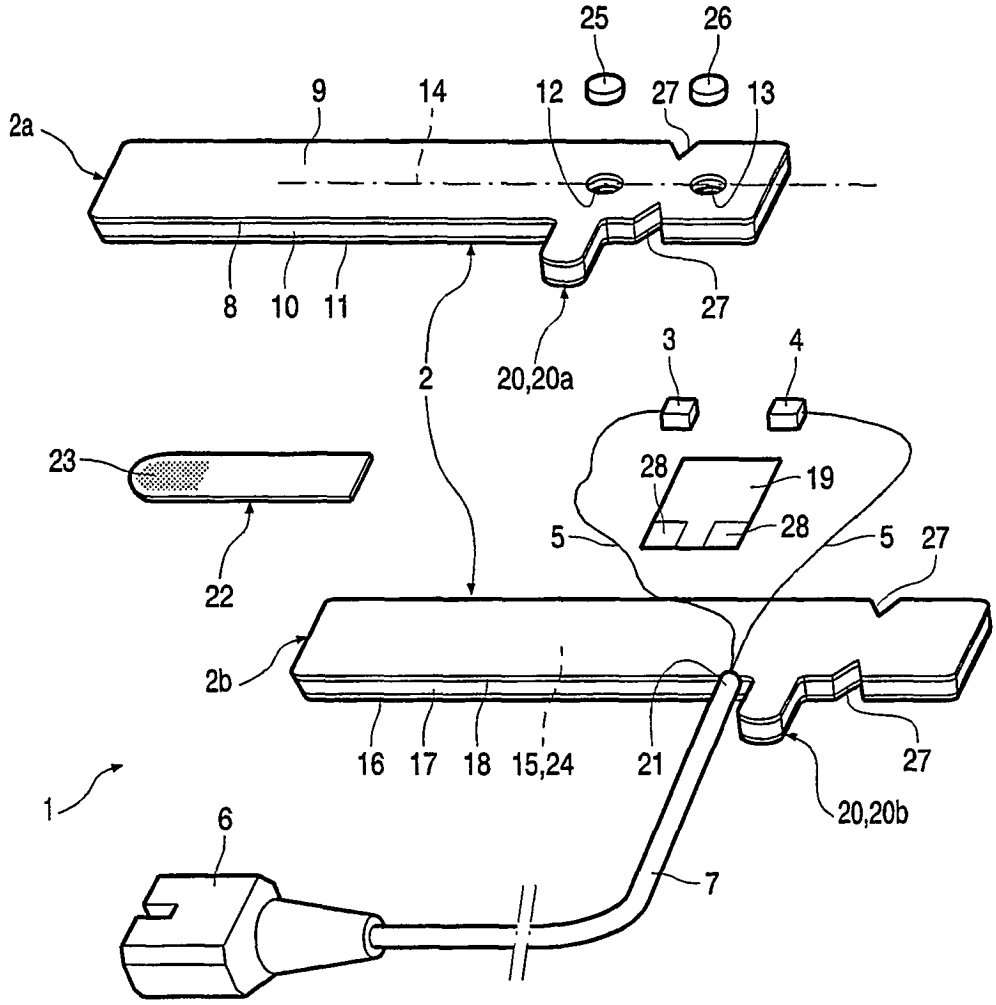
25
26
9
14
12
27
13
2a
8
10
11
27
2
20,20a
3
4
23
28
19
28
5
5
27
22
2b
16
17
18
15,24
21
27
20,20b
1
6
7

FIG.1

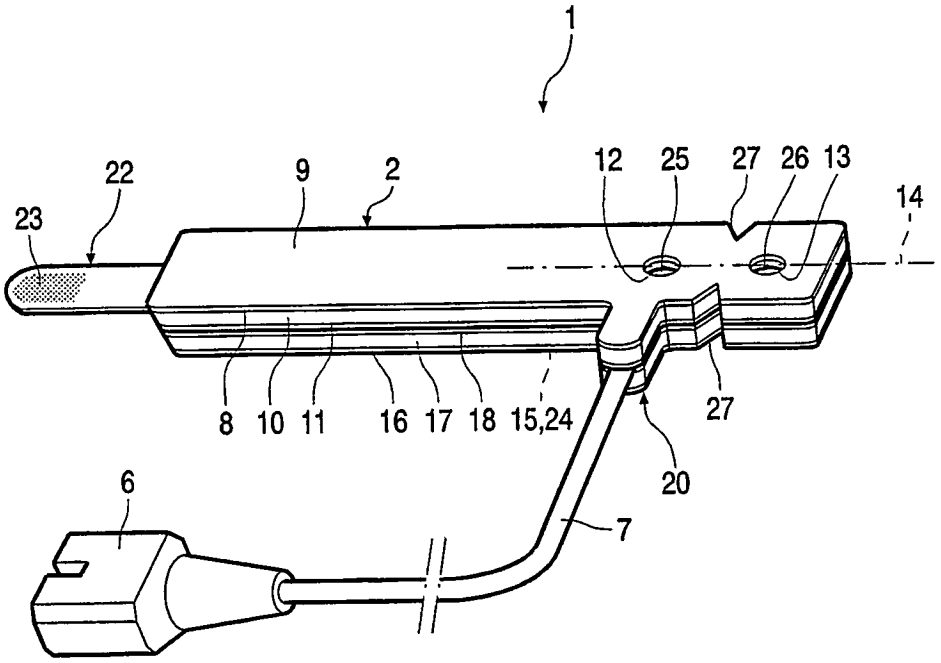

FIG.2

REFERENCES CITED IN THE DESCRIPTION

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专利名称(译)	医疗传感器		
公开(公告)号	EP1592341B1	公开(公告)日	2008-12-31
申请号	EP2004707266	申请日	2004-02-02
[标]申请(专利权)人(译)	皇家飞利浦电子股份有限公司		
申请(专利权)人(译)	飞利浦知识产权及标准部GMBH 皇家飞利浦电子N.V.		
当前申请(专利权)人(译)	飞利浦知识产权及标准部GMBH 皇家飞利浦电子N.V.		
[标]发明人	SCHMID ALFONS C O PHILIPS IP & STANDARDS GMBH		
发明人	SCHMID, ALFONS, C/O PHILIPS IP & STANDARDS GMBH		
IPC分类号	A61B5/00 A61B3/00		
CPC分类号	A61B5/6843 A61B5/14552		
优先权	2003100243 2003-02-05 EP		
其他公开文献	EP1592341A1		
外部链接	Espacenet		

摘要(译)

本发明涉及一种医疗传感器（1），用于通过透射或反射方法中的电磁波测量脉冲，血液，组织和/或皮肤参数。传感器（1）具有条带和/或带状载体部分（2），其承载至少一个发射器元件和至少一个接收器元件。为了使传感器（1）可以不止一次地用在患者身上并且足够地固定以防止相对于身体部分的相对运动，载体部分（2）在内侧（9）上设置成与身体部分接触主体部分具有至少两个粘合体（25,26），它们彼此间隔开并且在测量期间粘附到主体部分上，而内侧面（9）的其余部分设计成基本上不粘合的。尊重身体的一部分。

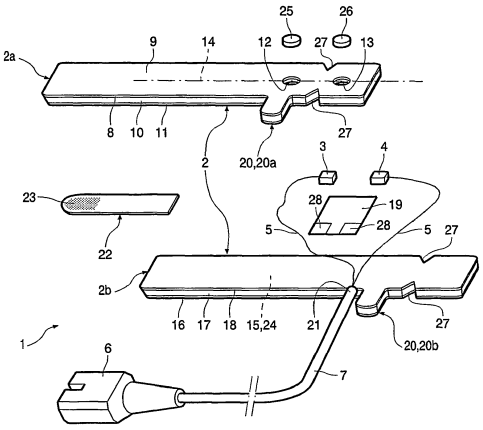

FIG.1