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(54) **Test sensor with thin lancet**

Prüfsensor mit dünner Lanzette

Capteur de test avec une lance mince

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US-A- 4 787 398
US-A- 5 047 044
US-A- 6 071 294

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to blood monitoring devices, and, more particularly, to a test sensor having a thin lance for obtaining a sample of blood.

BACKGROUND OF THE INVENTION

[0002] It is often necessary to quickly obtain a sample of blood and perform an analysis of the blood sample. One example of a need for painlessly obtaining a sample of blood 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 their 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. A prior art blood glucose testing device 100 is illustrated in FIG. 1. The portable nature of these devices 100 enables the users to conveniently test their blood glucose levels wherever the user may be. The glucose testing device contains a test sensor 102 to harvest the blood for analysis. The device 100 contains a switch 104 to activate the device 100 and a display 106 to display the blood glucose analysis results. In order to check the blood glucose level, a drop of blood is obtained from the fingertip using a lancing device. A prior art lancing device 120 is illustrated in FIG. 2. The lancing device 120 contains a needle lance 122 to puncture the skin. Some lancing devices implement a vacuum to facilitate the drawing of blood. Once the requisite amount of blood is produced on the fingertip, the blood is harvested using the test sensor 102. The test sensor 102, which is inserted into a testing unit 100, is brought into contact with the blood drop. The test sensor 102 draws the blood to the inside of the test unit 100 which then determines the concentration of glucose in the blood. Once the results of the test are displayed on the display 106 of the test unit 100, the test sensor 102 is discarded. Each new test requires a new test sensor 102.

[0005] One problem associated with some conventional lancing devices is that the user who regularly self-tests is required to carry at least two instruments - a lance and a test unit. This places a greater burden on the user to remember to carry as well as to maintain two separate devices. Further, a greater amount of space is occupied on the user's person. There can also be an increased expense associated with two separate units.

[0006] Another problem associated with some conventional blood glucose monitoring devices is that the user's blood physically contacts the elements within the testing unit. Cross-contamination can be a problem if the monitoring device is used by more than one user such as in a doctor's office or other clinical setting.

[0007] US 4, 787,398 discloses a hand-held shirt-pocket portable glucose medical monitoring system for checking measurement of blood glucose or other body qualities. The system includes a disposable diagnostic reagent-lancet unit which carries a chemical reagent strip of blood reacting chemistry. The system includes a housing structure having a visual LCD readout, a microprocessor, and photosensing circuitry which measures the change of color of the blood reacting chemistry of the disposable unit. The housing also includes a spring arrangement for actuating a lancet onto the skin for sampling and transporting blood from a finger to a chemical reagent. The lancet is urged forward with sufficient force for puncturing a bottom plate sterility barrier and subsequentially the user skin for drawing of blood by means of a hammer which is propelled by a spring arrangement.

[0008] US 5, 047,044 discloses a novel medical whole blood and other liquid analyzing system which requires only a droplet of blood or other liquid for analysis. The test instrument is portable. Spaced lancet receiving compartments (one for each sensor) exist in longitudinal spaced orientation. One spring-shaped lancet is confined to the hollow lancet compartment of each sensor of a series packet of sensors. Each lancet is placed in its compartment in a cocked position. The spring segment of the lancet is wound in such a way as to permit the inertia of released caused lancet point to overtravel its normal unstressed position to accomplish the lancing. After lancing, the memory of the material from which the lancet is formed, retracts the lancet tip back into the compartment.

[0009] US 4,627,445 discloses a hand-held shirt-pocket portable medical diagnostic system for checking measurement of blood glucose or other blood qualities. The system includes the engagement of a disposable needle or lance probe package which carries a chemical reagent strip such as blood reacting chemistry. The system includes a pen structure having a visual readout, a microcomputer, and photosensing circuitry which measures the change of color of the blood reacting chemistry of the disposable probe package. The pen also includes a spring arrangement for actuating a needle or lance into the skin for transferring blood from a finger or other area

to the chemical reagent strip. In one embodiment a disposable unit of the system consists of a lance, a probe and a reagent strip inserted into the system. The top end of the lance is held by a lance holder. Pushing a button releases a latch. A plunger is forced down hitting the lance holder. The lance punctures the finger and ruptures capillary blood vessels. By action of a spring, the lance holder returns immediately to its neutral position, retracting the lance.

[0010] US 6,071,294 discloses a lancet cartridge for sampling blood. The cartridge has a cartridge case, a lancet and associated with the cartridge case an analytical region for analyzing the property of blood. The lancet has a tip for lancing the skin and is housed in the cartridge case. The lancet is operatively connected to the cartridge case such that the lancet can be pushed to extend its tip outside the cartridge case for lancing the skin to yield blood. The lancet is operatively connected to the cartridge case for movement. The lancet is mounted on a two-armed cantilever frame, the arms of the cantilever frame being about 20 mm long. The cantilever structure causes the lancet to move in a generally straight direction (parallel to the lancet axis) with negligible curving or non-linear motion, in order to pierce the skin with minimal tearing.

SUMMARY OF THE INVENTION

[0011] A test sensor for use in the determination of the concentration of a chemical in blood is provided. The test sensor comprises a thin test sensor adapted to collect a sample of blood through its inlet and a thin lance coupled to the thin test sensor and adapted to puncture skin. The lance has a base, a thin spring, a thin, generally U-shaped body with an interior edge and an exterior edge and a thin needle.

[0012] The first end of the spring is coupled to the base and the second end of the thin spring iscoupled to the interior edge of the U-shaped body and the thin needle is coupled to the exterior edge of the U-shaped body. The thin, generally U-shaped body has two sides which are force receiving members for providing movement of the thin needle.

[0013] The above summary of the present invention is not intended to represent each embodiment, or every aspect, of the present invention. Additional features and benefits of the present invention will become apparent from the detailed description, figures, and claims set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] 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 top view of a prior art blood glucose testing device-,

FIG. 2 is a perspective view of a prior art lance-,

FIG. 3 is a perspective view of a test sensor having a thin lance according to one embodiment of the present invention;

FIG, 4 is front view of a thin lance according to one embodiment of the present invention"

FIG. 5 is a perspective view of test sensor according to one embodiment of the present invention,

FIG. 6 is a cross-sectional view of the test sensor illustrated in FIG. 5

FIG. 7 is an embodiment of a blood glucose monitoring system for use in conjunction with a test sensor having a thin lance according to an alternative embodiment of the present invention"

FIG. 8 is a prospective view of an end cap and a blood glucose monitoring system for use in conjunction with a test sensor having a thin lance according to a second alternative embodiment of the present invention"

FIG. 9a is a cross-sectional view of the end cap illustrated in FIG. 8; and

FIG. 9b is a cross-sectional view of the end cap illustrated in FIG. 8 with the thin lance extended.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] Referring now to FIG. 3, a test sensor having a thin sensor and lance ("sensor/lance") 200 according to one embodiment of the present invention is illustrated. The sensor/lance 200 includes a thin test sensor 202 and a thin lance 203 The thin lance 203 has a base 204 which is coupled to the test sensor 202. The remainder of the thin lance 203 is movable allowing a thin needle 206 to travel downward to puncture a user's skin in order to produce a drop of the user's blood. The test sensor 202 has an inlet 208 through which blood is moved by capillary action into the test sensor 202. The test sensor 202 and the lance 203 are generally thin and flat and each have a thickness of approximately 0.15 mm (0.006 inch).

[0016] Referring also to FIG. 4, the thin lance 203 of the sensor/lance 200 will be described in greater detail. The illustrated embodiment of the thin lance 203 is formed out of a single piece of metal. A thin spring 212 couples the base 204 to a U-shaped member 216. The spring 212 has a first end 218 and a second end 220, the first end 218 of which is coupled to the base 204 and the second end is coupled to an interior 222 of the U-shaped member 216. The thin needle 206 is formed on an exterior 224 of the U-shaped member. The two sides of the U-shaped member are force receiving members 232,234 for providing movement to the thin needle 206.

[0017] In operation, when a user is testing the glucose concentration of blood, the test sensor 202 remains stationary within a testing device while a force is imparted on to a top portion 236,238 of each force receiving member 232,234. The force receiving members 232,234 are driven downward thus forcing the needle 206 downward

into the user's skin. Once the force is removed from the force receiving members 232,234, the spring 212 retracts the needle 206 from the users skin.

[0018] Referring also to FIGS. 5 and 6, the thin test sensor 202 will be described in greater detail. The test sensor 202 comprises a test chamber having a test area 240 disposed between a front panel 242 and a rear panel 244. The test area 240 is designed to allow blood to move from the inlet 208 up the test area 240 via capillary action. An adhesive 246 is disposed on the front panel 242 to adhere the base 204 of the thin lance 203 to the front panel 240.

[0019] A reagent is incorporated into the test sensor 202. The reagent is designed to react with the glucose in the blood which moves up the test area 240. The reaction produces a detectable signal which is indicative of the glucose concentration in the sample of blood. That signal is then measured by a sensor which can measure the concentration of the glucose in the blood based on the signal. The specific reagent incorporated into the test sensor 202 is a function of the type of sensing employed to determine the concentration of glucose in the blood. In the illustrated embodiment of the test sensor 202, electrochemical sensing is employed. The test sensor 202 includes a pair of electrodes 250 (FIG. 6). In electrochemical analysis, the change in current across the electrodes 250 caused by the reaction of the glucose and the reagent is indicative of the concentration of the glucose in the blood. The reaction of the glucose and the reagent creates an oxidation current at the electrodes 250 which is directly proportional to the user's blood glucose concentration. This current can be measured by an appropriate sensor coupled to a pair of terminals 252 corresponding to the electrodes 250 implemented in a glucose monitoring device for use with the sensor/lance 200. The glucose monitoring device can then communicate to the user the blood glucose concentration. An example of an electrochemical testing system is described in detail by commonly-owned U.S. Patent No. 5,723,284 entitled "Control Solution and Method for Testing the Performance of an Electrochemical Device for Determining the Concentration of an Analyte in Blood".

[0020] Referring now to FIG. 7, an application of the sensor/lance 200 is in an integrated blood glucose monitoring system 300 which integrates the lancing, the blood harvesting, and a blood glucose analyzer into a single instrument. The integrated blood glucose monitoring system 300 contains a plurality of sensors/lances 200 for use in a plurality of blood glucose self-tests. In operation, a user would activate the system 300 with a switch 304. A new thin sensor/lance 200 is advanced to the test end 302 of the system 300. The user would then press the test end 302 of the system against the user's skin and depress a trigger 306 causing a spring loaded member (not shown) to apply a force to the force receiving members 232,234 of the thin lance 203. The needle 206 would then extend through an opening 308 in the test end 302 of the system 300 to puncture the user's skin. After the needle 206 is fully extended out of the opening 308, the spring 214 would withdraw the needle from the laceration created in the user's skin through the opening 308. Blood emerging from the laceration created in the user's skin is moved from the inlet 208 by capillary action into the test sensor 202. Once the requisite blood sample has been obtained and the requisite time has elapsed for the reaction in the test sensor 202 to take place, the blood glucose monitoring system 300 measurers the signal produced by the reaction and determines the blood glucose concentration of the blood sample. The results of the analysis are communicated to the user via a display 3 10. The sensor/lance 200 is then ejected from the system 300 and discarded.

[0021] Referring now to FIGS. 8, 9a, and 9b, another application of the sensor/lance 200 is in a disposable, protective end cap 350. In a clinical setting, such as a medical doctor's office where the user is a doctor, nurse, or technician seeing multiple patients, cross contamination is a serious concern. Obviously, components of medical devices which come into contact with one patient's blood can not come into contact with the user or another patient. The end cap 350 protects those who handle the end cap 350 from coming into contact with the needle 206 and any blood disposed thereon after the sensor/lance 200 within the end cap 350 have been used. Only when actuated (during testing), does the needle 206 extend beyond the area bounded by the end cap 350. Accordingly, a user (doctor, nurse, technician) is protected from being punctured with the needle 206 when connecting the end cap 350 to or removing the end cap 350 from the sensor/lance 200.

[0022] A blood glucose monitoring system 360 for use with the disposable end cap 350 having a sensor/lance 200 disposed therein is also illustrated in FIG. 8. The device 360 contains a switch 362 to activate the device 360. A trigger 364 is provided to fire a spring loaded plunger 366 to contact the force receiving members 232,234 which in turn provide movement to the needle 206. The when actuated, the spring loaded plunger 366 rapidly moves downward a predetermined distance to move the force receiving members 232,234 and in turn the needle 206 a predetermined distance causing the needle 206 to extend beyond a test end 352 of the end cap 350 a distance about equal to the needle 206 penetration depth. The distance that the needle 206 extends beyond the test end 352 of the end cap 350 is preferably a distance sufficient to draw a sample of blood for analysis. Once the plunger forces the needle downward, the spring loaded plunger 366 retracts a distance allowing the needle 206 to retract back within the bounds of the disposable end cap 350. Meanwhile, the sample of blood moves though the inlet 208 disposed adjacent to the test end 352 of the end cap 350) of the test sensor 202. Once the requisite blood sample has been obtained and the requisite time has elapsed for the reaction in the test sensor 202, the blood glucose monitoring system 360 measurers the signal produced by the reaction and determines

the blood glucose concentration of the blood sample. The results of the analysis are communicated to the user via a display 368. The end cap 350 containing the used sensor/lance 200 is then removed from the system 300 and discarded. The end cap 350 and the blood glucose monitoring system 360 have suitable connectors 370, 372 for mating the end cap 350 with the blood glucose monitoring system 360.

[0023] Thus far, only electrochemical analysis to determine the glucose concentration of a blood sample has been discussed in conjunction with the present invention. However, the thin sensor/lance 200 of the present invention can be used with other types of blood glucose testing methods. For example, colorimetric testing may be implemented in the test sensor in conjunction with an alternative embodiment of the present invention. Colorimetric testing is described in commonly-owned U.S. Patent No. 5,723,284 entitled "Control Solution and Method for Testing the Performance of an Electrochemical Device for Determining the Concentration of an Analyte in Blood."

[0024] While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and will be described in detail herein. It should be understood, however, that it is not intended to limit the invention to the particular forms disclosed, but, to 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. A test sensor (200) for use in the determination of the concentration of a chemical in blood, the test sensor (200) comprising:

   a thin test sensor (202) having an inlet (208), the thin test sensor being adapted to collect a sample of blood through the inlet (208); and
   a thin lance (203) coupled to the thin test sensor (202), the lance (203) being adapted to puncture skin, wherein
   the thin lance (203) includes:
   a base (204);
   a thin spring (212) having a first end (218) and a second end (220), the first end (218) coupled to the base (204); **characterized by**
   a thin, generally U-shaped body (216) having an interior edge (222) and an exterior edge (224), the second end (220) of the thin spring (212) coupled to the interior edge (222) and a thin needle (206) coupled to the exterior edge (224);
   the thin, generally U-shaped body (216) having two sides which are force receiving members (232, 234) for providing movement of the thin needle (206).

2. The test sensor (200) of claim 1 wherein the thin test sensor (202) includes a reagent, the reagent being adapted to produce an electrochemical reaction, the thin test sensor (202) further comprising a pair of electrodes (250) coupled to the test area.

3. The test sensor (200) of claims 1 or 2 in combination with a monitoring system (300) adapted to measure the concentration of a chemical in the blood

4. The test sensor (200) of one of the claims 1 to 3 further comprising a protective housing surrounding the thin test sensor (202) and the thin lance (203).

5. The test sensor (200) of one of the claims 1 to 4 wherein the thin test sensor (202) has a thickness of about 0.15 mm (0.006 inch).

6. The test sensor (200) of one of the claims 1 to 5 wherein the thin lance (203) has a thickness of about 0.15 mm (0.006 inch).

7. The test sensor (200) of one of the claims 1 to 3 and 5 and 6 further comprising: a housing(350) having a test end (352) with an aperture disposed therein;
   the thin test sensor (202) disposed within the housing (350), the inlet (208) of the thin test sensor (202) disposed adjacent to the aperture in the test end (352); and
   the thin lance (203) being adapted to extend through the aperture in the test end (352) of the housing (350).

8. The test sensor (200) of claim 7 wherein the housing (350) is generally cylindrical in shape and substantially hollow.

9. The test sensor (200) of claim 7 or 8 wherein the housing (350) has an attachment end (270), the attachment end (270) being adapted to connect to a monitoring device (360).

10. The test sensor (200) of one of the claims 1 or 9 wherein the base (204), the thin spring (212), the U-shaped body (216) and the thin needle (206) are made of a single piece of metal.

11. The test sensor (200) of one of the claims 1 or 10 wherein the thin test sensor (202) is generally flat.

12. The test sensor (200) of one of the claims 1 or 11 wherein the thin lance (203) is generally flat.

Patentansprüche

1. Prüfsensor (200) zur Verwendung bei der Bestimmung der Konzentration einer Chemikalie in Blut,

wobei der Prüfsensor (200) Folgendes umfasst:

einen dünnen Prüfsensor (202) mit einem Einlass (208), wobei der dünne Prüfsensor ausgebildet ist, um eine Blutprobe durch den Einlass (208) aufzunehmen; und
eine dünne Lanzette (203), die mit dem dünnen Prüfsensor (202) gekoppelt ist, wobei die Lanzette (203) ausgebildet ist, um Haut zu durchstechen, worin:
die dünne Lanzette (203) Folgendes umfasst:
eine Basis (204);
eine dünne Feder (212) mit einem ersten Ende (218) und einem zweiten Ende (220), wobei das erste Ende (218) mit der Basis (204) gekoppelt ist; **gekennzeichnet durch**:
einen dünnen, im Allgemeinen U-förmigen Körper (216) mit einer Innenkante (222) und einer Außenkante (224), wobei das zweite Ende (220) der dünnen Feder (212) mit der Innenkante (222) gekoppelt ist und eine dünne Nadel (206) mit der Außenkante (224) gekoppelt ist;
wobei der dünne, im Allgemeinen U-förmige Körper (216) zwei Seiten aufweist, die kraftaufnehmende Elemente (232, 234) zur Durchführung der Bewegung der dünnen Nadel (206) sind.

2. Prüfsensor (200) nach Anspruch 1, worin der dünne Prüfsensor (202) ein Reagens umfasst, wobei das Reagens ausgebildet ist, um eine elektrochemische Reaktion hervorzurufen, und worin der dünne Prüfsensor (202) ferner ein Paar an Elektroden (250) umfasst, die an den Testbereich gekoppelt sind.

3. Prüfsensor (200) nach Anspruch 1 oder 2 in Kombination mit einem Überwachungssystem (300), das ausgebildet ist, um die Konzentration einer Chemikalie in dem Blut zu messen.

4. Prüfsensor (200) nach einem der Ansprüche 1 bis 3, ferner umfassend ein Schutzgehäuse, das den dünnen Prüfsensor (202) und die dünne Lanzette (203) umgibt.

5. Prüfsensor (200) nach einem der Ansprüche 1 bis 4, worin der dünne Prüfsensor (202) eine Dicke von etwa 0,15 mm (0,006 Zoll) aufweist.

6. Prüfsensor (200) nach einem der Ansprüche 1 bis 5, worin die dünne Lanzette (203) eine Dicke von etwa 0,15 mm (0,006 Zoll) aufweist.

7. Prüfsensor (200) nach einem der Ansprüche 1 bis 3 und 5 und 6, ferner umfassend:

ein Gehäuse (350) mit einem Testende (352) mit einer darin angeordneten Öffnung;
den dünnen Prüfsensor (202), der in dem Gehäuse (350) angeordnet ist, wobei der Einlass (208) des dünnen Prüfsensors (202) in Bezug auf die Öffnung des Testendes (352) benachbart angeordnet ist; und
die dünne Lanzette (203), die ausgebildet ist, um sich durch die Öffnung in dem Testende (352) des Gehäuses (350) hindurch zu erstrekken.

8. Prüfsensor (200) nach Anspruch 7, worin das Gehäuse (350) im Allgemeinen zylinderförmig und im Wesentlichen hohl ist.

9. Testssensor (200) nach Anspruch 7 oder 8, worin das Gehäuse (350) ein Anschlussende (270) aufweist, wobei das Anschlussende (270) ausgebildet ist, um mit einer Überwachungsvorrichtung (360) verbunden zu sein.

10. Prüfsensor (200) nach einem der Ansprüche 1 oder 9, worin die Basis (204), die dünne Feder (212), der U-förmige Körper (216) und die dünne Nadel (206) aus einem einzigen Metallstück hergestellt sind.

11. Prüfsensor (200) nach einem der Ansprüche 1 oder 10, worin der dünne Prüfsensor (202) im Allgemeinen flach ist.

12. Prüfsensor (200) nach einem der Ansprüche 1 oder 11, worin die dünne Lanzette (203) im Allgemeinen flach ist.

Revendications

1. Capteur de test (200) destiné à être utilisé dans la détermination de la concentration d'un agent chimique dans le sang, ledit capteur de test (200) comprenant:

un capteur de test mince (202) comportant un orifice d'admission (208), le capteur de test mince étant adapté à collecter un échantillon de sang par l'orifice d'admission (208) ; et
une lancette mince (203) couplée au capteur de test mince (202), la lancette (203) étant adaptée à perforer la peau,
dans lequel
la lancette mince (203) comprend:
une base (204) ;
un ressort mince (212) ayant une première extrémité (218) et une seconde extrémité (220), la première extrémité (218) étant couplée à la base (204) ; **caractérisé par**
un corps mince généralement en forme de U (216) ayant un bord intérieur (222) et un bord extérieur (224), la seconde extrémité (220) du

ressort mince (212) étant couplée au bord intérieur (222) et une aiguille mince (206) étant couplée au bord extérieur (224) ;
le corps mince généralement en forme de U (216) ayant deux faces qui ont des éléments récepteurs de force (232, 234) pour assurer le mouvement de l'aiguille mince (206).

2. Capteur de test (200) suivant la revendication 1, dans lequel le capteur de test mince (202) comprend un réactif, le réactif étant adapté à produire une réaction électrochimique, le capteur de test mince (202) comprenant en outre une paire d'électrodes (250) couplées à la surface de test.

3. Capteur de test (200) suivant la revendication 1 ou 2, en association avec un système de contrôle (300) adapté à mesurer la concentration d'un agent chimique dans le sang.

4. Capteur de test (200) suivant l'une des revendications 1 à 3, comprenant en outre un boîtier protecteur entourant le capteur de test (202) et la lancette mince (203).

5. Capteur de test (200) suivant l'une des revendications 1 à 4, dans lequel le capteur de test mince (202) a une épaisseur d'environ 0,15 mm (0,006 inch).

6. Capteur de test (200) suivant l'une des revendications 1 à 5, dans lequel la lancette mince (203) a une épaisseur d'environ 0,15 mm (0,006 inch).

7. Capteur de test (200) suivant l'une des revendications 1 à 3 et 5 et 6, comprenant en outre :

un boîtier (350) comportant une extrémité de test (352) avec un orifice présent dans celle-ci ;
le capteur de test mince (202) disposé dans le boîtier (350), l'orifice d'admission (208) du capteur de test mince (202) étant disposé en position adjacente à l'ouverture dans l'extrémité de test (352) ; et
la lancette mince (203) étant adaptée à s'étendre à travers l'ouverture dans l'extrémité de test (352) du boîtier (350).

8. Capteur de test (200) suivant la revendication 7, dans lequel le boîtier (350) est généralement de forme cylindrique et substantiellement creux.

9. Capteur de test (200) suivant la revendication 7 ou 8, dans lequel le boîtier (350) comporte une extrémité de fixation (270), l'extrémité de fixation (270) étant adaptée à la connexion à un dispositif de contrôle (360).

10. Capteur de test (200) suivant l'une des revendications 1 et 9, dans lequel la base (204), le ressort mince (212), le corps en forme de U (216) et l'aiguille mince (206) sont constitués d'une seule pièce de métal.

11. Capteur de test (200) suivant l'une des revendications 1 et 10, dans lequel le capteur de test mince (202) est généralement plat.

12. Capteur de test (200) suivant l'une des revendications 1 et 11, dans lequel la lancette mince (203) est généralement plate.

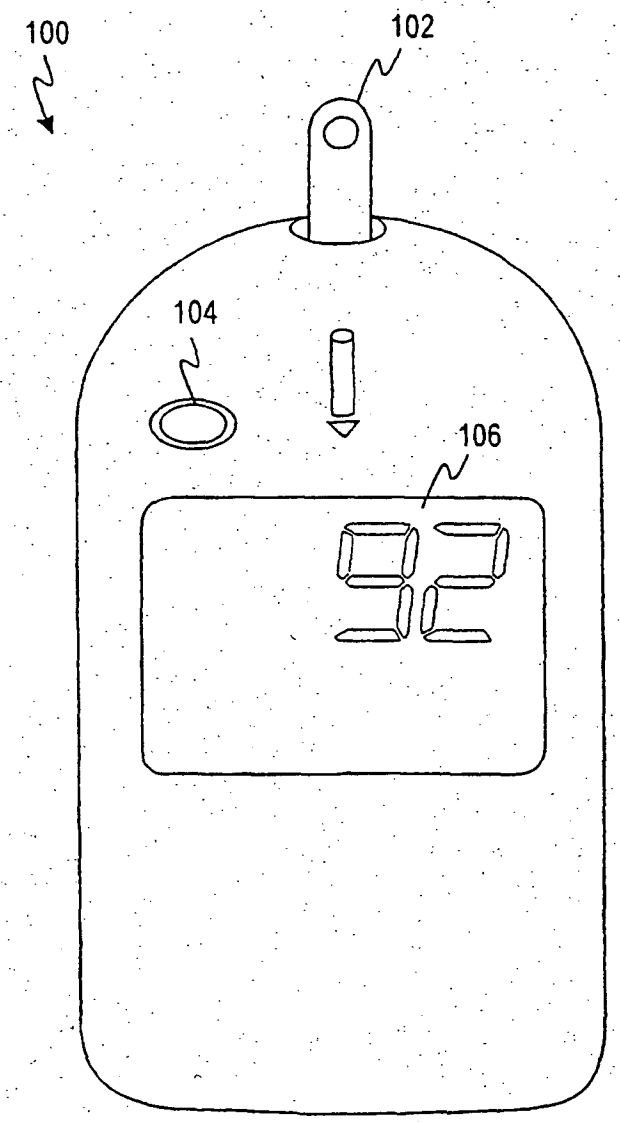


FIG. 1
(Prior Art)

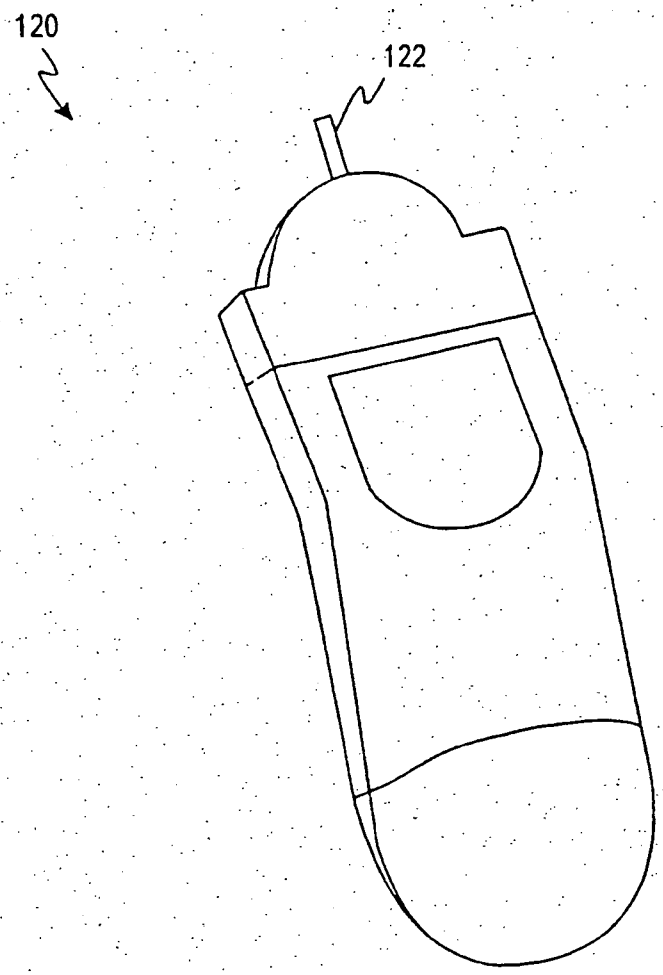


FIG. 2
(Prior Art)

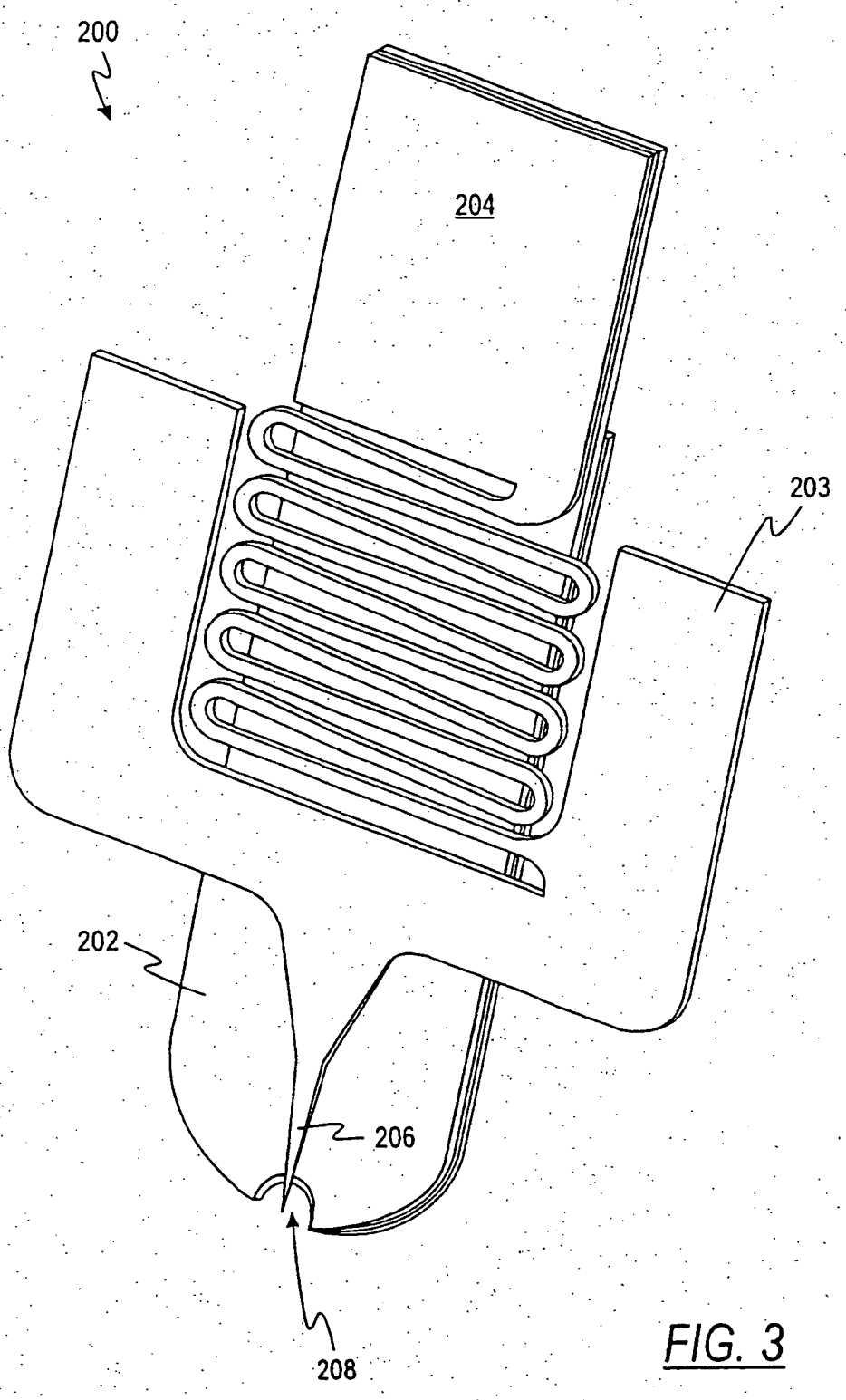


FIG. 3

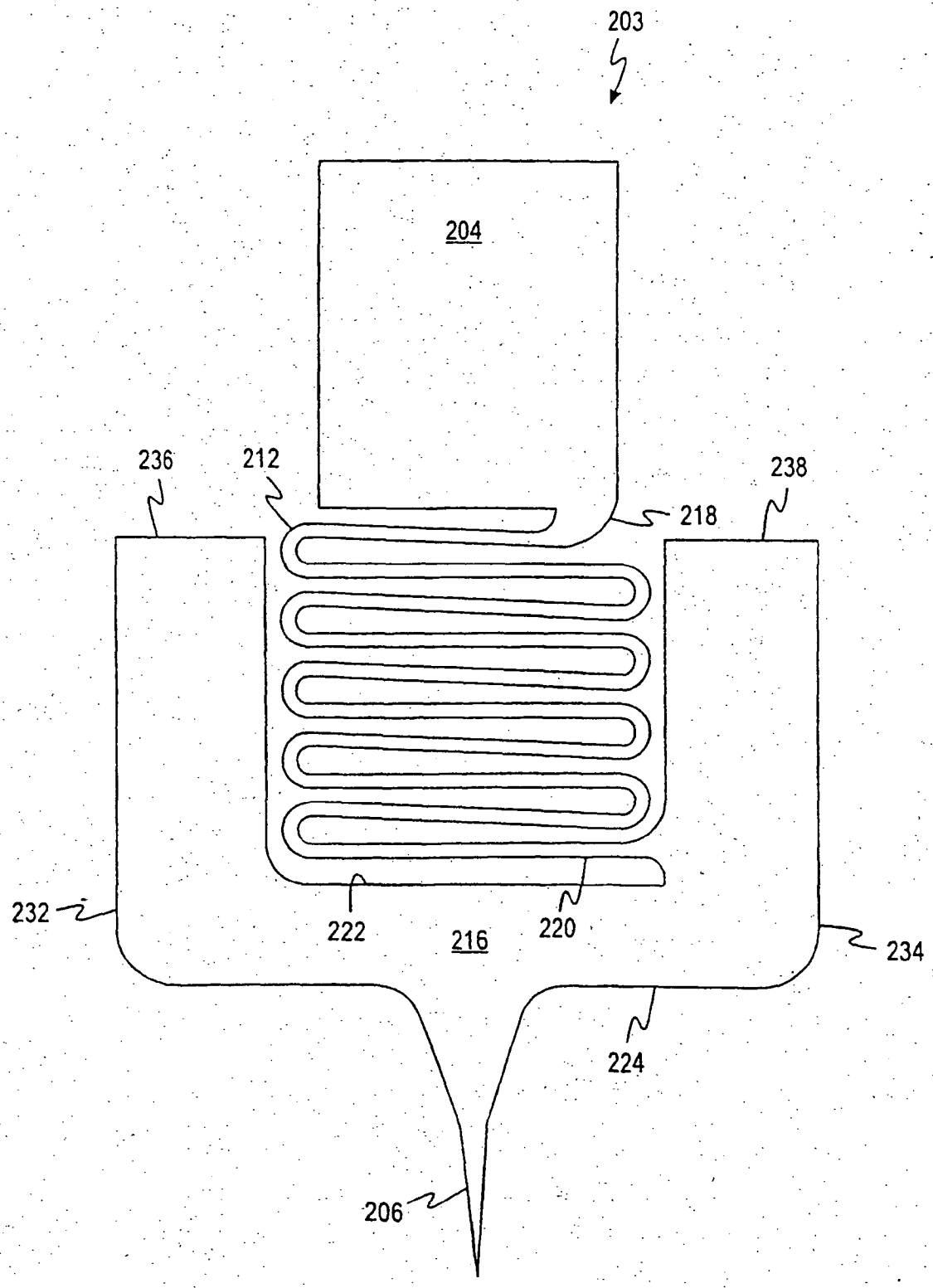


FIG. 4

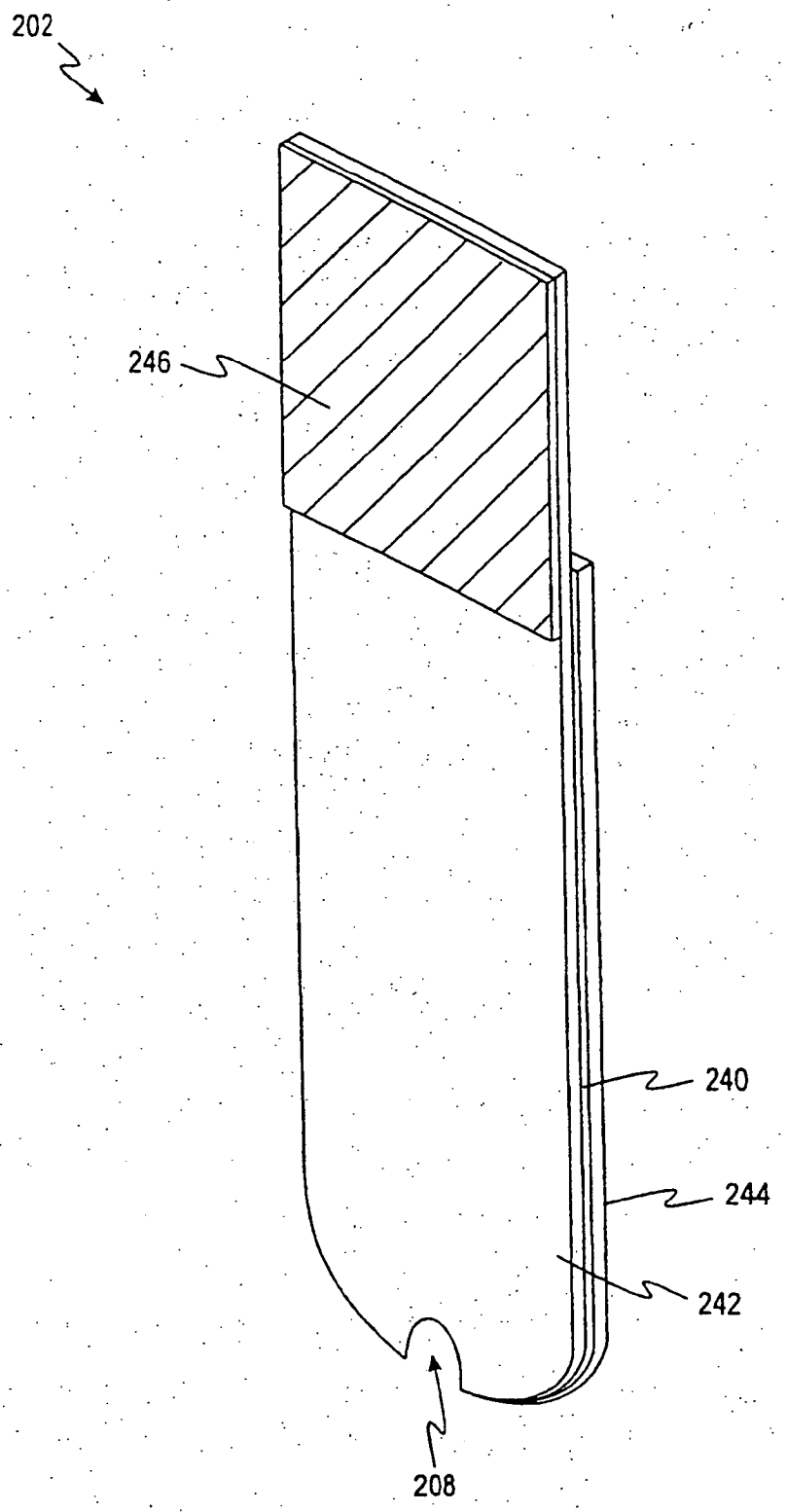


FIG. 5

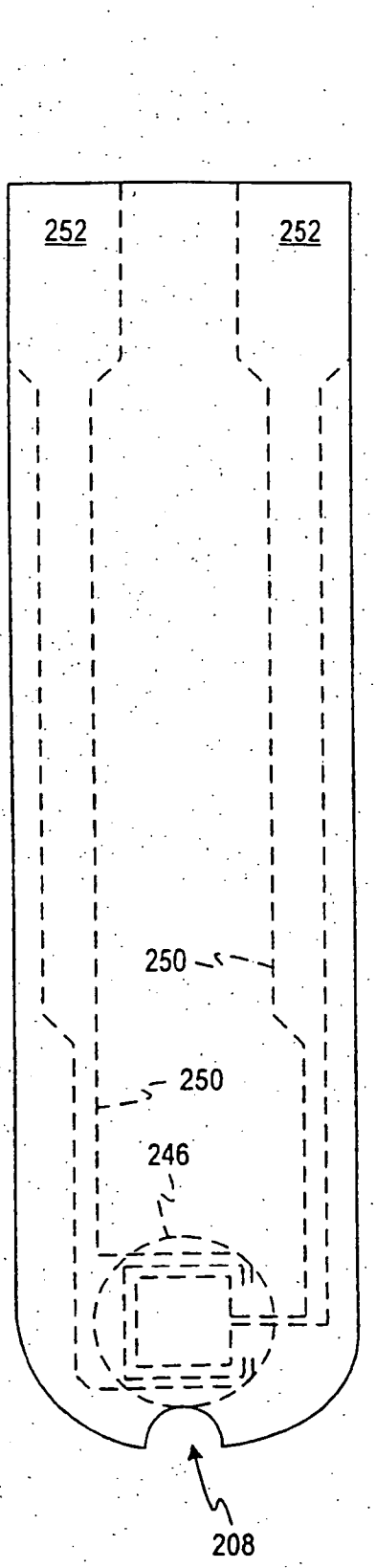


FIG. 6

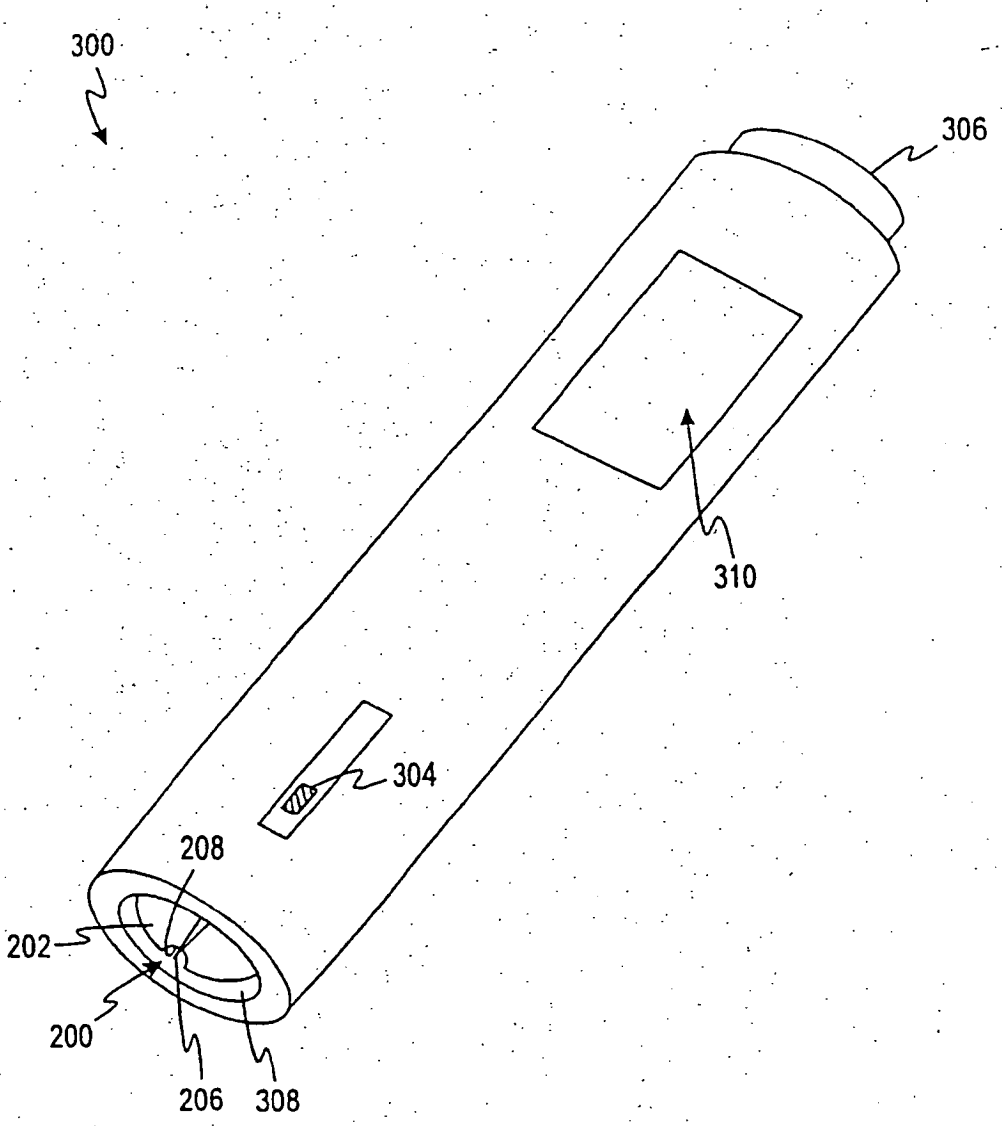


FIG. 7

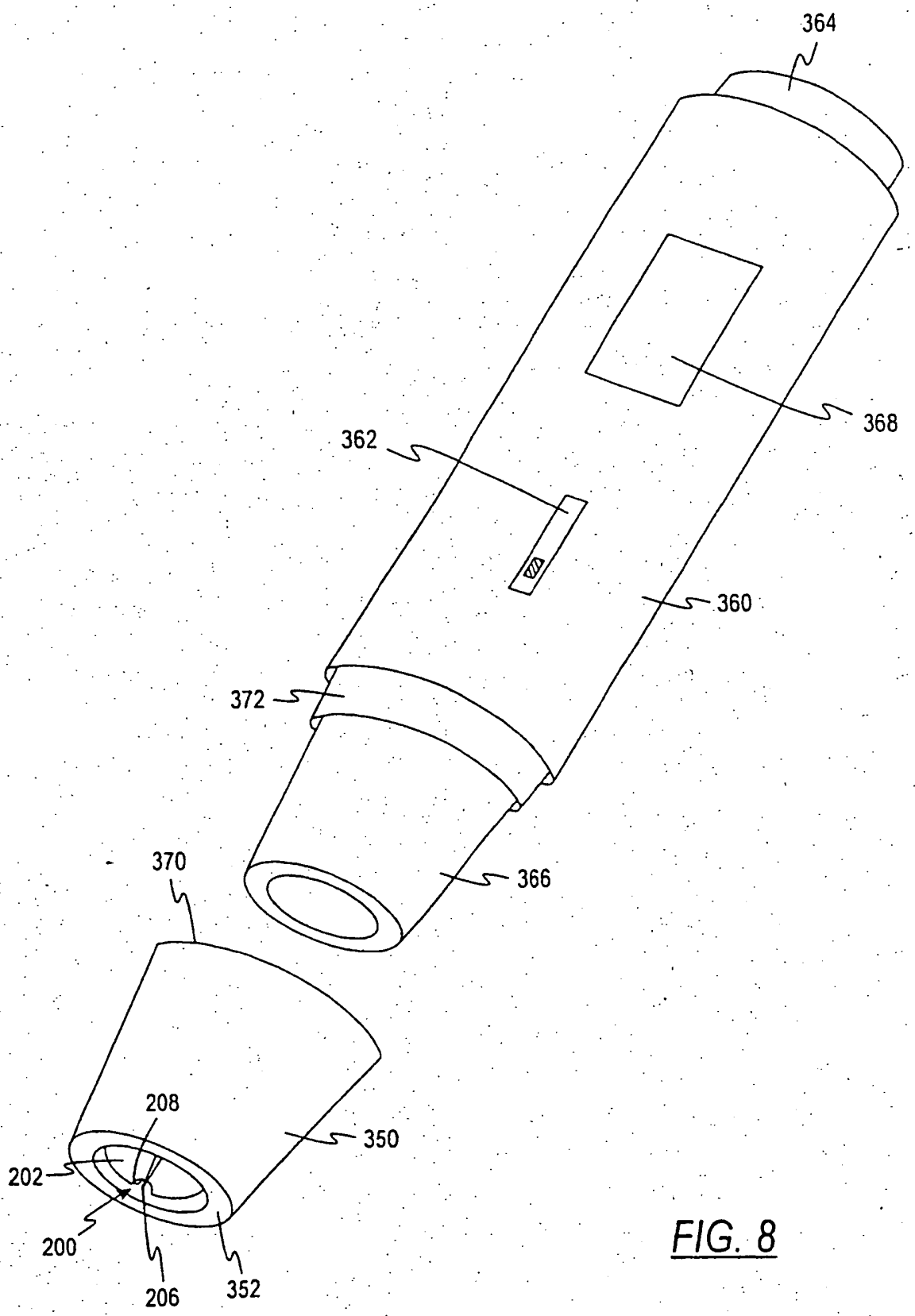
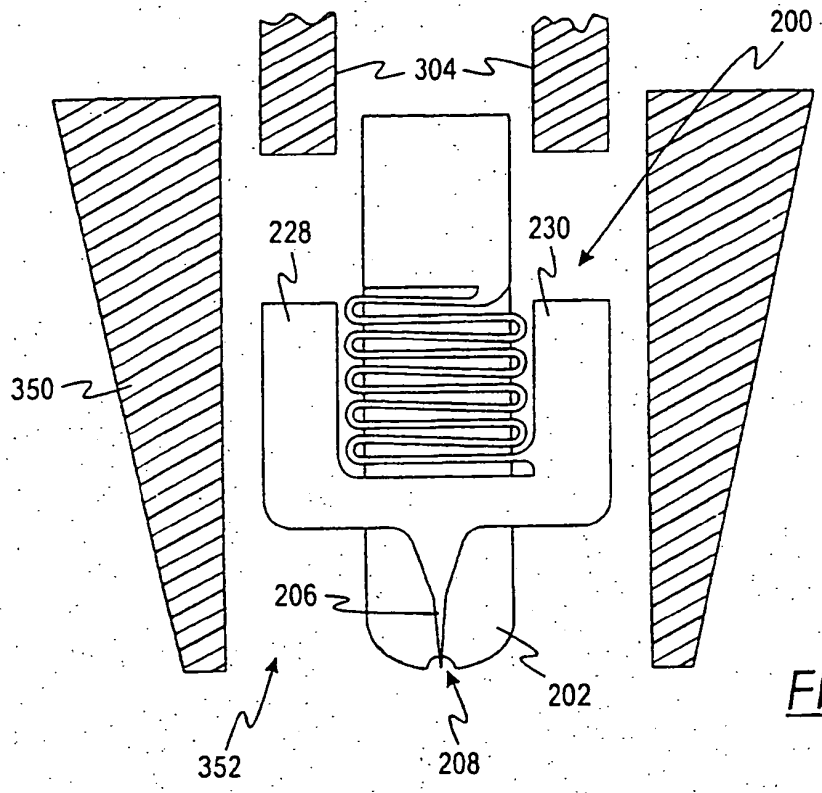


FIG. 8


200
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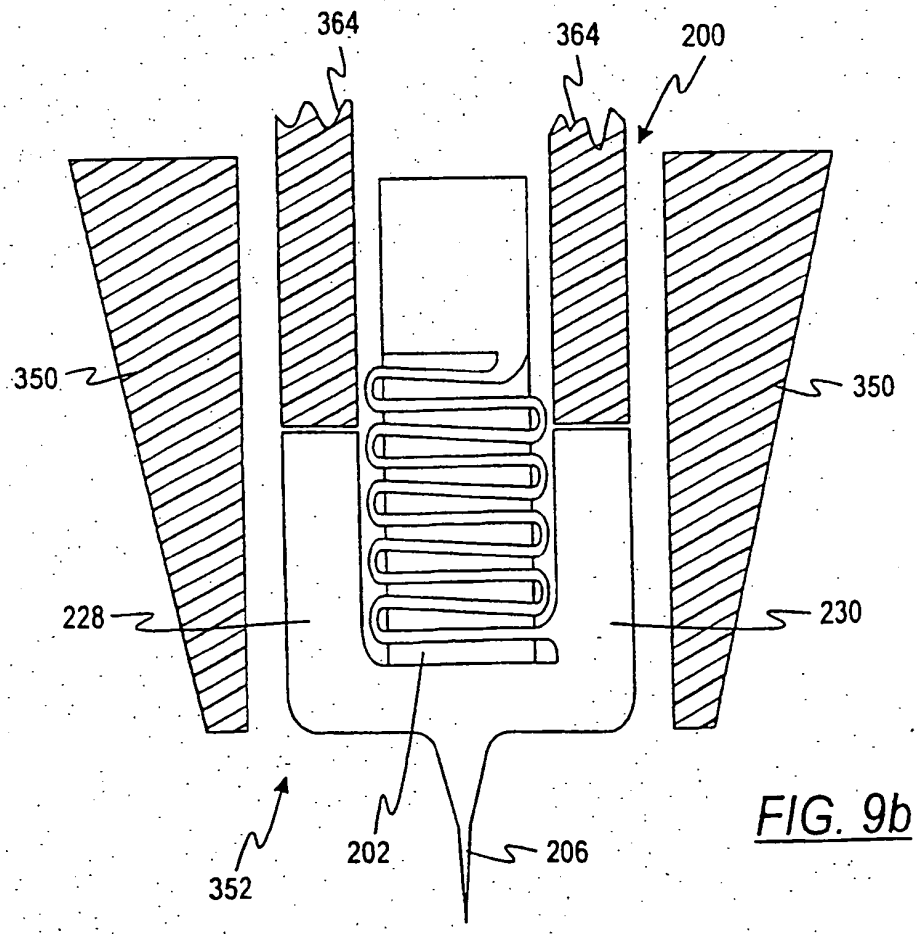
228
230
350
206
202
352
208

FIG. 9a


364
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200
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350
228
230
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202
206

FIG. 9b

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 5047044 A **[0008]**
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- US 6071294 A **[0010]**
- US 5723284 A **[0019] [0023]**

专利名称(译)	用薄刺血针测试传感器		
公开(公告)号	EP1417929B1	公开(公告)日	2009-09-23
申请号	EP2004001740	申请日	2001-07-02
[标]申请(专利权)人(译)	拜尔公司		
申请(专利权)人(译)	拜耳公司		
当前申请(专利权)人(译)	拜耳公司		
[标]发明人	WHITSON ROBERT C		
发明人	WHITSON, ROBERT C.		
IPC分类号	A61B5/15 G01N33/48 A61B5/00 A61B5/145 A61B5/1473 A61B5/151 A61B5/157 G01N33/49 G01N33/66		
CPC分类号	A61B5/15186 A61B5/14532 A61B5/150022 A61B5/150358 A61B5/150435 A61B5/150503 A61B5/15113 A61B5/15117 A61B5/1519 A61B5/15194 A61B5/157 A61B2562/0295		
优先权	60/216972 2000-07-10 US		
其他公开文献	EP1417929A2 EP1417929A3		
外部链接	Espacenet		

摘要(译)

提供测试传感器用于确定血液中化学品的浓度。测试传感器包括具有入口的薄测试室，测试室适于通过入口收集血液样本和耦合到测试室的薄矛。提供用于刺穿皮肤并产生血液样本的喷枪。该喷枪包括弹簧，该弹簧具有设置在针和基座之间的第一端和第二端，其中弹簧的第一端连接到基座，弹簧的第二端连接到针。

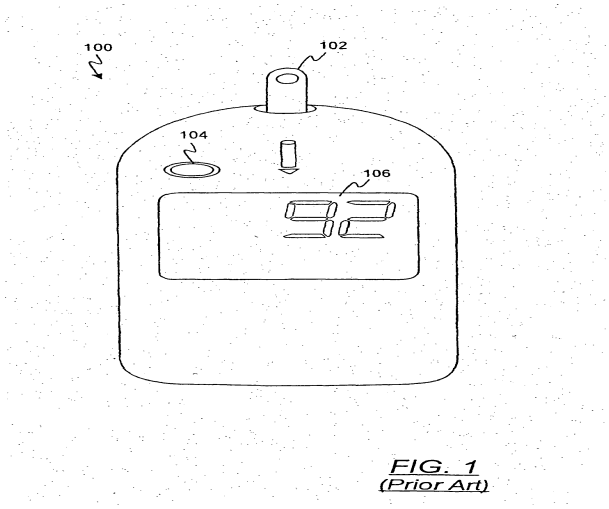

FIG. 1
(Prior Art)