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(54) **Puncture needle cartridge**

Punkturadelkartusche

Cartouche d'aiguilles de perforation

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Description

TECHNICAL FIELD

[0001] The present invention relates to a puncture device to be used for collecting blood from a fingertip or the like in advance of analysis of the blood, and a puncture needle cartridge for replacement.

BACKGROUND ART

[0002] Conventionally, there have been invented various kinds of puncture devices for collecting blood from skins of human beings and animals for analysis of the blood. In recent years, a puncture device in which an urging force for puncture is charged simultaneously with attachment of a puncture needle to the puncture device has been invented (refer to Patent Document 1: Japanese Published Patent Application No. 2000-245717). Such puncture device performs operations of puncture and withdrawal using two compression springs, i.e., a first compression spring for puncture and a second compression spring for withdrawal. Further, a puncture needle cartridge for discarding a puncture needle which has touched the skin has been developed to avoid infection due to attached blood.

[0003] Figure 10 is a cross-sectional view of a conventional puncture device 1100. In figure 10, a natural position of a plunger 1002 is restricted by the total length of a first compression spring 1000, and the plunger 1002 is urged toward a front end of the puncture device 1100 by a restorative force of the first compression spring 1000 during puncture, while it is urged toward a rear end of the puncture device 1100 by a restorative force of the second compression spring 1001 during withdrawal. A charge lever 1003 slides backward to attach a puncture needle 1004 to the puncture device, and simultaneously, it stores a urging force for puncture by using the first compression spring 1000 and the second compression spring 1001.

[0004] Figure 11 is a cross-sectional view of a conventional puncture needle cartridge 1101. As shown in figure 11, the puncture needle cartridge 1101 comprises a puncture needle holder 1005, a lancet body 1007 having a puncture needle 1004, and a puncture needle protection cap 1006 for protecting the puncture needle 1004. The puncture needle holder 1005 houses the lancet body 1007. The lancet body 1007 is stored so as to be movable in the puncture needle holder 1005 along its axial direction. Further, the lancet body 1007 has a large diameter portion 1008 to prevent the lancet body 1007 from moving toward an opening of the puncture needle holder 1005, i.e., toward the front end, unless a predetermined force is applied.

[0005] The puncture needle cartridge 1101 constituted as described above is attached to the puncture device 1100, and the lancet body 1007 is inserted in the plunger 1002 of the puncture device 1100. When performing

puncture, this plunger 1002 is moved by an urging means, and thereby the lancet body 1007 projects toward the front end and the puncture needle 1004 protrudes from the opening of the puncture needle holder 1005, and thus the puncture site. After the puncture, when the puncture needle 1004 is removed from the puncture site, the lancet body 1007 is moved in a direction opposite to the forward direction (i.e., toward the rear end) by the urging means of the puncture device 1100, and thereby the puncture needle 1004 is again housed in the puncture needle holder 1005.

[0006] Further art is disclosed by the document JP 2004 113 580 which describes a lancet including a piercing needle for piercing skin, a containing case having a hole formed to retractably move a needle member having the needle provided at one end, inhibiting parts formed on an inner surface of the case and an outer surface of the member to be movable when the member is advanced or to inhibit a movement of the member at a retracting time. A distal end position of the needle in a state in which the member is locked is retracted from the end of the case.

[0007] The document EP 1 815 792 also discloses a lancet including a casing, and a puncture body which is accommodated in the casing so as to be movable in a puncturing direction. For removing the lancet from a main body, the lancet has a convex portion formed on an inner surface of the casing and a recessed portion formed on the puncture body, which form fitting for holding the puncture body so as to be immovable in the puncturing direction in the casing. Further prior art is disclosed in documents EP 0 569 124 and US 5324303.

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0008] When two compression springs are used as in the conventional puncture device shown in figure 10, it is necessary to secure precision of the total length of the first compression spring 1000 that determines the natural position of the plunger 1002. However, as is well known, it is very difficult to secure precision of a total length of a compression spring because of its configuration. Therefore, in order to secure precision of the product, it is necessary to obtain a required measure by such as accurately polishing the both ends of the first compression spring 1000. Further, it is also necessary to consider distribution between a force that enables puncture and a force that reliably returns the puncture needle, and an advanced technique for optimizing a ratio of spring pressures between the first compression spring 1000 and the second compression spring 1001 is required. Further, when two compression springs are used as means for urging the plunger 1002, reciprocation of the plunger due to the compression springs (i.e., howling) undesirably occurs, and this howling causes that the needle punctures the skin several times, leading to an increase in pain that

inflicts suffering on the patient. Further, according to a recent survey of patients, not only pain during puncture but also impact sound of the puncture device further increase fears of the patients.

[0009] Further, although replacement of the puncture needle is safely carried out by using the conventional puncture needle cartridge 1101 shown in figure 11, the puncture needle cartridge 1101 is constituted such that the once used puncture needle 1004 can be reused. That is, since the puncture needle cartridge 1101 which is once removed from the puncture device can be again attached to the puncture device, the puncture needle 1004 can be projected from the opening of the puncture needle holder 1005 many times so long as an urging force is stored by reattachment. Therefore, the once used puncture needle 1004 is reused without replacement, leading to a possibility of infection or the like.

[0010] Further, when the puncture needle cartridge 1101 shown in figure 11 is attached to the puncture device 1000, the puncture needle 1004 might be projected unless it is covered with the puncture needle protection cap 1006. Further, the lancet body 1007 is provided with the large diameter part 1008 so that the lancet body 1007 cannot be moved unless a predetermined force is applied thereto. However, the puncture needle cartridge 1101 which has once performed a puncture operation is released from the locking by the large diameter part 1008, and the puncture needle 1004 might be projected from the opening of the puncture needle holder 1005 if the puncture needle cartridge 1101 removed from the puncture device is turned downward, resulting in a problem that it is dangerous to discard the cartridge 1101 without a cap.

[0011] The present invention is made to solve the above-described problems and has for its object to simplify the fabrication process of a puncture device, and provide a puncture device and a puncture needle cartridge which can prevent plural times of punctures of a puncture needle, can adjust the puncture speed, and further, can safely discard a used puncture needle.

MEASURES TO SOLVE THE PROBLEMS

[0012] In order to solve the above-mentioned problems, there is provided a puncture needle cartridge according to the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Figure 1(a) is a diagram illustrating the construction of a puncture device according to a first embodiment not belonging to the present invention.

Figure 1(b) is a diagram illustrating the construction of a puncture device according to a first embodiment not belonging to the present invention.

Figure 2 is a diagram illustrating a motion of a plunger

and a state of a tension spring according to the first embodiment not belonging to the present invention. Figure 3 is a diagram illustrating an example of a lock plate control mechanism (puncture speed control mechanism) according to the first embodiment not belonging to the present invention.

Figure 4 is a diagram illustrating an example of a puncture device for performing puncture, which is provided with a puncture needle cartridge according to an embodiment of the present invention.

Figure 5 is a diagram illustrating the construction of the puncture needle cartridge according to the embodiment.

Figure 6 is a diagram illustrating the construction of a lancet of the puncture needle cartridge according to the second embodiment.

Figure 7 is a cross-sectional view illustrating a puncture needle holder of the puncture needle cartridge according to the embodiment.

Figure 8 is a diagram illustrating the puncture needle cartridge according to the embodiment wherein the lancet is incorporated in the puncture needle holder.

Figure 9(a) is a cross-sectional view illustrating the internal structure of the puncture device before puncture, to which the puncture needle cartridge according to the embodiment is attached.

Figure 9(b) is a cross-sectional view illustrating the internal structure of the puncture device in the puncture standby state, to which the puncture needle cartridge according to the embodiment is attached.

Figure 9(c) is a cross-sectional view illustrating the internal structure of the puncture device during puncture, to which the puncture needle cartridge according to the embodiment is attached.

Figure 9(d) is a cross-sectional view illustrating the internal structure of the puncture device after puncture, to which the puncture needle cartridge according to the embodiment is attached.

Figure 9(e) is a cross-sectional view of the puncture device when the puncture needle cartridge according to the embodiment is discarded.

Figure 9(f) is a cross-sectional view illustrating the internal structure of the puncture device when the once-used puncture needle cartridge from which a puncture needle protection cap is removed is attached to the puncture device.

Figure 10 is a cross-sectional view of the conventional puncture device.

Figure 11 is a cross-sectional view of the conventional puncture needle cartridge.

DESCRIPTION OF REFERENCE NUMERALS

[0014]

1 ...	base plate
1a ...	fulcrum shaft
1b ...	first tension spring fixing chip

2 ... plunger
 2a ... puncture needle holding part
 2b ... first projection
 2c ... sliding restriction part
 2d ... rotation axis
 3 ... lever
 4 ... tension plate
 5 ... lock plate
 5a ... lock position adjusting projection
 6 ... depth adjustment knob
 6a ... receiver
 7 ... operation button
 8 ... speed adjusting knob
 8a ... groove
 9 ... injection rod
 10 ... injection rod spring
 12 ... injection knob
 13 ... injection lock claw
 14 ... lock claw spring
 15 ... housing
 15b ... opening
 16 ... puncture needle cartridge
 16a ... puncture needle
 16b ... lancet body
 16c ... puncture needle protection cap
 16d ... puncture needle holder
 101 ... puncture device
 102 ... puncture needle cartridge
 201 ... puncture needle holder
 202 ... puncture needle protection cap
 203 ... lancet body
 204 ... lancet
 205 ... puncture needle holder internal diameter part
 301 ... puncture needle
 302 ... arm means
 303 ... lancet body first convex portion
 304 ... lancet body second convex portion
 305 ... latch part
 306 ... front end part
 307 ... puncture needle protection part
 401 ... opening
 402 ... skin contact part
 403 ... to-be-latched means
 404 ... puncture needle holder groove
 405 ... puncture needle holder rear end surface
 601 ... plunger
 602 ... housing
 603 ... puncture needle holder cover
 604 ... knurling shape
 605 ... inner diameter of to-be-latched means
 606 ... inner diameter of housing
 1000 ... first compression spring
 1001 ... second compression spring
 1002 ... plunger
 1003 ... charge lever
 1004 ... puncture needle
 1005 ... puncture needle holder
 1006 ... puncture needle protection cap

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1007 ... lancet body
 1008 ... large diameter part
 1100 ... puncture device
 1101 ... puncture needle cartridge

BEST MODE TO EXECUTE THE INVENTION

[0015] A puncture device according to a first embodiment not belonging to the present invention will be described with reference to figure 1.

[0016] Figure 1 is a diagram illustrating the construction of the puncture device according to the first embodiment not belonging to the present invention. Figure 1(a) is a cross-sectional view of the puncture device in a state where an injection mechanism comprising an injection rod 9, an injection rod spring 10, an injection knob 12, an injection lock claw 13, and an injection claw spring 14, is removed, and figure 1(b) is a cross-sectional view of the puncture device in a state where the injection mechanism is attached.

[0017] In figure 1, the puncture device according to the first embodiment not belonging to the present invention comprises a base plate 1 disposed inside a housing 15, and a plunger 2 that is slidably held by the base plate 1. The housing 15 and the base plate 1 may be integrated.

[0018] The housing 15 has, at its front end, an opening 15b in which the puncture needle cartridge 16 is inserted, and a needle depth adjustment knob 6 having a receiver 6a for restricting an amount of movement of the plunger 2 when the plunger 2 moves in its axial direction, is rotatably fitted to the opening 15b.

[0019] The receiver 6a of the needle depth adjustment knob 6 has a spiral shape, and the amount of movement of the plunger 2 in the axial direction can be varied by rotating the adjustment knob 6 with respect to the housing 15. While in figure 1 the receiver 6a and the needle depth adjustment knob 6 are integrated, these elements may be constituted by separated parts.

[0020] The plunger 2 comprises, from its front end, a puncture needle holding part 2a, a first projection 2b, and a sliding restriction part 2c.

[0021] The puncture needle cartridge 16 is detachably fitted to the puncture needle holding part 2a.

[0022] A lancet body 16b which holds a puncture needle 16a in a puncture needle holder 16d is slidably held in the puncture needle cartridge 16, and a puncture needle protection cap 16c which protects the puncture needle 16a is provided at a front end of the puncture needle 16a. Although the puncture needle protection cap 16c is removed when the puncture device is used, since the puncture needle 16a is positioned inside the puncture needle holder 16d, the user of the puncture needle does not see the needle and therefore can perform puncture without feeling fear.

[0023] The first projection 2b is a part of the plunger 2, and it is engaged with a lock plate 5.

[0024] The sliding restriction part 2c of the plunger 2 contacts against the receiver 6a, thereby restricting slid-

ing of the plunger 2 toward the front end.

[0025] At the rear side of the plunger 2, a lever 3 is engaged with a rotation axis 2d so that it can rotate within a predetermined range, and a rear end of a tension spring 4, a front end of which is fixed to a first tension-spring fixing chip 1b, is engaged with a second tension-spring fixing chip 3a.

[0026] Hereinafter, a description will be given of the operation of performing puncture using the puncture device of the first embodiment not belonging to the present invention which is constituted as described above, with reference to figure 2.

[0027] Figure 2 is a diagram illustrating the states of the tension spring 4 and the lever 3 when the plunger 2 is in a natural position, a puncture preparation position, and a puncture position.

[0028] In figure 2, the natural position is a position where the tension spring 4 moves the plunger 2 through the lever 3 toward the front end of the housing 15. The puncture preparation position is a position where the plunger 2 is urged toward the rear end of the housing 15 and thereby the plunger 2 is moved toward the rear end of the puncture device while expanding the tension spring 4 in its axial direction, and this motion of the plunger makes the first projection 2b and the lock plate 5 engage with each other and thereby urging of the plunger 2 toward the front end is stopped. The puncture position is a position where the engagement of the plunger 2 and the lock plate 5 is released and thereby the plunger 2 moves toward the front end due to an urging force toward the front end by the tension spring 4, and further, the plunger moves toward the front end exceeding the natural position due to an inertial force of the plunger 2.

[0029] In the state where the plunger 2 is in the natural position, the operator attaches the puncture needle cartridge 16 to the puncture needle holding part 2a of the plunger 2, and then presses the plunger 2 toward the rear end. When the plunger 2 moves toward the rear end, the lever 3 whose rotation to the left is restricted also moves toward the rear end in conjunction with the plunger 2, and thereby the tension spring 4 is extended in its axial direction.

[0030] When the plunger 2 is further pushed into the housing 15, the first projection 2b of the plunger 2 is engaged with the lock plate 5, and urging of the plunger 2 toward the front end is stopped, whereby the plunger is set in the puncture preparation position.

[0031] In the puncture preparation position, when the operator presses the operation button 7 provided on the housing 15, the lock plate 5 moves in the direction which releases the engagement with the first projection 2b and thereby the engagement is released, and the plunger 2 swiftly urged toward the front end by a restorative force of the tension spring 4.

[0032] When the plunger 2 and the lever 3 move toward the front end due to the urging by the tension spring 4 toward the front end, a fulcrum shaft 1a provided on the housing 15 contacts a peripheral edge part 3b of the ro-

tatable lever 3, which is located between the rotation axis 2d and the second tension spring fixing part 3a. Even after the fulcrum shaft 1a contacts the peripheral edge part 3b, the plunger 2 still moves forward due to its inertia force. Since the plunger 2 thus moves forward and the fulcrum shaft 1a pushes down the rotatable lever 3 backward while rotating the lever 3 to the right, the tension spring 4 is again expanded via the rotatable lever 3, and the plunger 2 is urged toward the rear end by a restorative force of the re-expanded tension spring 4. After the plunger 4 returns to the natural position, it moves across the natural position up to the puncture position located ahead the natural position due to its inertia force, and performs puncture in this puncture position. Then, the plunger 2 is urged backward from the puncture position to return to the natural position, thereby completing the puncture operation.

[0033] During the above-mentioned operation, the urging force of the plunger 2 toward the front end is obtained as follows. That is, the tension spring 4 is expanded in its axial direction to move the plunger 2 toward the front end, and thereby the first projection 2b of the plunger 2 is engaged with the lock plate 5, and this engagement stops urging of the plunger 2 toward the front end. Since the urging force of the plunger 2 toward the front end at this time is determined by an amount of expansion of the tension spring 4, it can be adjusted by changing the position of the lock plate 5, and thereby the puncture speed can be controlled.

[0034] Although there are considered various constructions of the puncture speed control mechanism which changes the position of the lock plate 5, an example is shown in figure 3.

[0035] In figure 3, a lock position control projection 5a is connected to the lock plate 5. Therefore, by constituting a mechanism for engaging the lock position control projection 5a with a spiral groove 8a of a speed control knob 8, the position of the lock position control projection 5a in the axial direction can be varied by turning the speed control knob 8, thereby to move the position of the lock plate 5 forward and backward with respect to the housing 15.

[0036] Although it is said that the pain during puncture depends on the puncture speed, the straightness of movement of the puncture needle, and the shape of the needle tip, it is possible to provide a puncture device that can reduce the pain by controlling the puncture speed using the above-mentioned puncture speed control mechanism.

[0037] After the puncture operation is ended, as shown in figure 1(b), the inner end surface of the puncture needle cartridge 16 is pushed forward from the housing 15 by the injection rod 9 that is urged by the injection rod spring 10 via the injection knob 12, whereby the user can remove the puncture needle cartridge 16 from the puncture device without touching it.

[0038] The injection lock claw 13 and the lock claw spring 14 are means for locking the puncture needle car-

tridge injection mechanism against the urging force of the injection rod spring 10, and this injection lock state is released by the injection knob 12 to perform injection.

[0039] Further, when the puncture needle cartridge 16 is pushed forward from the housing, the front end of the injection rod 9 contacts the rear end of the puncture needle holder 16d and pushes the cover forward from the housing, whereby the puncture needle cartridge 16 can be pushed out with the puncture needle 16a being housed in the back of the puncture needle holder 16d, and thus safety of the detached puncture needle cartridge 16 can be ensured.

[0040] As described above, according to the puncture device of the first embodiment not belonging to the present invention, the front end of the tension spring 4 is fixed to the housing 15 via the first tension spring fixing chip 1b while the rear end of the tension spring 4 is engaged with the second tension spring fixing part 3a of the lever 3 that is engaged with the plunger 2 rotatably within a predetermined range, and the rear end of the tension spring 4 is moved toward the rear end of the puncture device in conjunction with the movement of the plunger 2 toward the rear end of the puncture device to expand the spring 4 in its axial direction, whereby the plunger 2 can be moved toward the front end of the housing 15 via the second tension spring fixing part 3a by a restorative force caused by the expansion of the tension spring 4. Further, when the plunger 2 is moved beyond the natural position toward the front end, the tension spring 4 is again expanded by the function of the rotatable lever 3 that contacts the fulcrum shaft 1a, and the plunger 2 can be urged toward the rear end by a restorative force of the tension spring 4. In this way, the means for urging the plunger forward and backward is realized by one tension spring. Further, by changing the position of the fulcrum to be a center of fluctuation of the lever to change the ratio of the arm length of the lever, an optimum urging force toward the rear end can be obtained by the same tension spring, whereby the fabrication process of the puncture device is simplified, and plural times of punctures of the puncture needle is avoided.

(Embodiment)

[0041] Hereinafter, a puncture needle cartridge according to an embodiment of the present invention will be described with reference to figures 4 to 9.

[0042] Figure 4 is a diagram illustrating an example of a puncture device which performs puncture with a puncture needle cartridge according to the embodiment being attached thereto. As shown in figure 4, the puncture needle cartridge 102 according to the embodiment is attached to the puncture device 101. It is assumed that a direction in which a puncture needle is projected (an arrow direction in figure 4) is a direction toward a front end, and a direction opposite to the front-end direction (a direction opposite to the arrow direction in figure 4) is a direction toward a rear end.

[0043] Next, the specific construction of the puncture needle cartridge 102 will be described with reference to figures 5, 6, and 7.

[0044] Figure 5 is a configuration diagram illustrating the puncture needle cartridge according to the embodiment. In figure 5, the puncture needle cartridge 102 has a puncture needle holder 201, a puncture needle protection cap 202, and a lancet body 203. The puncture needle protection cap 202 covers the puncture needle of the lancet body 203, and a lancet 204 comprising the puncture needle protection cap 202 and the lancet body 203 is stored in an inner-diameter part 205 of the cylindrical puncture needle holder 201. In the puncture needle cartridge 102 according to the second embodiment, the lancet body 203 is housed movably in its axial direction in the puncture needle holder 201 so that the puncture needle can be projected.

[0045] Next, the puncture needle holder 201 and the lancet 204 constituting the puncture needle cartridge 102 shown in figure 5 will be described with reference to figures 6 and 7.

[0046] Figure 6 is a diagram illustrating the construction of the lancet 204. In figure 6, the lancet 204 comprises the lancet body 203 having a puncture needle 301, and the puncture needle protection cap 202 for protecting the puncture needle 301, and the puncture needle 301 is protected by a puncture needle protection part 307 of the puncture needle protection cap 202, which has the same shape as the trunk of the lancet body 203. Further, the lancet body 203 has an arm means 302, a lancet body first convex portion 303, and a lancet body second convex portion 304.

[0047] The arm means 302 has a latch part 305 as one end thereof being connected to the lancet body 203, and a front end part 306 as the other end thereof being opened such that it is tapered toward the front end of the lancet body 203. The arm means 302 elastically deforms toward the center of the lancet body 203 or outward from the lancet body 203.

[0048] The first convex portion 303 is shaped in a long strip, and it is provided in two positions at right and left toward the axial direction, on the trunk of the lancet body 203. Further, a second convex portion 304 is provided in two positions at right and left toward the axial direction, on the rear end of the trunk of the lancet body 203.

[0049] Figure 7 is a cross-sectional view of the puncture needle holder 201.

[0050] As shown in figure 7, the puncture needle holder 201 has, at its front end, a skin contact part 402 having an opening 401, and has a to-be-latched means 403 having a convex portion inside, which convex portion cooperates with the arm means 302. Further, the puncture needle holder 201 has, in its axial direction, a puncture needle holder groove 404 which is engaged with the first convex portion 303 of the lancet body 203 and serves as a guide for making the lancet body 203 move more straightly. The puncture needle holder 201 has a puncture needle holder rear end surface 405 which cooperates

ates with the lancet body second convex portion 304 of the lancet body 203 to prevent dropping of the lancet body 203 toward the front end.

[0051] Further, in this embodiment, the lancet body 203 has the first and second convex portions, and the puncture needle holder 201 has the grooves that are engaged with the respective convex portions.

[0052] Further, the puncture needle cartridge 102 shown in figure 5 is constituted by incorporating the lancet 204 in the inner-diameter part 205 of the puncture needle holder 201. At this time, as shown in figure 8, the rear end of the lancet body 203 is inserted from the opening 401 of the puncture needle holder 201. The second convex portion 304 comprises an elastically deformable material such as a resin. Further, the shape of the second convex portion 304 may be inclined toward the rear end of the trunk portion of the lancet body so that it can be easily inserted in the puncture needle holder 201, whereby the lancet body 203 can easily push the lancet 204 up to the position shown in figure 5 with the second convex portion 304 being elastically deformed. Thus, the lancet body can be easily incorporated in the puncture needle holder, and thereby the man-hour in assembling the puncture needle cartridge can be reduced. In this second embodiment, the position of the lancet body 203 where insertion of the lancet 204 in the puncture needle holder 201 is completed as shown in figure 5 is referred to as an initial position of the lancet body 203 (hereinafter, first position).

[0053] In the first position of the lancet body 203 where insertion of the lancet 204 in the puncture needle holder 201 is completed as shown in figure 5, when the lancet body 203 moves in the direction opposite to the puncture direction, the rear end of the arm means 302 and/or the first convex portion 303 contact the rear end portion 405 of the puncture needle holder, whereby the movement of the lancet body 203 in the direction opposite to the puncture direction is stopped. Further, also when the lancet body 203 moves in the puncture direction, the arm means 302 of the lancet body and the to-be-latched means 403 cooperate with each other, and the arm means 302 elastically deforms so as to broaden outward from the lancet body 203 and the latch part 305 of the arm means contacts the to-be-latched means 403, whereby the movement of the lancet body 203 in the puncture direction is stopped. Therefore, the puncture needle cartridge 102 according to the embodiment can be constituted such that the puncture needle does not protrude when it is not attached to the puncture device and moves from the first position in the puncture direction.

[0054] Hereinafter, the puncture operation of the puncture needle cartridge constituted as described above will be described with reference to figures 9(a) to 9(f).

[0055] Figure 9(a) is a cross-sectional view illustrating the internal structure of the puncture device before puncture, to which the puncture needle cartridge 102 according to the embodiment is attached. Figure 9(b) is a cross-sectional view illustrating the internal structure of the

puncture device in the puncture standby state where the puncture needle protection cap 202 is removed. Figure 9(c) is a cross-sectional view illustrating the internal structure of the puncture device in the position where the puncture needle is projected for puncture. Figure 9(d) is a cross-sectional view illustrating the internal structure of the puncture device after puncture. Figure 9(e) is a cross-sectional view illustrating the construction when the puncture needle cartridge 102 is removed from the puncture device and discarded.

[0056] First of all, the puncture needle cartridge 102 is inserted into the puncture device 101 as shown in figure 9(a), and the puncture needle protection cap 202 is removed from the state shown in figure 9(a) as shown in figure 9(b), thereby setting the puncture device 101 in the puncture preparation state where an urging force is stored by such as a charge spring (not shown) of the puncture device.

[0057] As shown in figures 9(a) and 9(b), the positional relationship between the lancet body 203 of the puncture needle cartridge 102 and the puncture needle holder 201 before puncture is the same as that in the puncture standby state, that is, the arm means 302 is positioned behind the to-be-latched means 403, like the first position of the lancet body 203 shown in figure 5. In this way, the puncture needle cartridge 102 according to the embodiment is attached to the puncture device 101 so that the first position wherein the arm means 302 is positioned behind the to-be-latched means 403 is the puncture preparation position, and the housing 602 of the puncture device grasps the rear end portion of the puncture needle holder 201, and the plunger 601 grasps the rear end portion of the lancet body 203.

[0058] At this time, the arm means 302 is elastically deformed toward the center of the lancet body by the housing 602 of the puncture device to stand by for puncture. That is, in the puncture needle cartridge shown in figures 9(a) and 9(b), the arm means 302 and the housing 602 of the puncture device are engaged with each other, and the arm means 302 of the lancet body is elastically deformed toward the center of the puncture needle body as compared with figure 5.

[0059] Further, the puncture needle protection cap 202 is provided with a puncture needle holder cover 603 to make it easy to hold the protection cap when the puncture needle cartridge 102 is attached to the puncture device 101, and further, a portion of the puncture needle protection cap 202 to be held when the cap 202 is turned has a knurling shape 604 which makes the cap 202 fit to the hand and makes it easy to turn the cap 202 when it is twisted off.

[0060] While in this embodiment the knurling shape 604 is adopted to make the puncture needle cap fit to the hand, the present invention is not restricted thereto, and an octagon shape or a finger shape may be adopted.

[0061] The puncture needle protection cap 202 protects the puncture needle. Further, in order to prevent the lancet body 203 from moving in the puncture needle

holder, attachment of the puncture needle cartridge is performed while holding the puncture needle holder cover 603, whereby the arm means 302 and the housing 602 of the puncture device can be engaged with each other without mutually moving the puncture needle holder 201 and the lancet body 203. That is, since the puncture needle protection part 307 of the puncture needle protection cap 202 contacts the front end portion of the lancet body 203 in the inner-diameter part 205 of the puncture needle holder 201, the lancet body 203 can be fixed so as not to move in the puncture needle holder.

[0062] In the first position shown in figure 9(b), the user applies his/her finger or the like to the skin contact part 402 of the puncture needle holder 201, and pushes a puncture button (not shown) of the puncture device 101 to perform puncture.

[0063] At this time, as shown in figure 9(c), in the puncture needle cartridge 102, the plunger 601 shoots out the lancet body 203 from the first position by the urging force of the charge spring (not shown) of the puncture device, and the lancet body 203 and the plunger 601 move toward the front end, whereby the lancet body 203 moves to a position where the puncture needle protrudes (hereinafter referred to as "second position"). At this time, as shown in figures 9(a) and 9(b), since the arm means 302 of the lancet body elastically deforms toward the center of the lancet body, the arm means 302 of the lancet body does not cooperate with the to-be-latched means 403 when the lancet body 203 moves toward the front end, whereby puncture can be carried out. Thereby, the puncture needle 301 protrudes from the opening 401 of the puncture needle holder 201, and punctures the puncture site. During the puncture, since the lancet body first convex portion 303 is engaged with the puncture needle holder groove 404, the lancet body 203 can move straightly in its axial direction.

[0064] The inner diameter 605 of the to-be-latched means 403 of the puncture needle holder may be constituted according to the inner diameter 606 of the housing of the puncture device to which the puncture needle cartridge is attached, and it should be constituted so that the arm means 302 does not cooperate with the to-be-latched means 403 when the lancet body 203 moves from the first position to the second position, i.e., the inner diameter 605 of the to-be-latched means 403 should be equal to or larger than the inner diameter 606 of the housing 602 of the puncture device.

[0065] Further, when the plunger 601 does not grasp the lancet body 203, the lancet body second convex portion 304 contacts the puncture needle holder rear end surface 405, thereby preventing the lancet body 203 from dropping out of the puncture needle holder 201.

[0066] Then, as shown in figure 9(d), in the puncture needle cartridge 102 after the puncture, the charge spring of the puncture device is restored to its original state, and thereby the lancet body 203 moves from the second position toward the rear end, and stops at a position where the puncture needle 301 does not protrude from the open-

ing 401 of the puncture needle holder 201 although the position is closer to the front end than that when the cartridge 102 was attached. This position is the puncture end position (hereinafter referred to as "third position").

[0067] In the puncture needle cartridge 102 according to the embodiment, the initial position of the lancet body 203 is regarded as the first position, and this first position is regarded as the puncture preparation position. However, the present invention is not restricted thereto. For example, a position behind the initial position may be regarded as the puncture preparation position in order to cope with a puncture device which once moves the plunger 601 and the lancet body 203 in a direction opposite to the puncture direction to charge a urging force during preparation for puncture. In this case, the same operation as mentioned above is performed with the puncture preparation position being set at the first position.

[0068] Figure 9(e) is a diagram illustrating the puncture needle cartridge 102 when it is discarded.

[0069] After the puncture is ended, when removing the puncture needle cartridge 102, the user initially holds the puncture needle holder 201 in the state where the puncture needle cartridge 102 is as shown in figure 9(d), and pulls the puncture needle cartridge 102, whereby the puncture needle holder 201 and the lancet body 203 move apart from each other, and thereby the lancet body 203 moves from the third position back to the first position where the arm means 302 of the lancet body is positioned behind the to-be-latched means 403, and the latch part 305 of the arm means 302 of the lancet body contacts the rear end 405 of the puncture needle holder and/or the first convex portion 303 contacts the puncture needle holder groove 404. When the user further pulls the puncture needle cartridge 102, engagement of the lancet body 203 with the plunger 601 of the puncture device and engagement of the arm means 303 with the housing 602 of the puncture device are released, and elastic deformation of the arm means 302 toward the center of the lancet body is released. Thus, in the state after the puncture needle cartridge is removed as shown in figure 9(e), the lancet body moves from the third position to the first position, and further, the arm means 302 that has been elastically deformed toward the center of the lancet body is restored to the original position. Therefore, even when the lancet body 203 is moved in the puncture direction in the puncture needle holder, the puncture needle does not protrude because the arm means 302 cooperates with the to-be-latched means 403. Thereby, the puncture needle cartridge can be safely discarded without requiring the puncture needle protection cap.

[0070] Next, a description will be given of the case where the arm means 302 of the lancet body and the to-be-latched means 403 cooperate with each other, with reference to figure 9(f). Figure 9(f) is a diagram illustrating the internal structure where the arm means 302 and the to-be-latched means 403 cooperate with each other, and for example, it shows an internal structure of the puncture

device when the user tries to insert the once-used puncture needle cartridge 102, from which the puncture needle protection cap 202 is removed, again into the puncture device 101. As shown in figure 9(f), when the user tries to insert the once-used puncture needle cartridge 102 from which the protection cap 202 is removed, into the puncture device 101, the puncture needle holder 201 and the lancet body 203 move so as to approach to each other, and the arm means 302 and the to-be-latched means 403 cooperate with each other, and thereby the arm means 302 elastically deforms outward. Thereby, the arm means 302 that extends outward contacts the insertion port of the puncture device or the housing, and the puncture needle cartridge 102 cannot be completely attached to the puncture device 101, and therefore, puncture cannot be performed again. That is, the puncture needle cartridge which has once performed puncture and then removed from the puncture device cannot be re-used, and the puncture needle 301 never protrude from the cartridge.

[0071] It is needless to say that, even if the puncture needle has never been used, the puncture needle cartridge without the puncture needle protection cap cannot be attached to the puncture device, as in the case of figure 9(f). That is, since the puncture needle cartridge is constituted so that it cannot be attached to the puncture device when the puncture needle protection cap 202 is removed, a safer puncture needle cartridge can be provided.

[0072] As described above, the puncture needle cartridge according to the embodiment makes the puncture needle 301 project only when puncture is to be performed, thereby preventing the puncture needle 301 from projecting from the opening 401 of the puncture needle holder at times other than puncture.

[0073] As described above, the puncture needle cartridge 102 according to the embodiment is provided with the lancet body 203 having the puncture needle 301, and the puncture needle holder 201, and further, the lancet body 203 has the arm means 302 and the puncture needle holder 201 has the to-be-latched means 403 that cooperates with the arm means 302. When the arm means 302 and the to-be-latched means 403 cooperate with each other, movement of the lancet body 203 in the puncture direction is stopped. Therefore, projection of the puncture needle is limited to only when puncture is performed, and thereby safety of the puncture needle cartridge is enhanced. Further, when the once-used puncture needle cartridge 102 from which the puncture needle protection cap 202 is removed is attached to the puncture device 101, the arm means 302 of the lancet body 203 and the to-be-latched means 403 of the holder 201 cooperate with each other, thereby preventing reuse of the once-used puncture needle.

APPLICABILITY IN INDUSTRY

[0074] A puncture needle cartridge according to the

present invention is useful as a disposable puncture needle cartridge having a puncture needle for replacement of a puncture device used for blood collection or the like, and a puncture needle holder in which the puncture needle is movably stored, which holder can be replaced simultaneously with the puncture needle.

Claims

1. A puncture needle cartridge for mounting on a puncture device (101) when in use, comprising:

a lancet (204) having an elongate lancet body (203) having a puncture needle (301) at one end and a portion to be held by the puncture device (101) at the other end, the lancet body further having a trunk between the one end and the other end, and a puncture needle protection cap (202) for protecting the puncture needle (301); and a cylindrical puncture needle holder (201) for holding the lancet body (203) so that the lancet body (203) is movable in its axial direction in the holder (201), wherein

a plurality of linear grooves (404), parallel to the puncture needle holder (201), are formed within the puncture needle holder (201) so that the grooves (404) divide the circumference of the puncture needle holder (201) in quarters, **characterized in that** a convex portion (303) is shaped in a long strip, is provided in two positions at right and left toward the axial direction of the lancet body and is formed on the trunk of the lancet body (203), said convex portion (303) is arranged to guide movement of the lancet body (203) in its axial direction by engaging with two of said plurality of grooves (404).

2. The puncture needle cartridge as defined in Claim 1, further comprising an arm means (302) formed on the lancet body (203), wherein the arm means (302), outside the puncture needle holder (201), restricts the movement of the lancet body (203).

3. The puncture needle cartridge as defined in Claim 2, comprising a plurality of the arm means (302) or the convex portions (303), wherein the plurality of the arm means (302) or the convex portions (303) simultaneously contact a contact part formed on the puncture needle holder (201) when restricting the movement of the lancet (204) toward the side not having the puncture needle (301).

4. The puncture needle cartridge as defined in any of Claims 2 to 3, wherein the arm means (302) has a slope and a height from the central axis of the lancet (204) increases toward the end of the side having

the puncture needle (301).

5. The puncture needle cartridge as defined in any Claims 1 to 4, wherein the lancet body (203) has two arm means (302) placed across the lancet body (203) and a convex portion (303) placed on the circumference of the lancet body (203).
6. The puncture needle cartridge as defined in any of Claims 1 to 5, wherein the periphery of the puncture needle holder (201) at an end on the skin-contact side is circular.
7. The puncture needle cartridge as defined in any of Claims 1 to 6, wherein the puncture needle holder (201) is larger in outer diameter at the end on the skin-contact side than at the other end.
8. The puncture needle cartridge as defined in any of Claims 1 to 7, wherein the puncture needle holder (201) has a portion having a first outer diameter and a portion having a second outer diameter that is smaller than the first outer diameter, and there is a difference in level between the portion having the first outer diameter and the portion having the second outer diameter.

Patentansprüche

1. Punktionskanülenkartusche zum Montieren an einer Punktionsvorrichtung (101), wenn im Gebrauch, die Folgendes umfasst:

eine Lanzette (204), die einen länglichen Lanzettenkörper (203), der an einem Ende eine Punktionskanüle (301) und am anderen Ende einen Abschnitt, der von der Punktionsvorrichtung (101) zu halten ist, aufweist, wobei der Lanzettenkörper ferner zwischen dem einen Ende und dem anderen Ende einen Rumpf aufweist, und eine Punktionskanülenschutzkappe (202) zum Schützen der Punktionskanüle (301) aufweist; und

einen zylindrischen Punktionskanülenhalter (201) zum Halten des Lanzettenkörpers (203), derart, dass der Lanzettenkörper (203) in seiner Axialrichtung im Halter (201) bewegbar ist, wobei

parallel zum Punktionskanülenhalter (201) eine Vielzahl von linearen Rillen (404) im Punktionskanülenhalter (201) derart gebildet sind, dass die Rillen (404) den Umfang des Punktionskanülenhalters (201) in Viertel teilen, **dadurch gekennzeichnet, dass**

ein konvexer Abschnitt (303) in einem langen Streifen geformt ist, in zwei Positionen rechts und links zur Axialrichtung des Lanzettenkör-

pers bereitgestellt ist und am Rumpf des Lanzettenkörpers (203) gebildet ist, wobei der konvexe Abschnitt (303) angeordnet ist, eine Bewegung des Lanzettenkörpers (203) in seiner Axialrichtung durch Eingreifen in zwei der Vielzahl von Rillen (404) zu führen.

2. Punktionskanülenkartusche nach Anspruch 1, die ferner ein Armmittel (302) umfasst, das am Lanzettenkörper (203) gebildet ist, wobei das Armmittel (302) außerhalb des Punktionskanülenhalters (201) die Bewegung des Lanzettenkörpers (203) einschränkt.
3. Punktionskanülenkartusche nach Anspruch 2, die eine Vielzahl der Armmittel (302) oder der konvexen Abschnitte (303) umfasst, wobei die Vielzahl der Armmittel (302) oder der konvexen Abschnitte (303) ein Kontaktteil, das am Punktionskanülenhalter (201) gebildet ist, gleichzeitig berühren, wenn sie die Bewegung der Lanzette (204) zu der Seite, die die Punktionskanüle (301) nicht aufweist, einschränken.
4. Punktionskanülenkartusche nach einem der Ansprüche 2 bis 3, wobei das Armmittel (302) eine Steigung aufweist und eine Höhe von der Mittelachse der Lanzette (204) zum Ende der Seite, die die Punktionskanüle (301) aufweist, zunimmt.
5. Punktionskanülenkartusche nach einem der Ansprüche 1 bis 4, wobei der Lanzettenkörper (203) zwei Armmittel (302), die über den Lanzettenkörper (203) platziert sind, und einen konvexen Abschnitt (303), der am Umfang des Lanzettenkörpers (203) platziert ist, aufweist.
6. Punktionskanülenkartusche nach einem der Ansprüche 1 bis 5, wobei die Peripherie des Punktionskanülenhalters (201) an einem Ende der Hautkontaktseite kreisförmig ist.
7. Punktionskanülenkartusche nach einem der Ansprüche 1 bis 6, wobei der Außendurchmesser des Punktionskanülenhalters (201) am Ende der Hautkontaktseite größer ist als am anderen Ende.
8. Punktionskanülenkartusche nach einem der Ansprüche 1 bis 7, wobei der Punktionskanülenhalter (201) einen Abschnitt mit einem ersten Außendurchmesser und einen Abschnitt mit einem zweiten Außendurchmesser, der kleiner ist als der erste Außendurchmesser, aufweist und zwischen dem Abschnitt mit dem ersten Außendurchmesser und dem Abschnitt mit dem zweiten Außendurchmesser hinsichtlich des Niveaus ein Unterschied besteht.

Revendications

1. Cartouche d'aiguille de perforation destinée à être montée sur un dispositif de perforation (101) lorsqu'il est utilisé, comprenant :

une lancette (204) ayant un corps de lancette allongé (203) ayant une aiguille de perforation (301) au niveau d'une extrémité et une partie à maintenir grâce au dispositif de perforation (101) au niveau de l'autre extrémité, le corps de lancette ayant en outre un tronc entre la première extrémité et l'autre extrémité, et un capuchon de protection d'aiguille de perforation (202) pour protéger l'aiguille de perforation (301) ; et un support d'aiguille de perforation cylindrique (201) pour maintenir le corps de lancette (203) de sorte que le corps de lancette (203) est mobile dans sa direction axiale dans le support (201), dans laquelle : une pluralité de rainures linéaires (404) parallèles au support d'aiguille de perforation (201), sont formées à l'intérieur du support d'aiguille de perforation (201) de sorte que les rainures (404) divisent la circonférence du support d'aiguille de perforation (201) en quarts, **caractérisée en ce que** : une partie convexe (303) est formée dans une longue bande, est prévue dans deux positions à droite et à gauche vers la direction axiale du corps de lancette et est formée sur le tronc du corps de lancette (203), ladite partie convexe (303) est agencée pour guider le mouvement du corps de lancette (203) dans sa direction axiale en se mettant en prise avec deux de ladite pluralité de rainures (404).
2. Cartouche d'aiguille de perforation selon la revendication 1, comprenant en outre un moyen de bras (302) formé sur le corps de lancette (203), dans laquelle le moyen de bras (302), à l'extérieur du support d'aiguille de perforation (201), limite le mouvement du corps de lancette (203) .
3. Cartouche d'aiguille de perforation selon la revendication 2, comprenant une pluralité de moyens de bras (302) ou de parties convexes (303), dans laquelle la pluralité de moyens de bras (302) ou de parties convexes (303) sont simultanément en contact avec une partie de contact formée sur le support d'aiguille de perforation (201) lors de la limitation du mouvement de la lancette (204) vers le côté n'ayant pas l'aiguille de perforation (301).
4. Cartouche d'aiguille de perforation selon l'une quelconque des revendications 2 à 3, dans laquelle le moyen de bras (302) a une inclinaison et une hauteur à partir de l'axe central de la lancette (204) augmente vers l'extrémité du côté ayant l'aiguille de perforation (301).
5. Cartouche d'aiguille de perforation selon l'une quelconque des revendications 1 à 4, dans laquelle le corps de lancette (203) a deux moyens de bras (302) placés de part et d'autre du corps de lancette (203) et une partie convexe (303) placée sur la circonférence du corps de lancette (203).
6. Cartouche d'aiguille de perforation selon l'une quelconque des revendications 1 à 5, dans laquelle la périphérie du support d'aiguille de perforation (201) au niveau d'une extrémité sur le côté de contact avec la peau est circulaire.
7. Cartouche d'aiguille de perforation selon l'une quelconque des revendications 1 à 6, dans laquelle le support d'aiguille de perforation (201) est plus important du point de vue du diamètre externe au niveau de l'extrémité du côté du contact avec la peau qu'au niveau de l'autre extrémité.
8. Cartouche d'aiguille de perforation selon l'une quelconque des revendications 1 à 7, dans laquelle le support d'aiguille de perforation (201) a une partie ayant un premier diamètre externe et une partie ayant un second diamètre externe qui est inférieur au premier diamètre externe, et il y a une différence de niveau entre la partie ayant le premier diamètre externe et la partie ayant le second diamètre externe.

Fig.1(a)

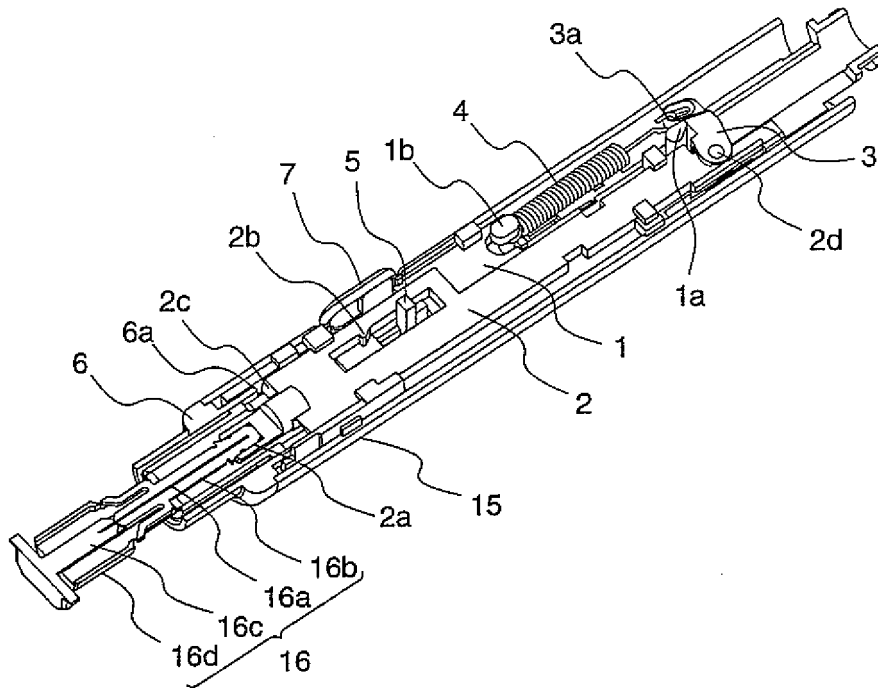


Fig.1(b)



Fig.2

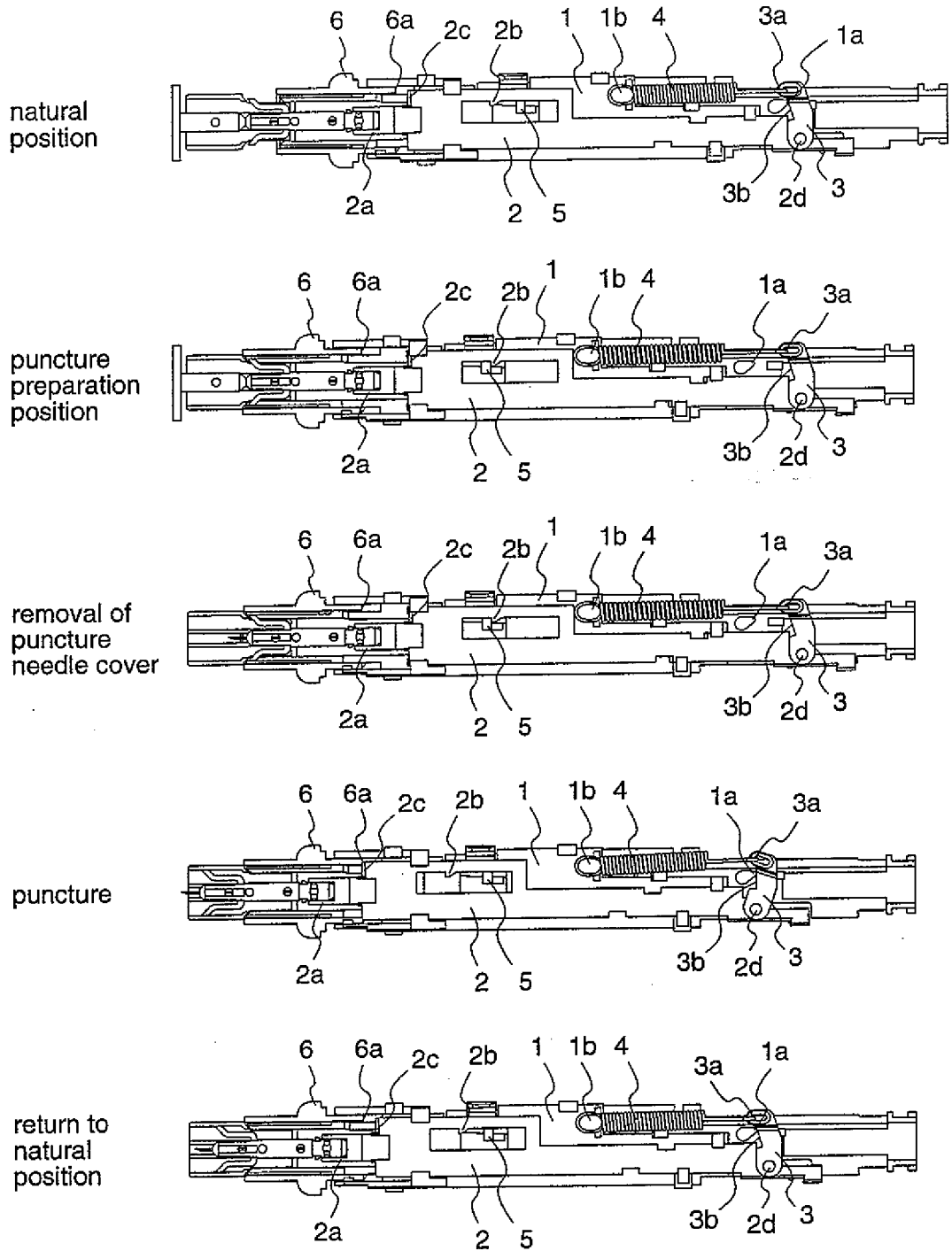


Fig.3

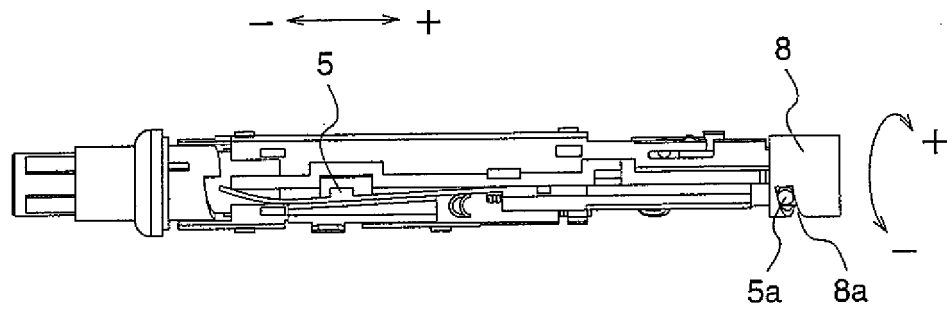


Fig.4

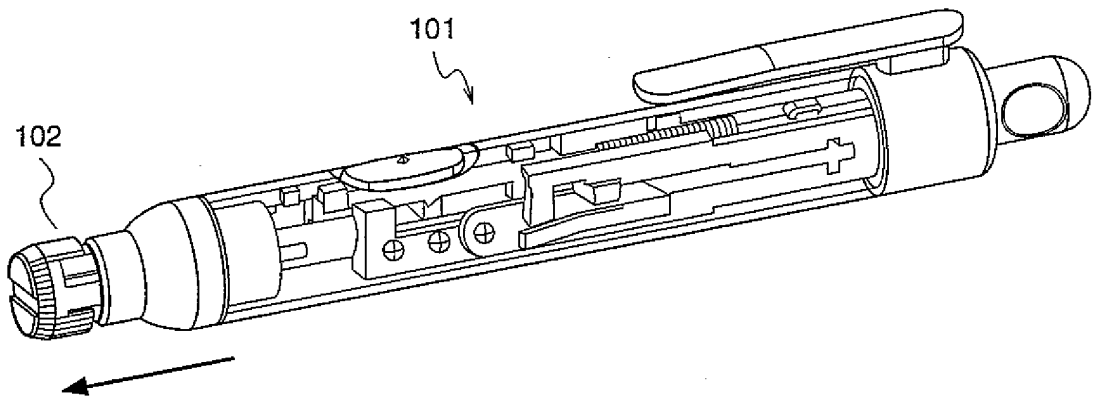


Fig.5

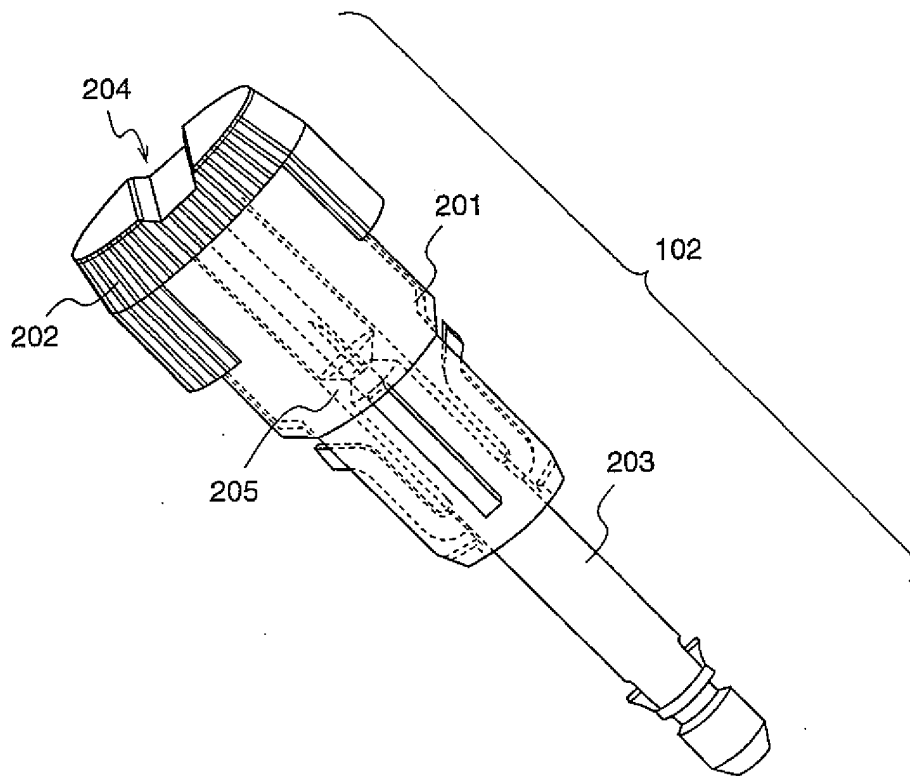


Fig.6

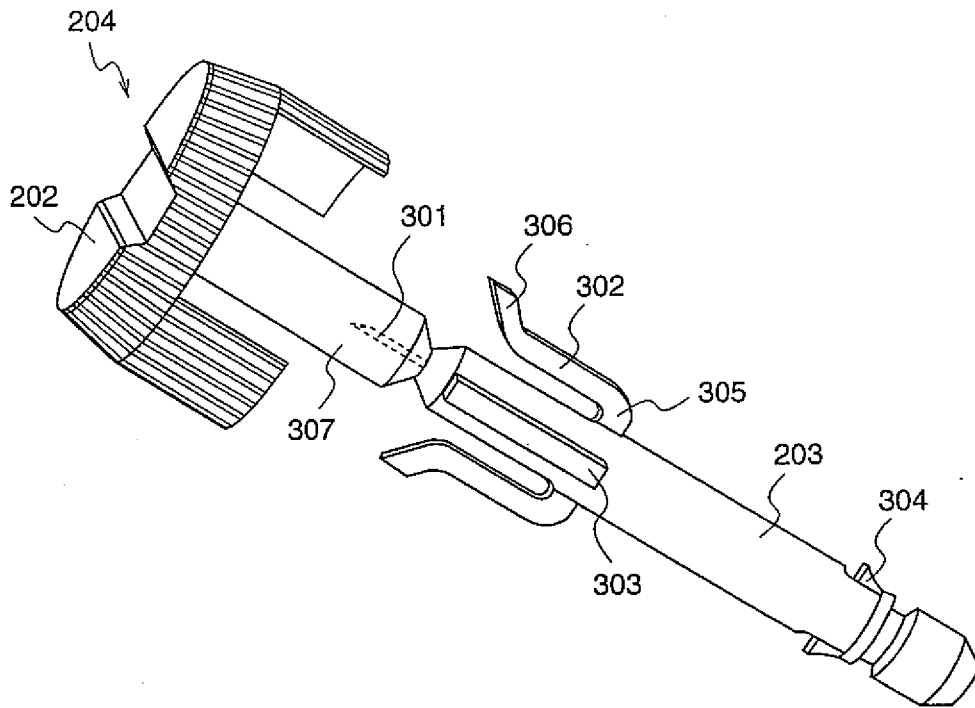


Fig.7

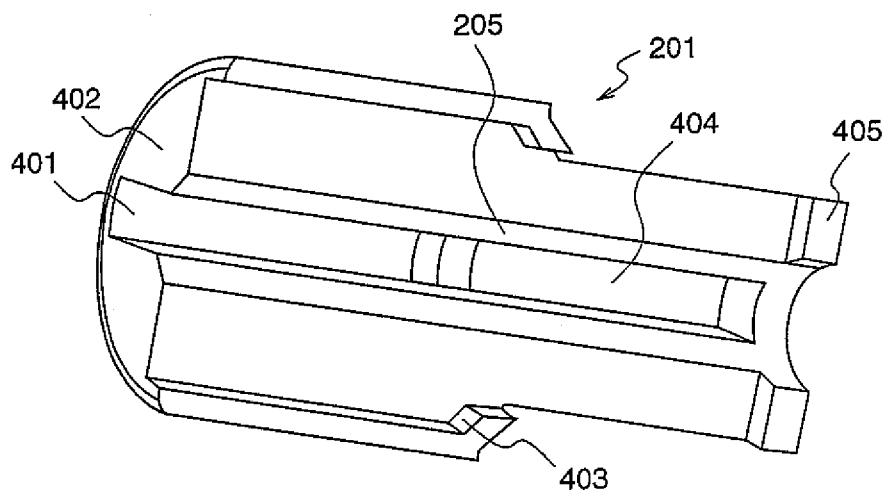


Fig.8

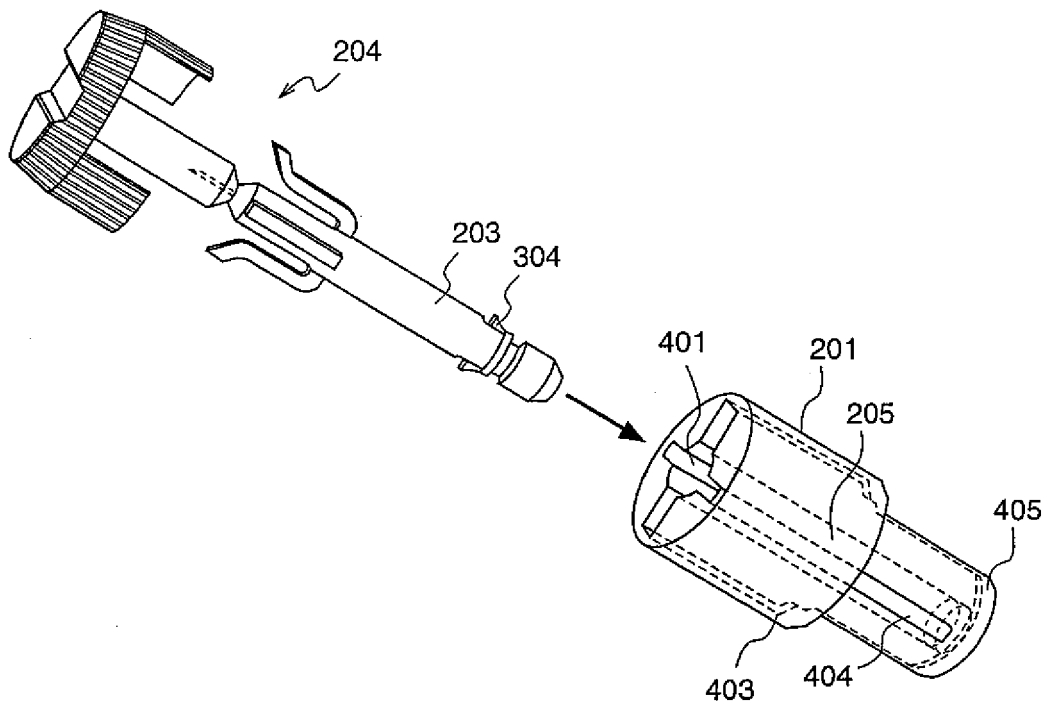


Fig.9(a)

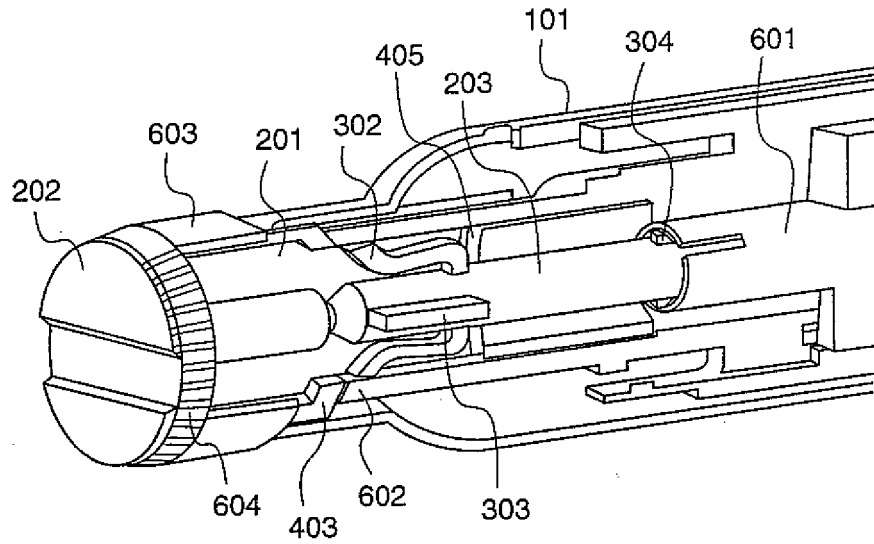


Fig.9(b)

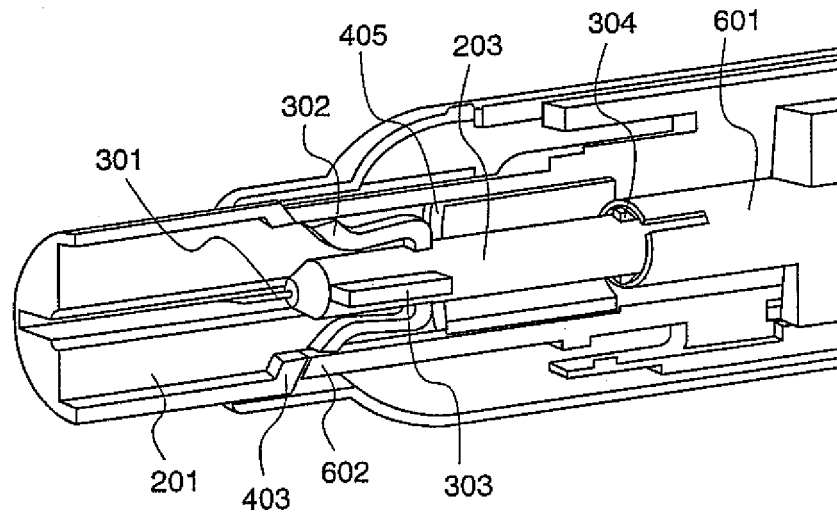


Fig.9(c)

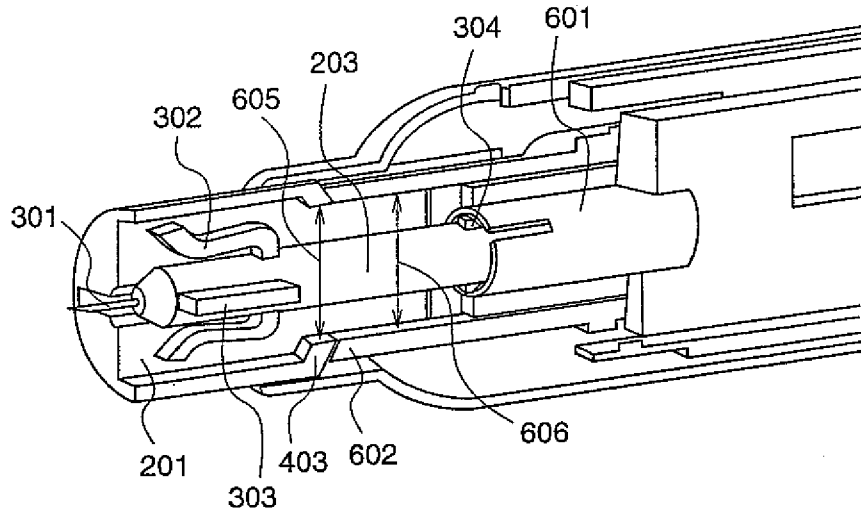


Fig.9(d)

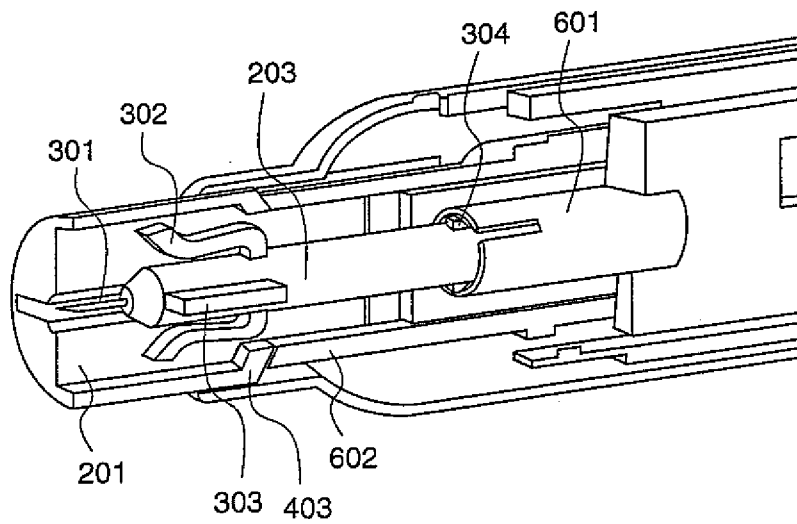


Fig.9(e)

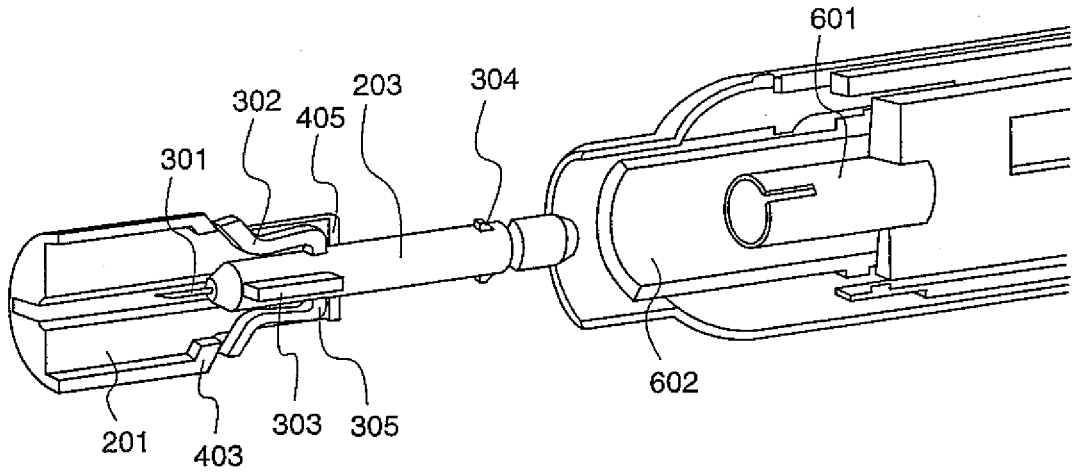
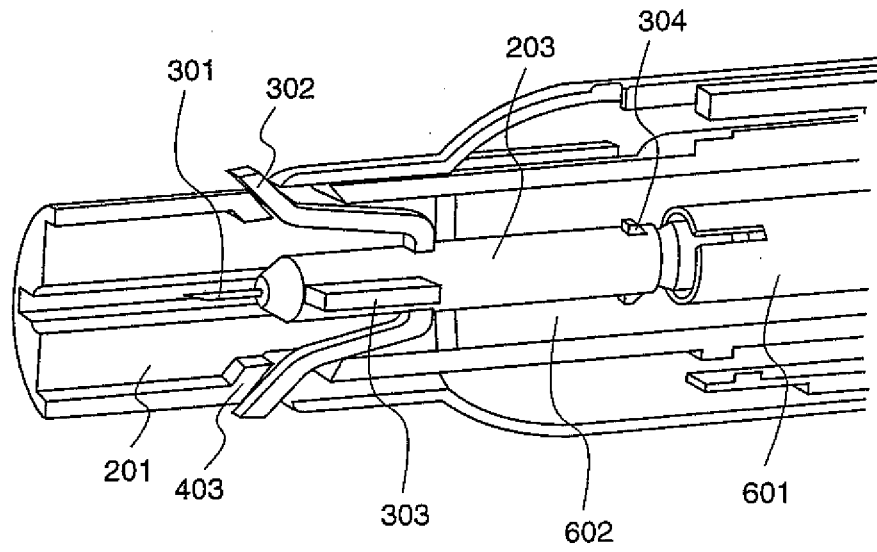


Fig.9(f)



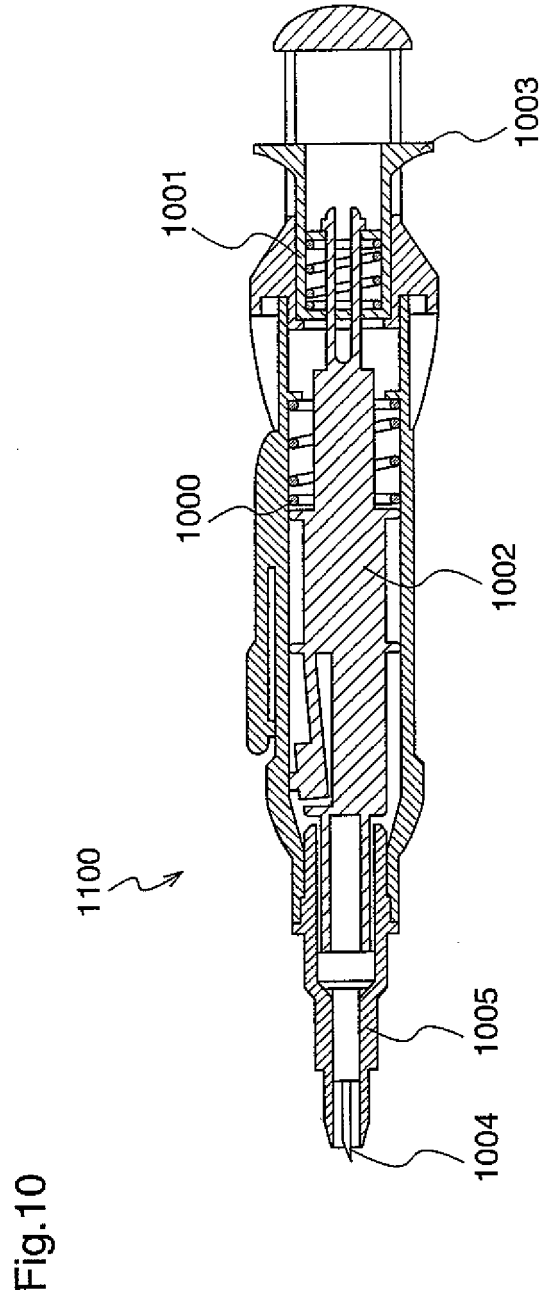
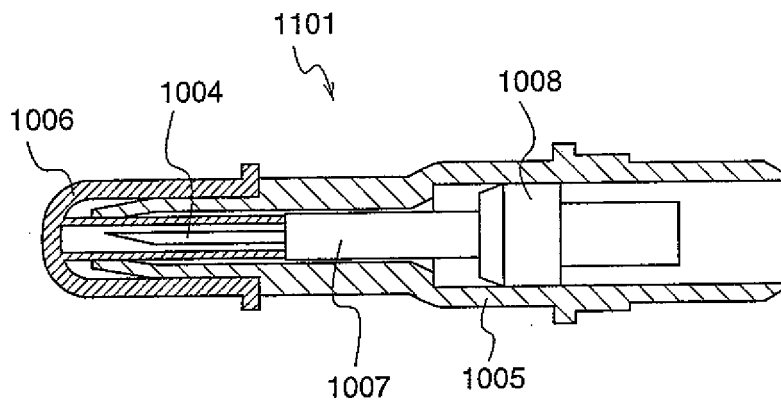


Fig.11



REFERENCES CITED IN THE DESCRIPTION

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发明人	UMEBAYASHI, NOBUE TSUBOUCHI, TOSHIHARU		
IPC分类号	A61B5/00 A61B5/151		
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其他公开文献	EP2298161A1		
外部链接	Espacenet		

摘要(译)

穿刺装置构成，在柱塞（2）上设置有被局部限制旋转的杆（3），通过拉力弹簧（4）的收缩恢复力获得向前的作用力，该拉力当柱塞（2）由于其惯性从未施加推力的位置进一步向前移动时，弹簧（4）再次以杠杆杆（3）伸长，并且柱塞（2）向后推恢复性力量的重新扩张。此外，穿刺针筒具备：具有穿刺针的刺血针主体（203）；以及可移动地收纳有刺血针主体（203）的穿刺针保持器（201）；此外，刺血针主体（203）具有：臂装置（302）和穿刺针保持器（201）包括与臂装置（302）配合的待门锁装置（303）。从而，简化了制造过程，并且防止了穿刺针的多次穿刺，并且进一步，控制了穿刺速度，并且，安全地丢弃了用过的穿刺针。

Fig. 1(a)

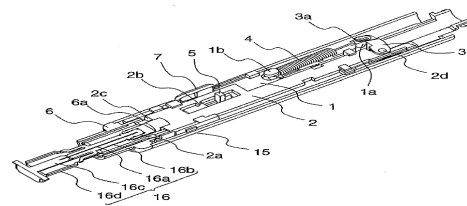


Fig. 1(b)

