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(54) Swing lance with integrated sensor

Schwenklanzette mit integriertem Sensor

Lancette pivotante avec capteur intégré

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(56) References cited:
WO-A-02/101359 **US-A- 5 314 441**

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to body fluid monitoring devices, and more particularly to a lancing mechanism and body fluid collection system.

BACKGROUND OF THE INVENTION

[0002] It is often necessary to obtain a sample of a body fluid and perform an analysis of an analyte in that body fluid. Preferably, the obtaining of body fluid is as painless as possible, and the collection of the sample is as simple as possible. One example of a need to obtain a sample of a body fluid is in connection with a blood glucose monitoring system where a user must frequently use the system to monitor the user's blood glucose level.

[0003] Those who have irregular blood glucose concentration levels are medically required to regularly self-monitor their blood glucose concentration level. An irregular blood glucose level can be brought on by a variety of reasons including illness such as diabetes. The purpose of monitoring the blood glucose concentration level is to determine the blood glucose concentration level and then to take corrective action, based upon whether the level is too high or too low, to bring the level back within a normal range. The failure to take corrective action can have serious implications. When blood glucose levels drop too low - a condition known as hypoglycemia - a person can become nervous, shaky, and confused. That person's judgment may become impaired and that person may eventually pass out. A person can also become very ill if his blood glucose level becomes too high - a condition known as hyperglycemia. Both conditions, hypoglycemia and hyperglycemia, are both potentially life-threatening emergencies.

[0004] One method of monitoring a person's blood glucose level is with a portable, hand-held blood glucose testing device. The portable nature of these devices enables the users to conveniently test their blood glucose levels wherever they may be. To check the blood glucose level, a drop of blood is obtained from the fingertip using a separate lancing device. The lancing device contains a needle lance to puncture the skin. Once the requisite amount of blood is produced on the fingertip, the blood is harvested using the blood glucose testing device. The blood is drawn inside the testing device, which then determines the concentration of glucose in the blood. The results of the test are communicated to the user via a display on the testing device.

[0005] One problem related with the prior art devices containing a separate lance and sample collection mechanism i s that t he u ser m ust c arry b oth d evices w ith h im. T he need t o carry m ultiple d evices o pens the p ossibility o f forgetting o r 1 osing o ne o f the devices. If the user forgets to bring both the lance and the testing device with him, he will not be able to test his blood; adverse consequences may result.

[0006] Another problem with a monitoring a system comprising a lancing device to lance the skin and a separate collection unit to collect the blood is that there is a greater chance of contaminating the sample. The user must be careful that he does not contaminate the blood drop that forms on the lance site or contaminate the collection device used. If any contamination occurs, the test result may not accurately reflect the level of the glucose present in the tested blood.

[0007] A third problem with having a device for lancing and a separate device for collection is the size of the sample needed. Users prefer to make smaller cuts, also referred to as lance sites, on their skin to produce a blood sample. A smaller lance site is usually less painful to make than a larger lance site, and should heal more quickly than a larger lance site. Generally, a smaller lance site will produce a smaller blood sample. The smaller the sample, the more important proper collection of t he s ample becomes. And a smaller sample requires greater precision in placing the collection device relative to the lance site. If the collection device is not properly positioned relative to the lance site on the user's skin, the requisite amount of sample may not be collected. If the requisite amount of sample is not collected an underfill condition occurs. The results of analyzing an underfill will not accurately reflect the amount of glucose present in the sample, or in the user.

[0008] Another problem with current lancing devices is that accidental lancing may occur from the exposed lance. If the lance is exposed it may come into contact with the user's skin in a location that the user did not intend to serve as a lance site. This cut may be painful and limit the available locations for a lance site.

[0009] Accordingly, there exists the need of a device that combines lancing capability and collection capability into one instrument. The combination device should be suitable for lancing skin and aligning the collection device at the lance site, collecting a small sample of blood from a small lance site on the skin, and reducing risk of accidental lance sites being formed from an exposed lance.

[0010] From the prior art the following devices are known:

US 5,314,441 discloses a lancet device for implementing an incision comprising a hollow housing means, a pivot arm supporting a blade located within said housing means, biasing means for biasing said pivot arm from a first position to a second position within said housing means, a guide within said housing means for guiding the path of said pivot arm from a first position to a second position, the guide causing a blade to emerge from the housing, create an incision with a slicing motion and return into the housing wherein the blade follows a generally tear drop shaped path between the first and the second position.

WO 02/101359 A2 discloses a simple miniaturized disposable test module for monitoring glucose or other analytes successively for multiple times. The apparatus is designed to collect and test small volumes of blood in a single step. It is further disclosed an apparatus for collecting blood from a patient's skin, the apparatus comprising a housing including a plurality of sampling segments, each sampling segment comprises a sampling port, a lancet having a tip, the tip adjacent the sampling port, the lancet maintained within the housing and operable to extend the lancet tip through the sampling port to pierce the patient's skin positioned adjacent the sampling port, and a sample test chamber in fluid communication with the sampling port, the sample test chamber associated with testing means. The blood sampling system allows integrated lancing of the skin, collection of blood, testing of the blood, display of information about the blood, and advancement of the apparatus to bring another sampling segment online.

SUMMARY OF THE INVENTION

[0011] An apparatus for lancing skin and collecting a liquid sample, having a housing with an outer periphery. The apparatus contains a rotatable arm having a lance to puncture the skin and a sample collection chamber attached to the arm. The arm of the apparatus rotates from a first position to a second position. As the arm rotates, the lance extends beyond the housing allowing the lance to contact the user's skin and create a lance site. As the arm continues to move to the second position, the lance is brought out of contact with the user's skin and back within the housing. When the arm is located in the second position, the collection area is in substantially the same location as the lance site on the user's skin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Other objects and advantages of the invention will become apparent upon reading the following detailed description in conjunction with the drawings in which:

FIG. 1 is a side view of an apparatus for sampling fluid and showing a housing and a rotatable arm.

FIG. 2 is a side view of the apparatus shown in FIG. 1 with the arm in a first position with the lance in the housing.

FIG. 3 is a side view of the apparatus shown in FIG. 2 as the arm rotates from the first position to a second position with the lance extended and lancing a site.

FIG. 4 is a side view of the apparatus of FIG. 3 with the arm in the second position with the lance in the housing and a collection area positioned at the lance site.

FIG. 5A shows a top view of an alternate embodiment of the present invention in which a sample collection area can be removed from the apparatus.

FIG. 5B illustrates the embodiment of FIG. 5A as a new sample collection area is being loaded into the apparatus.

FIG. 5C illustrates the embodiment of FIG. 5A as the lance is extended beyond the outer periphery of the housing of the apparatus.

FIG. 5D illustrates the embodiment of FIG. 5A with the sample collection area positioned in substantially the same position as the lance site that was made as shown in FIG. 5C.

DETAILED DESCRIPTION OF THE DRAWINGS

[0013] As discussed in the background section, the need to obtain a sample of blood and perform an analysis of that sample occurs frequently for persons with various medical conditions. Many people who suffer from conditions such as diabetes must regularly test the level of glucose contained in their blood. One way to perform this test would be with a device that combines the operation of lancing the skin and collecting the sample.

[0014] Referring now to FIG. 1, an apparatus 10 for lancing skin and collecting a liquid sample is illustrated. The apparatus 10 has a housing 8 with an outer periphery 23. A movable arm 11 is connected in the housing 8 to swing in a predefined path. Connected to movable arm 11 is a lance 12 and a sample collection area 13. As the arm 11 swings, the lance 12 is sequentially extended beyond the outer periphery 23 and retracted into housing 8.

[0015] Referring now to FIG. 2, the arm 11, which comprises the lance 12, and the collection area 13, pivots about point 22 as the arm 11. swings from a first position to a second position. The lance 12 has a sharp penetration end 14 that is capable of lancing a user, thereby creating a lance site on the skin to obtain a liquid sample for analysis. In a preferred embodiment, the lance 12 is a flat surface lying in the plane of rotation of the arm 11. The flat surface is useful to stabilize the lance 12 relatively to the arm 11. The collection area 13 is used to collect a liquid sample that forms at the lance site created by the lance 12. The second position of the arm 11 is predetermined to position the collection area 13 at the lance site created as the arm 11 rotates tot he second rotation.

[0016] In one embodiment of the current invention, the collection area 13 includes a capillary channel 15 through which the sample moves as it is collected. As the sample moves up the capillary channel 15, displaced air exits from the capillary channel 15 via a vent hole 17. In the illustrated embodiment, the collection area 13 includes a biosensor 16.

[0017] When an electrochemical biosensor is used, the biosensor 16 contains a reagent designed to react with the analyte in the sample and produce a change in current. The change in current is measured across traces 18 and 19. Additional detail concerning electrochemical biosensors is found in commonly owned U.S. Patent No. 5,759,364. The change in current is measured by a meter

coupled to terminals 20 and 21 of traces 18 and 19 coupled to electrodes (not shown) in the capillary.

[0018] The collection area 13 may be provided with the biosensor 16 having a reaction area that includes a reagent for producing a reaction with an analyte within the liquid sample 25. The reaction is indicative of the concentration of the analyte within that sample. In the case of a glucose tester, the reagent could be a mixture containing glucose oxidase and potassium ferricyanide. In one embodiment of the current invention, the biosensor is an electrochemical sensor. An optical sensor may also be used to analyze the liquid sample.

[0019] Another suitable biosensor is a colorimetric sensor; details of which is described in U.S. Patent No. 5,723,284.

[0020] To obtain a sample of blood, the user places the apparatus 10 on his skin 24 at a site t o 1 ance. I n FIG. 2, the apparatus 1 0 i s applied t o the skin 24 of the user. The rotatable arm 11 is shown in a first position. Next, the user activates the device by for example, pressing the trigger mechanism on the apparatus 10 (not shown). Pressing the trigger releases a torsion spring (not shown) that forces the arm 11 to rotate from the first position to a second position. The arm 11 is, in the illustrated embodiment, a pendulum that swings through a predefined arc about pivot point 22.

[0021] Referring now to FIG. 3, the arm 11 is between the first position and the second position. The penetration end 14 of the lance 12 extends beyond the outer periphery 23 of the housing 8 to cut the skin 24 to a predetermined depth and create a lance site. The lance site on the skin 24 allows a liquid sample 25 (see FIG. 4) to form near the lance site.

[0022] Referring now to FIG. 4, the arm 11 rotated to the second position. The second position is a predefined stopping point for the pendulum 11 that positions the collection area 13 over the lance site to collect the sample 25. At the second position, the penetration end 14 of lance 12 is within the housing 8. The collection area 13 is in substantially the same location of the skin 24 at which the penetration end 14 of the lance 12 created the lance site. When the sample collection area 13 is over the lance site in the skin 24, the liquid sample 25 is able to move into the sample collection area 13 via capillary channel 15, or be contacted by other sample structure used instead of the collection area. Figures 1-4 illustrate the collection area 13 spaced apart from the lance 12. In some embodiments, the lance penetration end 14 and collection area 13 are colocated.

[0023] A rotating lance, such as for example illustrated in FIGS. 1-4, can be combined with structure for storing a plurality of disposable sensors, in for example a cartridge. Referring now to FIG. 5A a top view of such an apparatus 40 for lancing skin and positioning a disposable sensor to collect a liquid sample. The apparatus 40 has a housing 42 with an outer periphery 44. The apparatus 40 comprises a rotatable arm 46 (or disc 46) having a lance 48 and a nest 50 for receiving a disposable sensor. The housing 42 contains cartridge 52 comprising a stack of disposable sensors. The disc 46 is adapted to rotate three hundred and sixty degrees within the housing 42. In FIG. 5A, the cartridge 52 is sealed against the disc 46 and the lance 48 is stored.

[0024] Referring now to FIG. 5B, arm 46 is rotated ninety degrees clockwise from the position shown in FIG. 5A. The nest 50 is located under the cartridge 52 so that a new sensor can be loaded. The sensor is pushed into the nest 50 by spring pressure from within the cartridge 52. The lance 48 is still located within the housing 42 and the lance drive, e.g., a spring, is cocked.

[0025] Referring now to FIG. 5C, the disc 46 is rotated ninety degrees clockwise from the position shown in FIG. 5B. The lance 48 is extended beyond the outer periphery 44 of the housing 42 to puncture the skin. A sensor 53 ejected from cartridge 52 is shown on nest 50. The cartridge 52 comprising the stack of disposable sensors has not been moved and is again sealed against the disc 46.

[0026] Referring now to FIG. 5D, the movable disc 46 is rotated ninety degrees clockwise from the position shown in FIG. 5C. The lance 48 is stored within the housing 42. The sensor 53 positioned on nest 50 is positioned so that it is in substantially the same location as the lance site created by the lance 48. In this position of the disc 46, sensor 53 collects the liquid sample.

[0027] The disc 46 is rotated ninety more degrees clockwise to eject the now used sensor 53 and store the nest 50. The disc 46 is then in the position shown in FIG. 5A.

[0028] Further details concerning disposable sensors and device for dispensing sensors is found in U.S. Patent Nos. D456,514; 6,316,264; 5,854,074; 5,810,199; and 5,632,410.

[0029] While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings herein described in detail. It should be understood, however, that it is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the scope of the invention as defined by the appended claims.

Claims

1. An apparatus (10) for lancing skin and collecting a liquid sample (25) comprising:

   a housing (8) sized to be handheld and having an outer periphery (23);
   a rotatable arm (11) rotatably positioned in the housing (8) and having an end movable from a first predefined position to a second predefined position;
   a lance (12) for lancing skin (24), the lance (12) being movable with the end of the rotatable arm

(11), the lance (12) being fully within the outer periphery (23) of the housing (8) when the end of the rotatable arm (11) is in the first predefined position and the lance (12) extends beyond the outer periphery (23) of the housing (8) as the arm (11) is rotating from the first predefined position to the second predefined position to create a lance site in skin (24) of a user;

characterized in
a sample collection area (13) movable with the end of the arm (11) in general fixed relation to the lance (12) as the arm (11) moves from the first predefined position to the second predefined position, the sample collection area (13) being positioned within an effective range of the lance site to collect the liquid sample (25) from the lance site when the arm (11) is at the second predefined position.

2. The apparatus (10) of Claim 1, wherein the sample collection area (13) overlaps at least a portion of the lance site when the arm is at the second predefined position.

3. The apparatus (10) of Claim 1 or 2, wherein the end of the arm (11) moves in an arc from the first predefined position to the second predefined position.

4. The apparatus (10) of Claim 3, wherein the end of the arm (11) moves in a continuous motion from the first predefined position to the second predefined position after being released.

5. The apparatus (10) of one of the Claims 1 to 4, wherein the sample collection area (13) comprises a biosensor (16).

6. The apparatus (10) of Claim 5, wherein the biosensor (16) is an electrochemical biosensor.

7. The apparatus (10) of Claim 5, wherein the biosensor (16) is an optical biosensor.

8. The apparatus (10) of one of the Claims 1 to 7, wherein the sample collection area (13) includes a capillary channel (15) for collecting the sample and moving the sample to a reaction area within the collection area (13), the reaction area having a reagent for producing a reaction with an analyte in the sample indicative of the concentration of the analyte in the sample (25).

9. The apparatus (10) of one of the Claims 1 to 8, wherein the lance (12) comprises a generally flat blade end (14).

10. The apparatus (10) of Claim 9, wherein the lance (12) lies along the arm (11) and the generally flat blade end (14) extends beyond the end of the arm (11).

11. The apparatus (10) of one of the Claims 1 to 10, wherein the arm (11) comprises a nest at the end of the arm (11) in fixed relation to the lance (12) and a disposable sensor comprising the sample collection area is positioned in the nest.

12. The apparatus (10) of one of the Claims 1 to 11, wherein the sample collection area (13) includes a mixture containing glucose oxidase and potassium ferricyanide.

13. The apparatus of one of the Claims 1 to 12, wherein the end of the rotatable arm (11) is adapted to move in a single direction from the first predefined position to the second predefined position in creating a lance site and positioning the sample collection area (13).

14. The apparatus of one of the Claims 1 to 12, wherein the sample collection area (13) is distinct and separate from the lance (12).

Patentansprüche

1. Vorrichtung (10) zum Durchstechen von Haut mit einer Lanzette und zum Sammeln einer flüssigen Probe (25), wobei die Vorrichtung Folgendes umfasst:

ein Gehäuse (8), das die Größe eines Handgeräts und einen Außenumfang (23) aufweist;
einen schwenkbaren Arm (11), der schwenkbar in dem Gehäuse (8) angeordnet ist und ein Ende aufweist, das von einer ersten vordefinierten Position in eine zweite vordefinierte Position bewegbar ist;
eine Lanzette (12) zum Durchstechen von Haut (24), wobei die Lanzette (12) mit dem Ende des schwenkbaren Arms (11) bewegbar ist und sich vollständig innerhalb des Außenumfangs (23) des Gehäuses (8) befindet, wenn sich das Ende des schwenkbaren Arms (11) in der ersten vordefinierten Position befindet, und sich über den Außenumfang (23) des Gehäuses (8) hinaus erstreckt, wenn der Arm (11) von der ersten vordefinierten Position in die zweite vordefinierte Position schwenkt, um eine Durchstichstelle in der Haut (24) eines Anwenders zu erzeugen;
gekennzeichnet durch
einen Probensammelbereich (13), der mit dem Ende des Arms (11) in einer im Wesentlichen fixierten Beziehung zu der Lanzette (12) bewegbar ist, wenn sich der Arm (11) von der ersten vordefinierten Position in die zweite vordefinierte Position bewegt, wobei der Probensammelbereich (13) innerhalb eines Wirkbereichs der

Durchstichstelle befindet, um die flüssige Probe (25) aus der Durchstichstelle zu sammeln, wenn sich der Arm (11) in der zweiten vordefinierten Position ist.

2. Vorrichtung (10) nach Anspruch 1, worin der Probensammelbereich (13) mit zumindest einem Teil der Durchstichstelle überlappt, wenn sich der Arm in der zweiten vordefinierten Position befindet.

3. Vorrichtung (10) nach Anspruch 1 oder 2, worin sich das Ende des Arms (11) in einem Bogen von der ersten vordefinierten Position in die zweite vordefinierte Position bewegt.

4. Vorrichtung (10) nach Anspruch 3, worin sich das Ende des Arms (11) nach der Freigabe in einer kontinuierlichen Bewegung von der ersten vordefinierten Position in die zweite vordefinierte Position bewegt.

5. Vorrichtung (10) nach einem der Ansprüche 1 bis 4, worin der Probensammelbereich (13) einen Biosensor (16) umfasst.

6. Vorrichtung (10) nach Anspruch 5, worin der Biosensor (16) ein elektrochemischer Biosensor ist.

7. Vorrichtung (10) nach Anspruch 5, worin der Biosensor (16) ein optischer Biosensor ist.

8. Vorrichtung (10) nach einem der Ansprüche 1 bis 7, worin der Probensammelbereich (13) einen Kapillarkanal (15) zum Sammeln der Probe und zum Bewegen der Probe in einen Reaktionsbereich innerhalb des Probensammelbereichs (13) umfasst, wobei der Reaktionsbereich ein Reagens aufweist, um eine Reaktion mit einem Analyt in der Probe hervorzurufen, die die Konzentration des Analyts in der Probe (25) anzeigt.

9. Vorrichtung (10) nach einem der Ansprüche 1 bis 8, worin die Lanzette (12) ein im Allgemeinen flaches Klingenende (14) aufweist.

10. Vorrichtung (10) nach Anspruch 9, worin die Lanzette (12) entlang des Arms (11) angeordnet ist und sich das im Wesentlichen flache Klingenende (14) über das Ende des Arms (11) hinaus erstreckt.

11. Vorrichtung (10) nach einem der Ansprüche 1 bis 10, worin der Arm (11) am Ende des Arms (11) ein Nest in einer fixierten Beziehung zu der Lanzette (12) umfasst, und ein Einwegsensor, der den Probensammelbereich umfasst, in dem Nest angeordnet ist.

12. Vorrichtung (10) nach einem der Ansprüche 1 bis 11, worin der Probensammelbereich (13) ein Gemisch umfasst, das Glucoseoxidase und Kaliumferricyanid enthält.

13. Vorrichtung nach einem der Ansprüche 1 bis 12, worin das Ende des schwenkbaren Arms (11) geeignet ist, um sich von der ersten vordefinierten Position in eine einzige Richtung in die zweite vordefinierte Position zu bewegen, wobei eine Durchstichstelle geschaffen und der Probensammelbereich (13) positioniert wird.

14. Vorrichtung nach einem der Ansprüche 1 bis 12, worin der Probensammelbereich (13) separat und von der Lanzette (12) beabstandet ausgebildet ist.

Revendications

1. Appareil (10) pour inciser la peau et recueillir un échantillon de liquide (25), comprenant :

un boîtier (8) ayant des dimensions permettant de le tenir à la main et ayant une périphérie extérieure (23) ;
un bras rotatif (11) positionné de manière apte à la rotation dans le boîtier (8) et ayant une extrémité mobile d'une première position prédéfinie à une seconde position prédéfinie ;
une lancette (12) pour inciser la peau (24), la lancette (12) étant mobile avec l'extrémité du bras rotatif (11), la lancette (12) était située intégralement à l'intérieur de la périphérie extérieure (23) du boîtier (8) lorsque l'extrémité du bras rotatif (11) est dans la première position prédéfinie et la lancette (12) s'étendant au-delà de la périphérie extérieure (23) du boîtier (8) lorsque le bras (11) est en rotation de la première position prédéfinie à la seconde position prédéfinie pour créer un site d'incision dans la peau (24) d'un utilisateur ;
caractérisé par
une zone de prélèvement d'échantillon (13) mobile avec l'extrémité du bras (11) en relation fixe générale avec la lancette (12) lorsque le bras (11) se déplace de la première position prédéfinie à la seconde position prédéfinie, la zone de prélèvement d'échantillon (13) étant positionnée à l'intérieur d'un intervalle efficace du site d'incision pour recueillir l'échantillon de liquide (25) à partir du site d'incision lorsque le bras (11) est à la seconde position prédéfinie.

2. Appareil (10) suivant la revendication 1, dans lequel la zone de prélèvement d'échantillon (13) chevauche au moins une partie du site d'incision lorsque le bras est à la seconde position prédéfinie.

3. Appareil (10) suivant la revendication 1 ou 2, dans

lequel l'extrémité du bras (11) se déplace suivant un arc de la première position prédéfinie à la seconde position prédéfinie.

4. Appareil (10) suivant la revendication 3, dans lequel l'extrémité du bras (11) se déplace suivant un mouvement continu de la première position prédéfinie à la seconde position prédéfinie après sa libération.

5. Appareil (10) suivant l'une des revendications 1 à 4, dans lequel la zone de prélèvement d'échantillon (13) comprend un biocapteur (16).

6. Appareil (10) suivant la revendication 5, dans lequel le biocapteur (16) est un biocapteur électrochimique.

7. Appareil (10) suivant la revendication 5, dans lequel le biocapteur (16) est un biocapteur optique.

8. Appareil (10) suivant l'une des revendications 1 à 7, dans lequel la zone de prélèvement d'échantillon (13) comprend un canal capillaire (15) pour recueillir l'échantillon et entraîner l'échantillon à une zone réactionnelle à l'intérieur de la zone de prélèvement (13), la zone réactionnelle comprenant un réactif pour produire une réaction avec un analyte présent dans l'échantillon, indiquant la concentration de l'analyte dans l'échantillon (25).

9. Appareil (10) suivant l'une des revendications 1 à 8, dans lequel la lancette (12) comprend une extrémité de lame généralement plate (14).

10. Appareil (10) suivant la revendication 9, dans lequel la lancette (12) s'étend le long du bras (11) et l'extrémité de lame généralement plate (14) s'étend au-delà de l'extrémité du bras (11).

11. Appareil (10) suivant l'une des revendications 1 à 10, dans lequel le bras (11) comprend une logette à l'extrémité du bras (11) en relation fixe avec la lancette (12), et un capteur jetable comprenant la zone de prélèvement d'échantillon est positionné dans la logette.

12. Appareil (10) suivant l'une des revendications 1 à 11, dans lequel la zone de prélèvement d'échantillon (13) comprend un mélange contenant de la glucose-oxydase et du ferricyanure de potassium.

13. Appareil (10) suivant l'une des revendications 1 à 12, dans lequel l'extrémité du bras rotatif (11) est conçue pour se déplacer dans une seule direction de la première position prédéfinie à la seconde position prédéfinie en créant un site d'incision et en positionnant la zone de prélèvement d'échantillon (13).

14. Appareil (10) suivant l'une des revendications 1 à 12, dans lequel la zone de prélèvement d'échantillon (13) est distincte et séparée de la lancette (12).

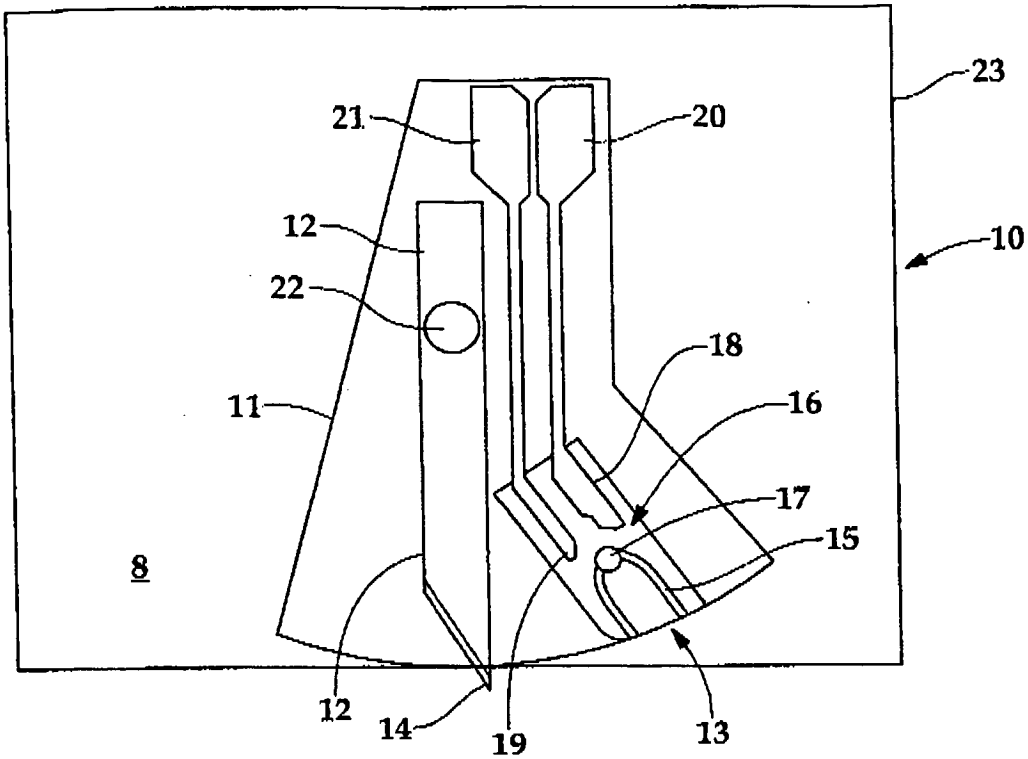
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Fig.1

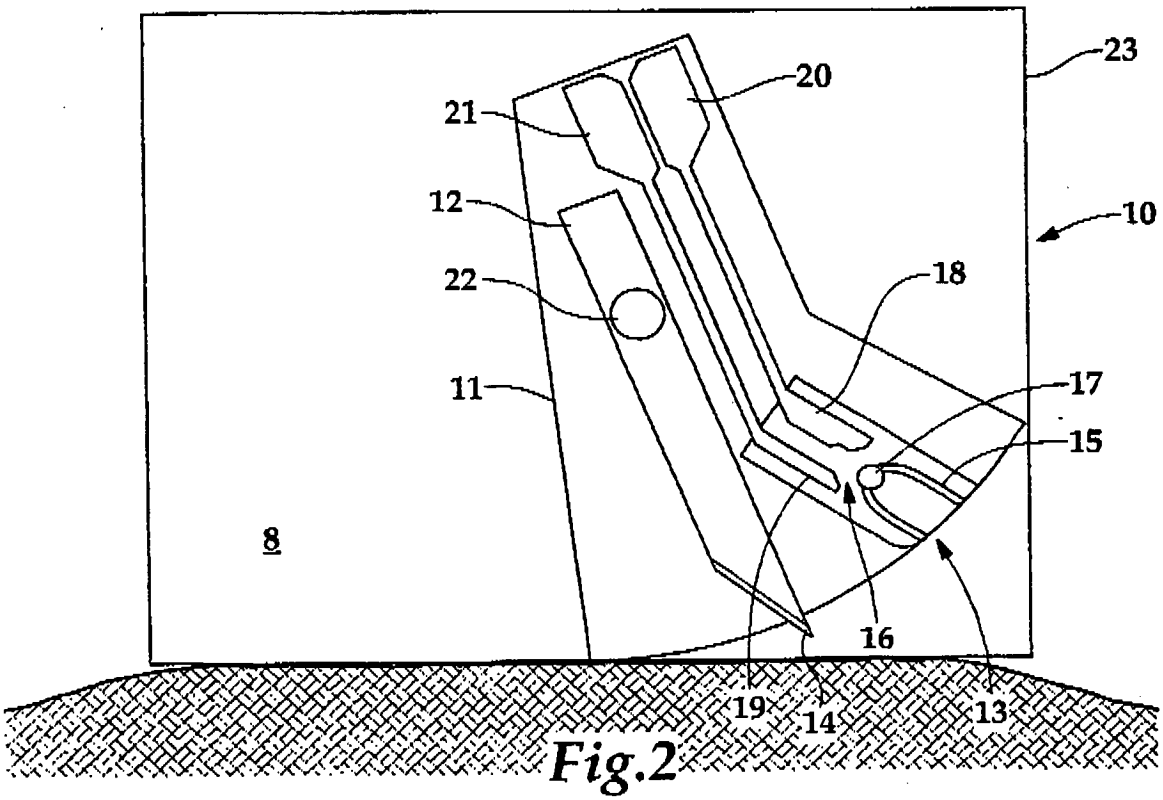
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Fig.2

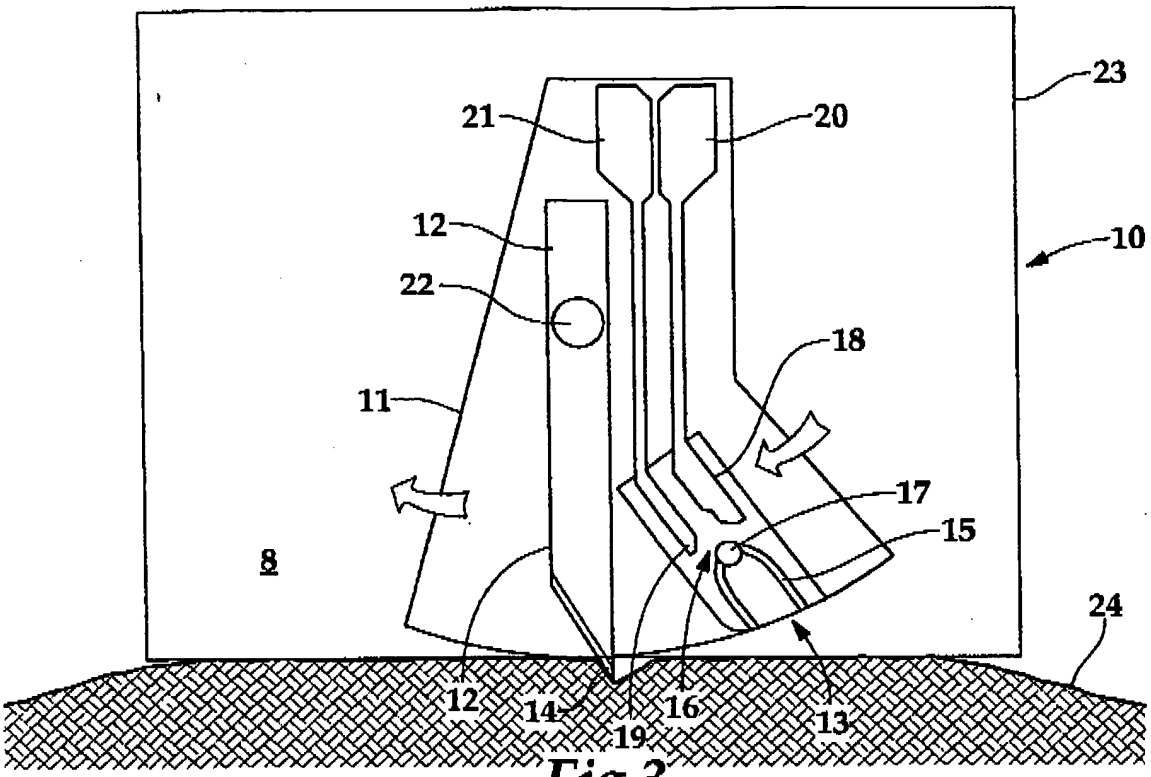
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Fig.3

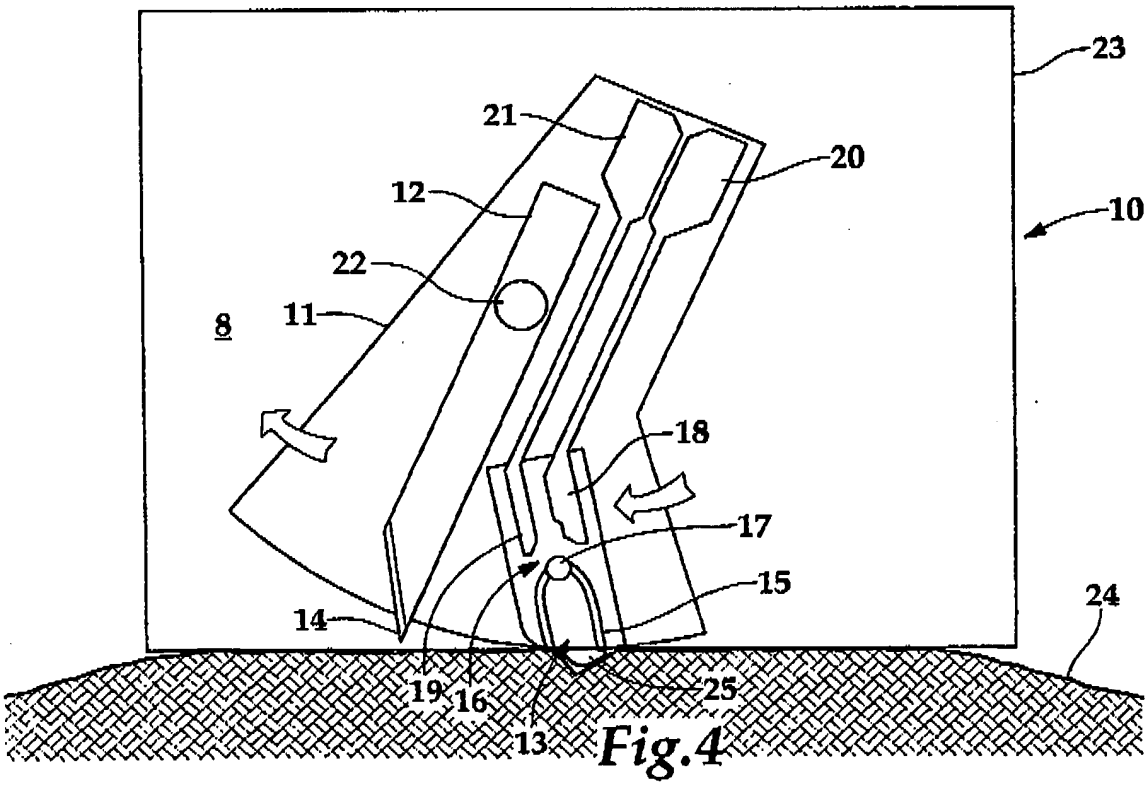
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Fig.4

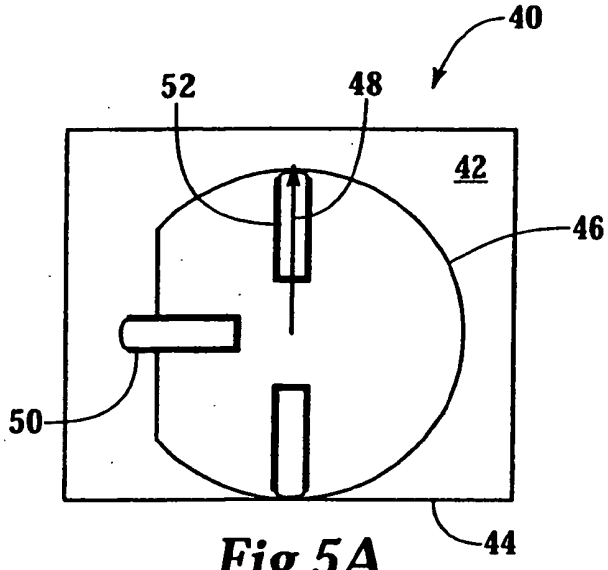

Fig.5A

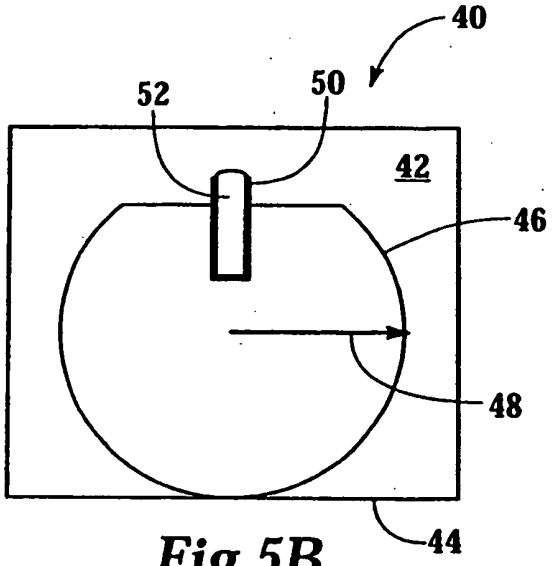

Fig.5B

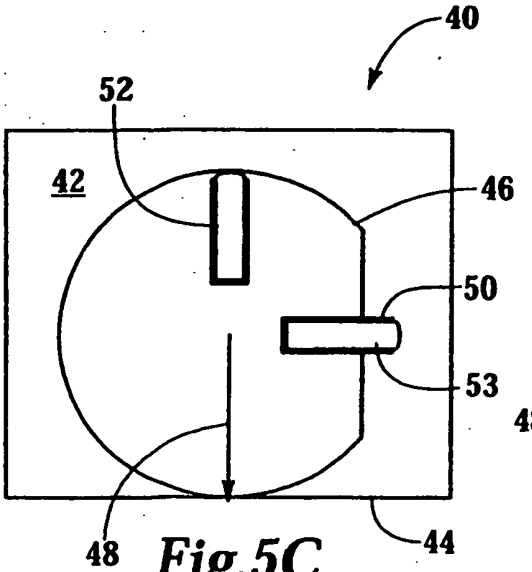

Fig.5C

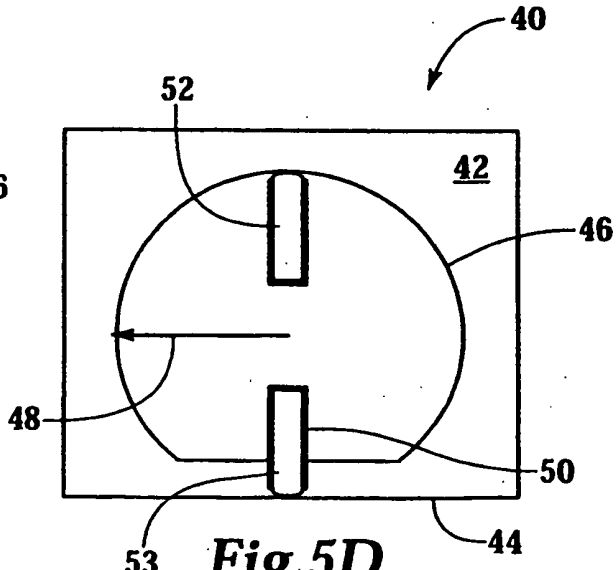

Fig.5D

REFERENCES CITED IN THE DESCRIPTION

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专利名称(译)	带集成传感器的摆动喷枪		
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IPC分类号	A61B5/15 A61B5/00 A61B5/151 A61B5/145 A61B5/1473 A61B5/157		
CPC分类号	A61B5/157 A61B5/14532 A61B5/150022 A61B5/150213 A61B5/150442 A61B5/15113 A61B5/15117 A61B5/15151 A61B5/15174		
优先权	60/490019 2003-07-28 US		
其他公开文献	EP1502547A1		
外部链接	Espacenet		

摘要(译)

一种用于切开皮肤并收集液体样本的装置。该装置具有带有外周边的壳体和可旋转的臂，该臂具有刺穿皮肤的喷枪。样本收集区域连接到手臂。装置的臂从第一位置旋转到第二位置。当臂旋转时，矛杆延伸超出壳体，允许矛杆接触使用者的皮肤并形成喷枪部位。随着手臂继续移动到第二位置，当收集区域被带到适当位置时，矛杆不会与使用者的皮肤接触并返回到壳体内。当臂位于第二位置时，收集区域与用户皮肤上的矛状部位基本相同。

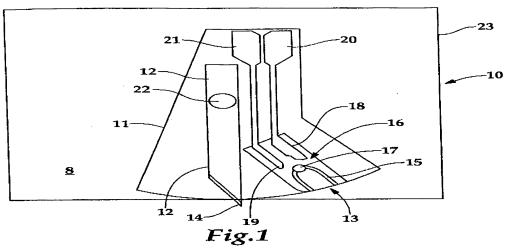

Fig.1

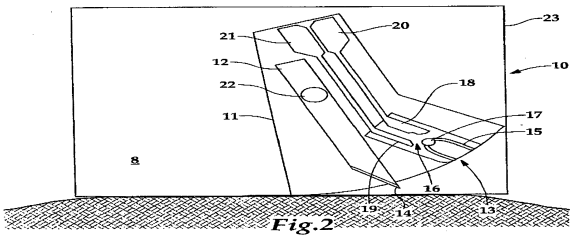

Fig.2