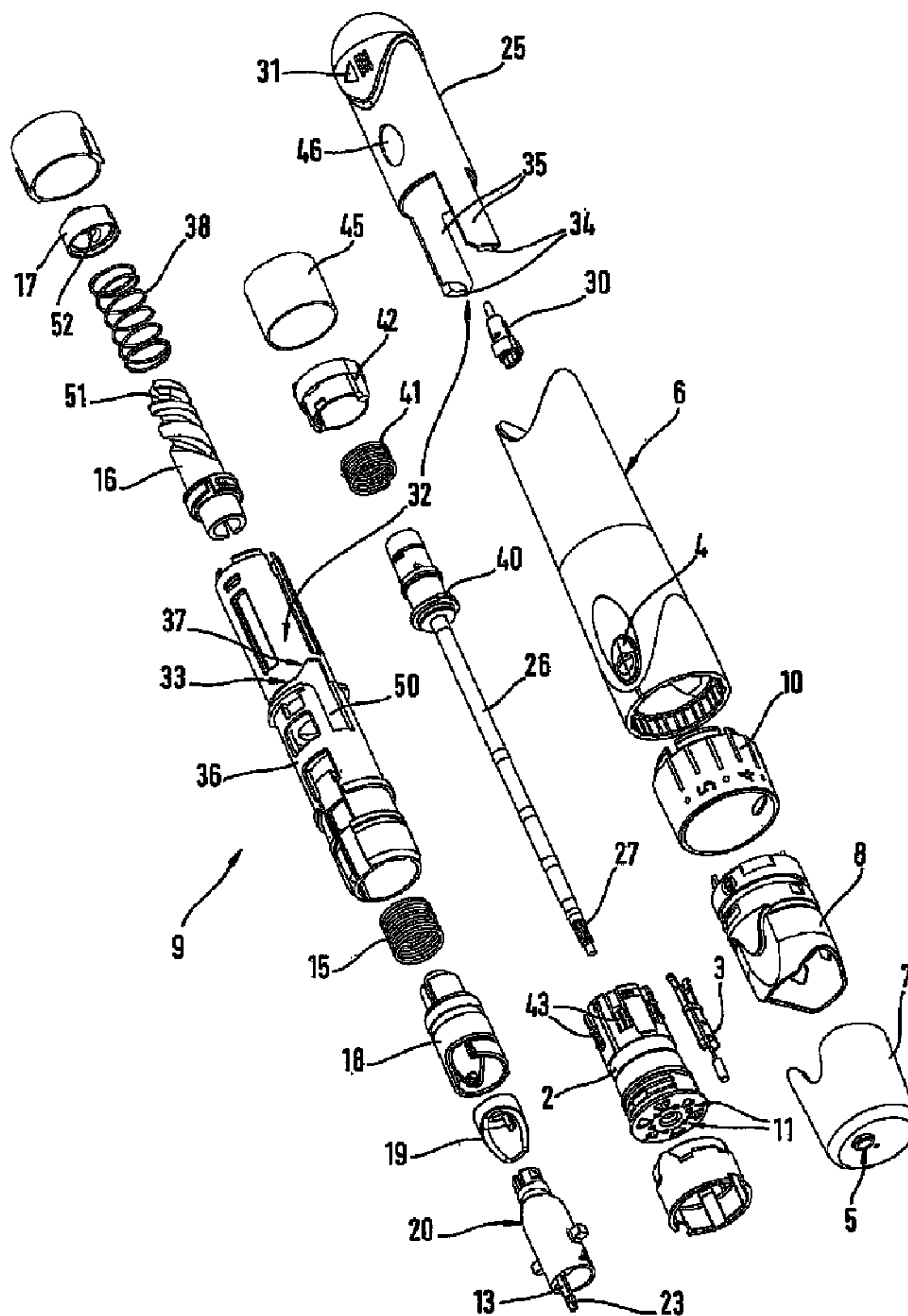




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(54) Titre : DISPOSITIF A LANCETTES POUR PRODUIRE UNE INCISION
 (54) Title: LANCET DEVICE FOR MAKING A PUNCTURE WOUND



(57) Abrégé/Abstract:
 The invention relates to a lancet device (1) for making a puncture wound, comprising: a magazine holder (8) for a lancet magazine (2) containing a number of lancets (3); a lancet drive (9) with a drive spring (15), a tensioning device (16, 17) for tensioning the

(57) **Abrégé(suite)/Abstract(continued):**

drive spring (15) and with a push rod (13), which can be coupled to a lancet (3) located inside the lancet magazine (2) and which, together with a lancet (3) coupled thereto, can be displaced with a puncturing and return motion while traveling at a high velocity by means of the lancet drive in order to make a puncture wound, and; a magazine advance (14) with which the lancet magazine (2) can be advanced whereby enabling the lancets (3) stored therein to be coupled to the push rod (13) in succession. The invention provides that the lancet drive is mechanically decoupled from the magazine advance, and the lancet device (1) has an actuating element (25) with which the magazine advance (14) can be actuated independent of the lancet drive, particularly independent of the tensioning device (16, 17).

RDG 132/00/WO

Abstract of the Disclosure

5

A lancing apparatus (1) for producing a puncture wound, comprising a magazine holder (8) for a lancet magazine (2) with a plurality of lancets (3), a lancet drive comprising a drive spring (15), a tensioning device (16, 17) for tensioning the drive spring (15) and a push rod (13), said push rod (13) being adapted for coupling to a lancet (3) located in
10 the lancet magazine (2) and said push rod (13) being adapted for moving at high velocity, together with a lancet (3) coupled thereto, by means of lancet drive (9) during a puncture and retraction movement producing a puncture wound, and a magazine advancing mechanism (14) for advancing the lancet magazine (2) in such a manner that the lancets (3) stored therein can be coupled to the push rod (13) one after the other.

15

According to the present invention, the lancet drive is mechanically not coupled to the magazine advancing mechanism (14) whereby a plurality of puncture wounds can be produced using the same lancet (3) a plurality of times, the lancing apparatus comprising an actuating element (25) for actuating the magazine advancing mechanism (14) independently from the lancet drive, in particular for actuating it independently from
20 the tensioning device (16, 17).

Figure 2

PCT/EP2005/009089
RDG 132/00/WO
English translation of application as filed

5

Applicant: Roche Diagnostics GmbH
68298 Mannheim, DE

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Lancing apparatus for producing a puncture wound

15

The present invention relates to a lancing apparatus for producing a puncture wound, in particular for obtaining a blood sample, which is to be analyzed for medical purposes. It comprises a magazine holder for a lancet magazine with a plurality of lancets; a lancet drive with a drive spring, a tensioning device for tensioning the drive spring, and a push rod, said push rod being adapted for coupling to a lancet located in the lancet magazine and said push rod being adapted for moving at high velocity, together with a lancet coupled thereto by means of the lancet drive during a puncture and retraction movement for producing a puncture wound; and a magazine advancing mechanism for advancing the lancet magazine in such a manner that the lancets stored therein can be coupled to the push rod one after the other.

25

Furthermore, the present invention relates to a blood sampling system comprising such a lancing apparatus and a lancet magazine adapted thereto and including a plurality of lancets.

30

For sampling a small quantity of blood from a body part (usually from a finger or earlobe) for analytic-diagnostic purposes, lancets are used, which are pierced into the corresponding body part for producing a puncture wound. Blood sampling systems have been available for some time, which comprise a lancing apparatus and associated

lancets specially tailored for the particular lancing apparatus. A lancet drive for piercing the lancet mechanically into the skin is located in a housing of the lancing apparatus.

5 Lancet devices have to fulfil difficult and partially contradictory requirements for minimal pain, simple operation, compact structure, and cost-effective construction. Extensive development work has been performed to fulfill these requirements as far as possible. One direction of the development efforts has gone toward offering the user more comfort. Simple and comfortable operation is important, in particular, for diabetics, who have to check their blood glucose level frequently to be able to keep it within specific
10 limits by insulin injections. In this context the usage comfort of the systems is of very high medical significance, because the regular self-checking ("home-monitoring") of the blood sugar significantly reduces the risk of grave long-term damage of diabetes mellitus (e.g., retinopathies, which may result in blinding) and any improvement of the operating comfort increases the readiness of the patients for regular self checking.

15 One possibility for increasing the comfort and making the operation of a lancing apparatus easier comprises the use of lancet magazines containing a plurality of lancets and adapted to be inserted into a magazine holder of a lancing apparatus. Thereby the insertion of individual lancets, which is difficult in particular for sick or frail people whose
20 manual dexterity is restricted, is no longer required.

A blood sampling system having a drum-shaped revolver magazine, which contains 10 lancets located on a ring, is described in DE 10022720 A1. After each puncture the magazine is advanced automatically, i.e., the magazine of the lancing apparatus is
25 transported further into the next position with a fresh lancet. A revolver magazine having a plurality of lancets located on a ring is also used in the blood sampling system described in EP 1384438 A1, no statements being made about its advancing.

A blood sampling system equipped with a lancet magazine is also described in WO
30 01/00090 A1. The system comprises a mechanism for automatic step-by-step advancement of the magazine. It is considered as advantageous that a fresh lancet is thus used automatically for each new puncture. This applies similarly to US Patent

6,228,100. It teaches different configurations, by which an unused lancet, which is next in line, is brought into the usage position after each triggering of the lancet drive. The reuse of used lancets is thus prevented.

5 WO 03/071940 A1 and US Patent 6,530,892 describe lancet systems and consider it favorable that in each case the lancet magazine is advanced between two puncture steps in such a manner that each time a fresh lancet is available.

10 In spite of these substantial development efforts, up to this point, lancing apparatuses comprising lancet magazines have not established themselves on the market. Therefore it is an object of the present invention to provide a magazine lancing apparatus which is better accepted by the users.

15 This object is achieved by a lancet system of the type described at the beginning in that the lancet drive is not coupled to the magazine advancing mechanism, the lancing apparatus comprising an actuating element for actuating the magazine advancing mechanism independently from the lancet drive, in particular for actuating it independently from the tensioning device.

20 The developments of blood lancet systems known from the prior art are all based on the assumption that it is advantageous for the construction and use of magazine blood lancet systems if the magazine is always advanced between two punctures and, accordingly, a new blood lancet is available in each case. Therefore, the advancing mechanism of the magazine is coupled to the lancet drive in such a manner that the magazine advancing occurs alternately with the puncture movements in an automatic and compulsory manner. The coupling is typically mechanical. In US Patent 6,530,892, 25 the coupling is implemented in an electronic controller of the system functions.

30 The inventors have found that the relatively complex coupling construction is neither necessary nor especially advantageous for practical handling. To the contrary, in the field of home monitoring, the handling is simplified and a simplified construction is simultaneously achieved if the functions of the lancet drive and the magazine advancing

mechanism are separated. It is easily possible to spatially separate the functions of "setting the puncture depth" and "advancing the lancet magazine" and localize them in such a manner that intuitive operation is possible: puncture depth setting at the front end of the device in proximity to the exit opening of the lancet; magazine advancing
5 mechanism at the rear end, in particular combined with the same actuating element used for tensioning the lancet drive.

The described and further advantages are in particular achieved if, in addition, at least a part of the preferred features are used which are explained hereafter on the basis of an
10 exemplary embodiment. Significant additional cost savings are achieved if the user himself can determine how frequently he advances the magazine and thus brings a new lancet into use.

Further details and advantages of the present invention are explained hereafter on the
15 basis of an exemplary embodiment with reference to the attached figures. The features illustrated therein can be used individually or in combination to provide preferred embodiments of the present invention.

Figure 1 shows a lancing apparatus according to the present invention in a side
20 view,

Figure 2 shows the lancing apparatus in an exploded illustration,

Figure 3 shows parts of the lancing apparatus with a cutaway housing, and
25

Figure 4 shows an illustration similar to Figure 3, but having a non-sectional illustration of some installed parts of the lancing apparatus.

The blood sampling system shown in Figures 1 and 2 comprises a lancing apparatus 1
30 and a lancet magazine 2, adapted thereto and including a plurality of lancets 3. It is used for generating a puncture wound for sampling blood for diagnostic purposes. By pressing a trigger element 4 the movement of a lancet drive 9 of the lancing apparatus 1

is started so that the tip of a lancet 3 exits at high velocity from an exit opening 5 of the housing 6. In the exemplary embodiment shown, the exit opening 5 is located at a cap 7 belonging to the housing 6, which encloses a lancet magazine 2 inserted into a magazine holder 8. A puncture depth adjustment ring 10 is used for adjusting a puncture depth which is optimal for minimum pain and the amount of blood obtained upon a puncture.

As Figure 2 shows, the lancet magazine 2 is implemented as a (drum-shaped) revolver magazine and contains a plurality of preferably six lancets 3. The lancets 3 are positioned in annularly located lancet holders of the lancet magazine 2. A lancet opening 11 is assigned to each lancet holder, adapted to be aligned with the exit opening 5 in a coupling position by rotating the lancet magazine 2. An insertion opening 12 (see Figure 3) for a push rod 13 of the lancet drive, adapted to be coupled to one of the lancets 3 in the coupling position, is located opposite each lancet opening 11.

The lancet drive 9 comprises a drive spring 15, a tensioning device 16, 17 for tensioning the drive spring 15, and the push rod 13, said push rod 13 being adapted for moving at high velocity, together with a lancet 3 coupled thereto, driven by the lancet drive 9, in such a manner that a puncture and retraction movement is executed.

As can be appreciated from Figure 2, further elements of the lancet drive 9 are a drive rotor 18 adapted to be driven by the drive spring 15 and an output-side coupling mechanism 19, 20, by which, in a forward movement phase of the lancet drive, a rotational movement of the drive rotor 18 is converted into a translational movement of the push rod 13 and thereby, into a puncture movement of the lancet 3.

The tensioning device includes a rotationally-movable tensioning rotor 16, on which the end of the drive spring 15 facing away from the drive rotor 18 is supported. The tensioning rotor 16 is adapted to rotate, while rotation of the drive rotor 18 is blocked, in the same rotational direction in which the drive rotor 18 rotates during the forward movement phase, thereby tensioning the drive spring 15. During the forward movement phase the tensioning rotor 16 is locked against backwards movement, so that, after

release of the blocking, the drive rotor 18 performs a rotational movement which is converted into a translational movement of the push rod 13. The drive rotor rotates during a work cycle, i.e., during a use of the device, through a total rotational angle range of 360°.

5

The tensioning device is actuated by a rotary-slide-transmission 51, 52, which cooperates with an actuating element 25 for tensioning the drive spring 15 when the actuating element 25 is pressed down. As Figure 2 shows, the rotary-slide-transmission is formed by a cam 51 in the form of a peripheral double groove on the tensioning rotor 10 16 and two control pins 52 of the tensioning sleeve 17, which travel along the cam 51 when the actuating element 25 is pressed down.

15

A lancet drive of this type is described in EP 1384438 A1, wherein the expression OWADAC (One Way Alternating Drive and Cocking) is used. The content of this document is incorporated in the disclosure of the present application by reference in regard to further features and functions of the lancet drive.

20

As already noted, the lancet magazine 2 has an insertion opening 12 diametrically opposite each lancet opening 11. The push rod 13 can be pushed through the insertion opening 12 to couple to a lancet 3 in the lancet magazine 2. The corresponding position of the lancet holder with a lancet 3 is referred to as the coupling position. The thickened head part 23 of the push rod 13 is coupled in a formfitting manner to the lancet 3, so that it remains connected to the push rod 13 during the puncture and retraction movement. Further details and alternative embodiments of a suitable coupling mechanism are 25 described in WO 02/36010 A1, which is incorporated in the disclosure of the present application in this regard by reference.

30

The rotation of the lancet magazine 2 by a rotation step, in which the next lancet 3 is brought into the next coupling position, is referred to as advancing or indexing and is achieved using a magazine advancing mechanism, which is described in greater detail hereafter.

The magazine advancing mechanism 14 is not mechanically coupled to the lancet drive. Rather the lancing apparatus 1 has an actuating element 25 for actuating the magazine advancing mechanism independently from the lancet drive, in particular independently from the tensioning device 16, 17. Thus, the user can determine himself how frequently he advances the magazine and thus brings a new lancet into use.

The elements of the magazine advancing mechanism are shown in the assembled state in Figures 3 and 4, in which the lancet drive is not shown for the sake of better visibility. The magazine advancing mechanism 14 includes an axle 26 for plugging on and for rotating the lancet magazine 2. The axle 26 has a head 27 having a profiled ring to ensure a rotationally fixed coupling to the lancet magazine 2. The magazine advancing mechanism is actuated by a rotational movement of the actuating element 25. This rotational movement is transmitted by a coupling part 30 to the axle 26. Alternatively, the magazine advancing mechanism can also be actuated by a translational movement of the actuating element, which is converted, for example by a rotary-slide-transmission, into a rotational movement of the axle 26.

The magazine advancing mechanism 14 is implemented in such a manner that the lancet magazine 2 is adapted for advancing only in one direction. For this purpose, it includes a direction-switched coupling by means of the coupling part 30, which is positioned between the axle 26 and actuating element 25. The direction-switched coupling 30 is preferably a pawl freewheel, in particular a ratchet. A rotational movement of the actuating element 25 can only be transmitted in one direction to the axle 26 by the direction-switched coupling 30. An arrow-shaped profiled marking 31 is fixed to the actuating element 25 to indicate the correct rotational direction to the user.

The magazine advancing mechanism comprises rotational step limiting means 32 in order that the lancet magazine 2 is rotated upon each actuation of the magazine advancing mechanism only so far that the next lancet 3 reaches its coupling position with the push rod 13. These rotational step limiting means 32 are explained hereafter with reference to Figure 2.

In the exemplary embodiment shown, the rotational step limiting means 32 are implemented by a cam mechanism having a cam 33 and a cam traveller 34. The cam 33 is formed by a recess rotationally fixed in relation to the housing. It extends over a sufficiently small angular range around the circumference, namely less than twice a rotational step of the magazine advancing mechanism 14. To avoid tilting torques, two recesses 33 of this type and two cam travellers 34 are provided diametrically opposing. Since the lancet magazine of the exemplary embodiment shown has six lancet holders, one rotational step is 60°. The recess 33 therefore preferably extends only over a peripheral angular range of 70 to 90°, i.e., significantly less than 120°.

One of the cam travellers 34, which are each located at the end of two guide arms 35 of the actuating element 25, engages with each recess 33. During a rotational movement of the actuating element 25, the cam travellers 34 are guided by the respective recess 33 until they stop at the end of the recess 33, whereby a rotation of the actuating element 25 beyond the permitted range is precluded. In the simplest case, the cam 33 can be positioned in the housing 6 itself. In the exemplary embodiment shown, the cam is located in a sleeve 36 which is rotationally fixed connected to the housing.

As shown in Figure 2, the cam 33 does not run exactly in circumferential direction along its complete length. Rather it is slightly inclined in a starting section. The actuating element 25 is moved slightly in the axial direction at the beginning of a rotational movement and pressed against the axle 26 due to the inclination 37. The axle 26 is thereby engaged with the actuating element 25 by the coupling part 30, so that a rotational movement of the actuating element 25 can be transmitted to the axle 26.

The actuating element 25 is reset into its original position before the next actuation of the magazine advancing mechanism. To this end the user can manually rotate the actuating element 25 back. To make the handling of the lancing apparatus 1 as simple as possible, in the exemplary embodiment shown this occurs automatically by means a spring 38. The spring 38 can be a torsion spring, which counteracts a rotational movement of the actuating element. Preferably a compression spring is used, which is compressed in the axial direction during the spring movement connected to a rotation.

Due to the inclination 37 of the cam 33, resetting of the actuating element 25 is made easier for a user by the force of the spring 38 acting in axial direction.

As shown in Figure 4, the magazine advancing mechanism 14 includes a rotation
5 limitation device 40, restricting the rotation of the lancet magazine to less than 360°. This measure has the advantage that a lancet 3, which was already used some time ago, is not unintentionally taken for a fresh lancet 3 and used again. A plurality of days may pass under certain circumstances between the use of the first lancet 3 and the last
10 lancet of a lancet magazine 2. In such a long period of time pathogens and spores originating from the environment can multiply to such an extent on a used lancet 3 that there is a health danger even if the lancet 3 is used by the same person. In contrast, there is practically no danger of infection in the case of double or triple use of a lancet in a period of a few hours, which is practiced by many diabetics in the course of their
15 regular self-monitoring of the blood sugar content.

In the exemplary embodiment shown, the rotation limitation device 47 is implemented by
a stop element 40 located on the axle. The stop element engages a stop 39 rotationally
fixed in relation to the housing 6. In the simplest case, the stop 39 can be positioned at
the housing 6 itself. In the exemplary embodiment shown, the stop is part of a sleeve
20 enclosing the axle 26.

Upon each exchange of the lancet magazine 2 the axle 26 rotates back into its original
position, driven by a restoring spring 41 shown in Figures 2 and 3, which is preferably
under pre-tension. As a result, there is no engagement of the rotation limitation device
25 47 until the axle 26 and thus also the lancet magazine 2 have been rotated far enough to allow use of all lancets 3. The restoring spring is a torsion spring 41 which is located around the axle 26. One end of this spring is supported on the axle 26 and the other end is supported on a support sleeve 42 which is connected rotationally fixed to the
housing 6.

30 The restoring spring 41 is increasingly tensioned upon actuation of the magazine advancing mechanism, i.e., upon each rotational angle step of the lancet magazine 2. A

reverse motion locking device 43 prevents backward rotation of the lancet magazine 2 when a coupling position has been reached. In the exemplary embodiment shown, the reverse motion locking device 43 is implemented by spring legs on the outer surface of the lancet magazine 2, which engage with beveled recesses (not shown) of the magazine holder 8. The slopes of the recesses are oriented so that the spring legs can slip along the slope face and out of the recesses upon a rotation of the lancet magazine 2 in the correct rotational direction, while a rotation in the opposite direction is prevented by a steep edge or an undercut which engage with the spring legs. When a lancet magazine is removed from the magazine holder, the reverse motion locking device 43 is disengaged, whereby the axle 26 is automatically rotated back into its starting position by the restoring spring 41.

As can be seen in particular in Figures 1 and 2, the lancing apparatus 1 has a display unit 44 for displaying the number of unused lancets of a lancet magazine positioned in the magazine holder. The display unit comprises a marking ring 45, which has markings, in particular numbers, on an exterior side facing toward a housing window 46. Each marking is assigned to a number of unused lancets of the lancet magazine. An actuation of the magazine advancing mechanism causes a rotational angle step of the marking ring 45 in relation to the housing window 46, whereby a marking of the marking ring 45 becomes visible in the housing window 46 which is assigned to the next smaller number of unused lancets 3.

Instead of numbers, bars of varying length extending around the circumference can also be displayed on the marking ring. Then, a user can recognize the number of unused lancets 3 on the basis of the number of bars visible in the window.

Instead of a window 46, through which only a part of the exterior side of the marking ring 45 is visible, a housing construction in which the entire exterior side of the marking ring 45 is visible can also be chosen. Thus, a housing marking, such as an arrow, can indicate which of the visible markings of the marking ring 45 indicates the number of unused lancets. The housing window 46 provided in the exemplary embodiment shown

is a housing marking, like an arrow, for displaying which of the visible markings of the marking ring 45 indicates the number of unused lancets.

5 The marking ring 45 is preferably connected rotationally fixed to the axle 26. Each rotational angle step of the lancet magazine 2 is thus transmitted to the marking ring 45 and a reliable display is provided thereby.

10 The display unit 44 can also be implemented in such a manner that instead of the number of remaining unused lancets, the number of used lancets is displayed. In general, any display unit indicating the usage state of the lancets of a magazine fixed in the magazine holder to the user is suitable.

15 The actuating element 25 has a plurality of actuation functions, which are independent of one another. The magazine advancing mechanism is actuated by a first actuation function - as described -. The tensioning device 16, 17 is actuated by a second actuating function. As already noted, in the exemplary embodiment shown the magazine advancing mechanism is actuated by rotating the actuating element 25, and the tensioning device 16, 17 is actuated by pressing it down. Thereby, the number of required actuating elements is reduced to a minimum and the handling is improved.

20 Rotation of the actuating element 25 during pressing down is prevented by a guide 50 running in the axial direction. Thereby unintended actuation of the magazine advancing mechanism is avoided during the tensioning procedure. The guide 50 is implemented as grooves running in the axial direction in the exemplary embodiment shown. A guide arm 25 35 of the actuating element 25 engages in each of the grooves. Depending on the actuating function, the cam travellers 34 are thus guided by the cam 33 or the guide groove 50.

RDG 132/00/WO**Reference list**

5	1	lancing apparatus
	2	lancet magazine
	3	lancet
	4	trigger element
	5	exit opening
10	6	housing
	7	cap
	8	magazine holder
	9	lancet drive
	10	puncture depth adjustment ring
15	11	lancet opening
	12	insertion opening
	13	push rod
	14	magazine advancing mechanism
	15	drive spring
20	16	tensioning rotor
	17	tensioning sleeve
	18	drive rotor
	19,20	coupling mechanism
	23	head part of the push rod
25	25	actuating element
	26	axle
	27	head of axle
	30	coupling part
	31	marking
30	32	rotational step limiting means
	33	cam
	34	cam traveller

	35	guide arm
	36	sleeve
	37	inclination
	38	spring
5	39	stop
	40	stop element
	41	restoring spring
	42	support sleeve
	43	reverse motion locking device
10	44	display unit
	45	marking ring
	46	housing window
	47	rotation limitation device
	50	guide
15	51,52	rotary-slight-transmission

PCT/EP2005/009089
RDG 132/00/WO
English translation of claims as amended during
international preliminary examination

5

Amended Patent Claims

- 10 1. A lancing apparatus for producing a puncture wound, comprising
- 15 a magazine holder (8) for a lancet magazine (2) with a plurality of lancets (3),
- a lancet drive comprising a drive spring (15), a tensioning device (16, 17) for
- 20 tensioning the drive spring (15) and comprising a push rod (13), said push rod
- (13) being adapted for coupling to a lancet (3) located in the lancet magazine (2)
- and said push rod (13) being adapted for moving at high velocity, together with a
- lancet (3) coupled thereto, by means of lancet drive (9) during a puncture and
- retraction movement producing a puncture wound, and
- 25 a magazine advancing mechanism (14) for advancing the lancet magazine (2) in
- such a manner that the lancets (3) stored therein can be coupled to the push rod
- (13) one after the other,
- characterized in that
- 30 the lancet drive is not coupled to the magazine advancing mechanism (14)
- whereby a plurality of puncture wounds can be produced using the same lancet
- (3) a plurality of times, the lancing apparatus comprising an actuating element
- (25) for actuating the magazine advancing mechanism (14) independently from
- the lancet drive, in particular for actuating it independently from the tensioning
- device (16, 17).
- 35 2. The lancing apparatus according to Claim 1, characterized in that the magazine
- advancing mechanism (14) is adapted and arranged for advancing the lancet
- magazine (2) in one direction only.

3. The lancing apparatus according to any one of the preceding claims, characterized in that the actuating element (25) is adapted for rotational movement and the magazine advancing mechanism (14) can be actuated by a rotational movement of the actuating element (25).
5
4. The lancing apparatus according to any one of the preceding claims, characterized in that the lancet magazine (2) is a revolver magazine.
- 10 5. The lancing apparatus according to Claim 4, characterized in that the magazine advancing mechanism (14) comprises an axle (26), said axle coupling the actuating element (25) to the lancet magazine (2).
- 15 6. The lancing apparatus according to any one of the preceding claims, characterized in that the magazine advancing mechanism (14) comprises an unidirectional coupling (30), said unidirectional coupling being located between the axle (26) and the actuating element (25).
- 20 7. The lancing apparatus according to Claim 6, characterized in that the unidirectional coupling (30) comprises a pawl freewheel, preferably a ratchet.
8. The lancing apparatus according to any one of Claims 4 to 7, characterized in that the magazine advancing mechanism (14) comprises a restoring spring (41), adapted to be tensioned upon actuation of the magazine advancing mechanism.
25
9. The lancing apparatus according to any one of Claims 4 to 8, characterized in that the magazine advancing mechanism (14) comprises a rotation limitation device (47) for restricting the rotation of the lancet magazine (2) to less than 360°.
30

10. The lancing apparatus according to any one of the preceding claims, characterized by a display (44) for displaying the usage status of the lancets (3) of a lancet magazine (2) inserted into the magazine holder (8).
- 5 11. The lancing apparatus according to Claim 10, characterized in that the display (44) includes a marking ring (45) having markings, preferably numbers, on an exterior side, each marking being assigned to a position of a lancet in the lancet magazine (2), an actuation of the magazine advancing mechanism (14) causing a rotational angle step of the marking ring (45) in relation to a housing marking (46), so that the housing marking (46) indicates after the rotational angle step a further marking of the marking ring (45).
10
12. The lancing apparatus according to Claim 11, characterized in that the marking ring (45) has numeric markings and the marking indicated after the rotational angle step corresponds to a number of unused lancets (3) which is in each rotational step reduced by one.
15
13. The lancing apparatus according to any one of the preceding claims, characterized in that the actuating element (25) has a plurality of actuating functions, which are independent of one another, the magazine advancing mechanism (14) being actuated using a first actuating function and the tensioning device (16, 17) being actuated using a second actuating function.
20
14. The lancing apparatus according to Claim 13, characterized in that one of the two actuating functions, preferably the first actuating function, can be triggered by rotating the actuating element (25), and the other of the two actuating functions, preferably the second actuating function, can be triggered by pressing down the actuating element (25).
25
- 30 15. The lancing apparatus according to any one of the preceding claims, characterized in that the lancet drive comprises a drive rotor (18) adapted to be driven by the drive spring (15) and an output-side coupling mechanism (19, 20),

by which, in a forward movement phase of the lancet drive, a rotational movement of the drive rotor (18) is converted into a translational movement of the push rod (13) and thereby into a puncture movement of the lancet (3).

- 5 16. The lancing apparatus according to any one of the preceding claims, characterized in that the tensioning device (16, 17) comprises a rotary-slide-transmission (50, 51) for cooperation with the actuating element (25) in such a manner that the drive spring (15) is tensioned when the actuating element (25) is pressed down.
- 10 17. The lancing apparatus according to any one of the preceding claims, characterized in that the magazine advancing mechanism (14) comprises a transport limitation device(32) for limiting the lancet magazine (2) movement upon actuation of the magazine advancing mechanism (14) in such a manner
- 15 that in each case the lancet(3) which is next in line reaches its coupling position, in which it can be coupled to the push rod (13).
- 20 18. A blood sampling system comprising a lancing apparatus (1) according to any one of the preceding claims and a lancet magazine (2) adapted thereto and including a plurality of lancets (3).

1 / 4

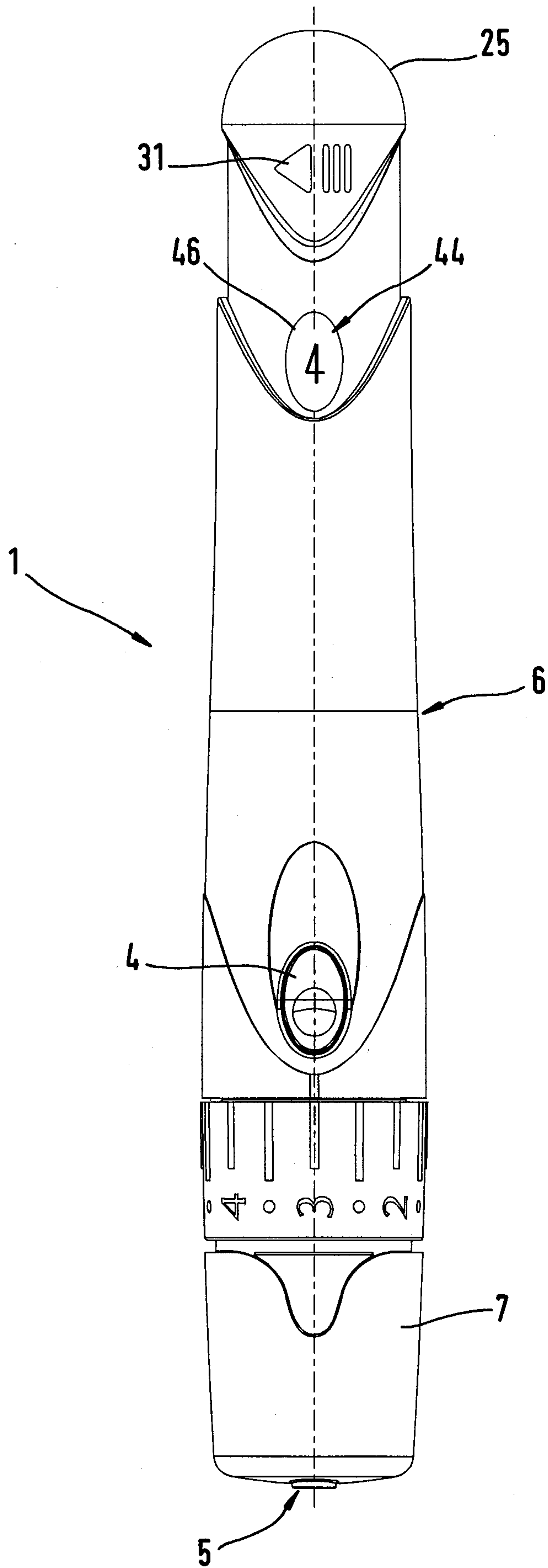


Fig. 1

2 / 4

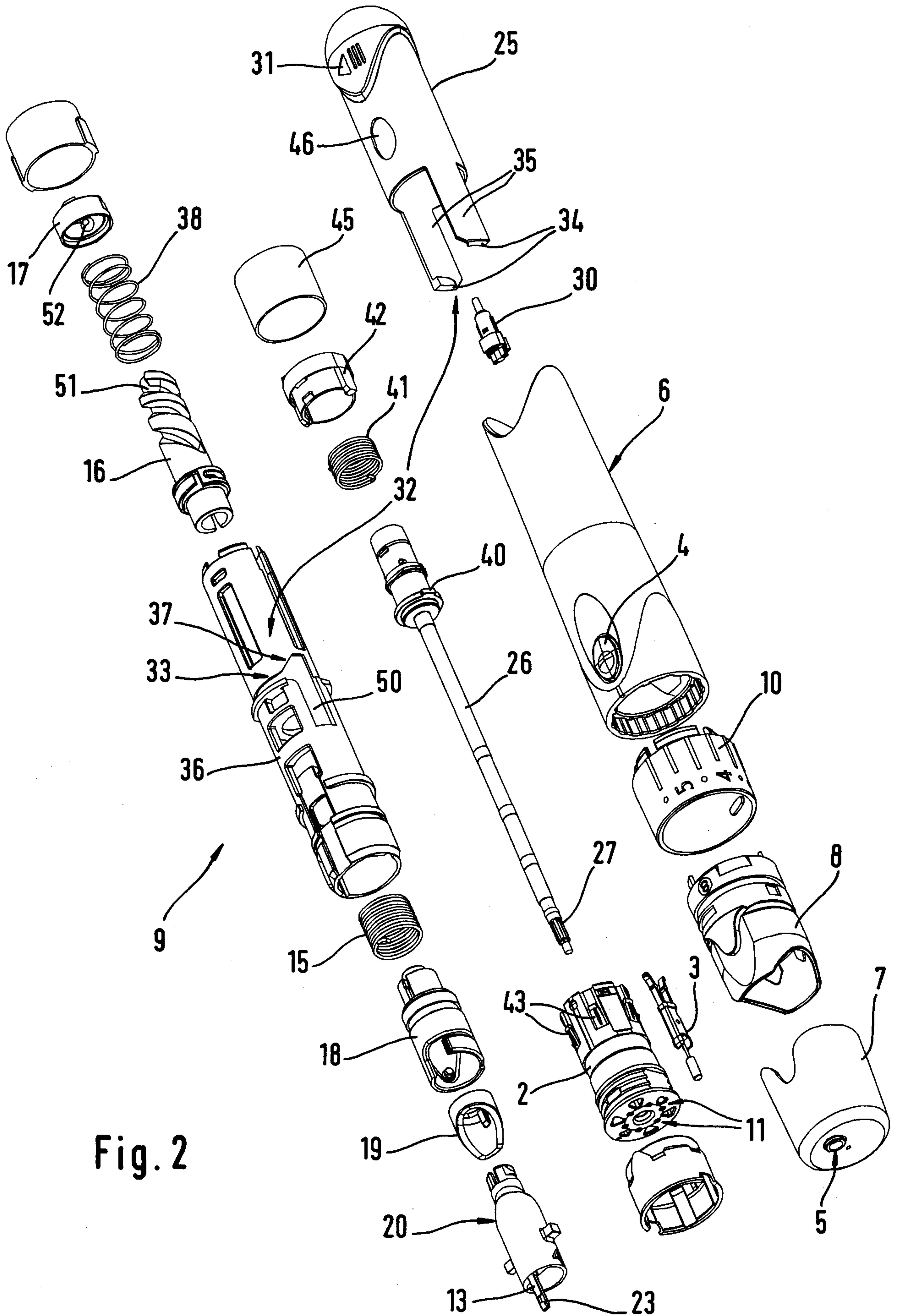
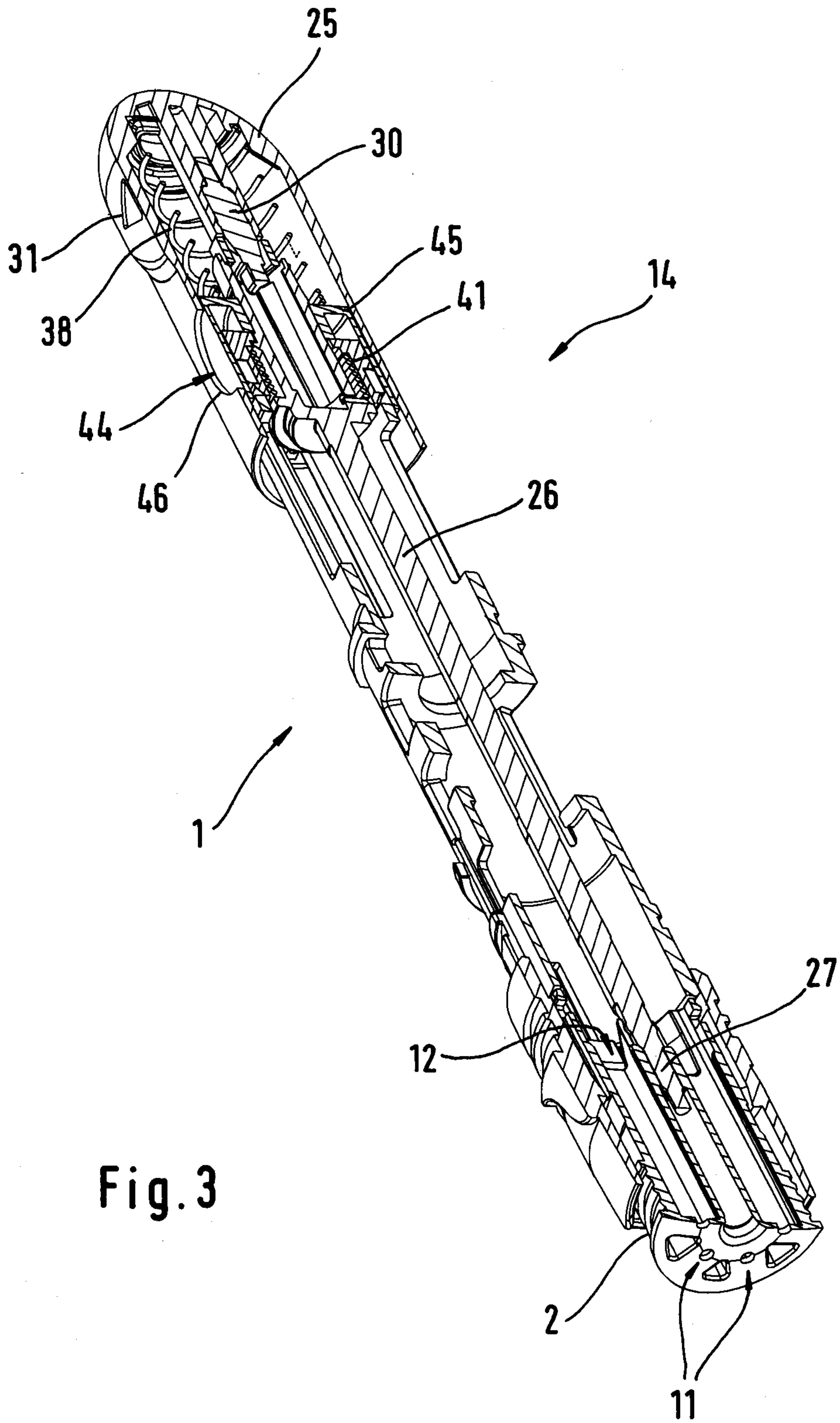


Fig. 2

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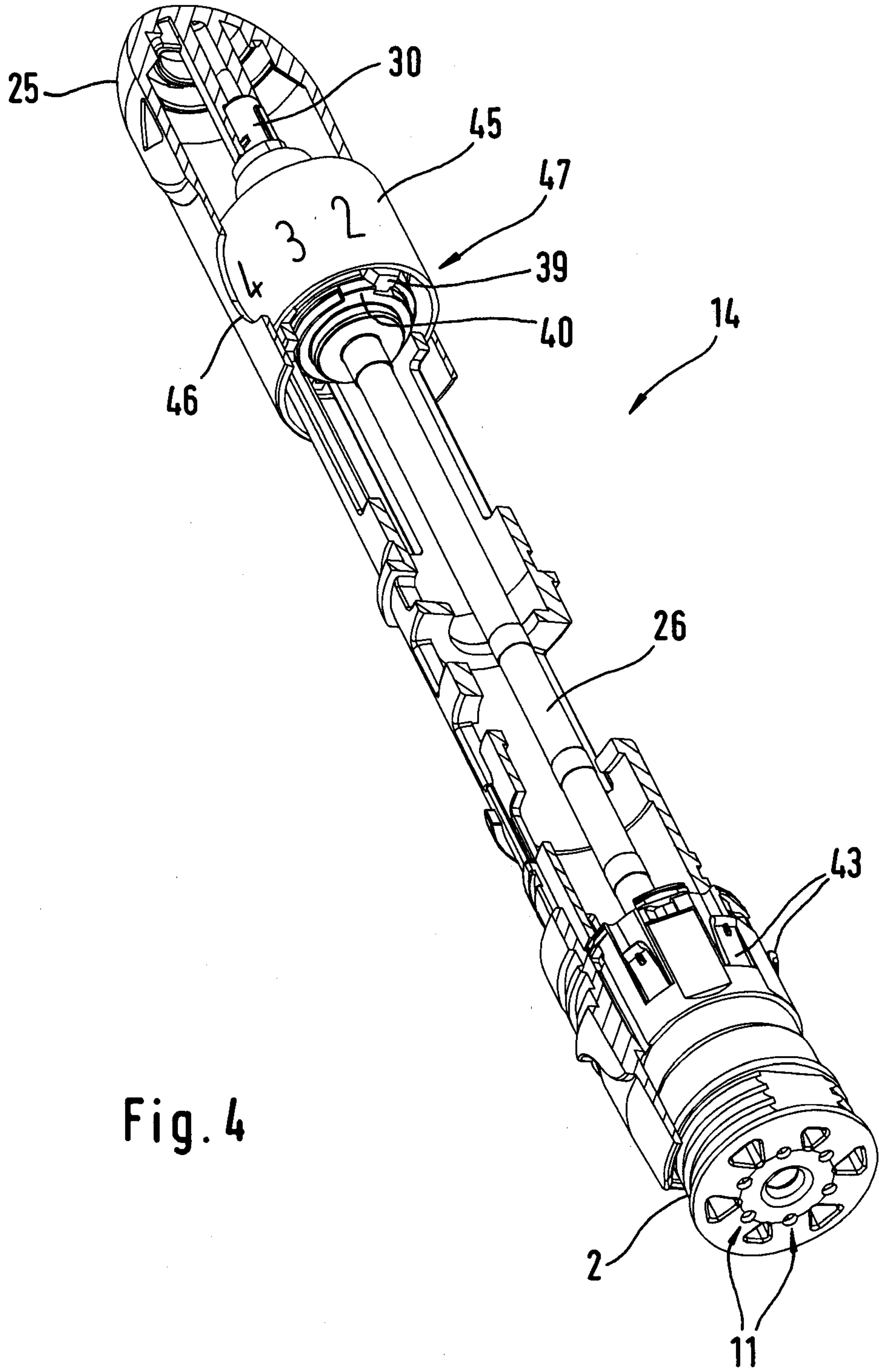


Fig. 4

