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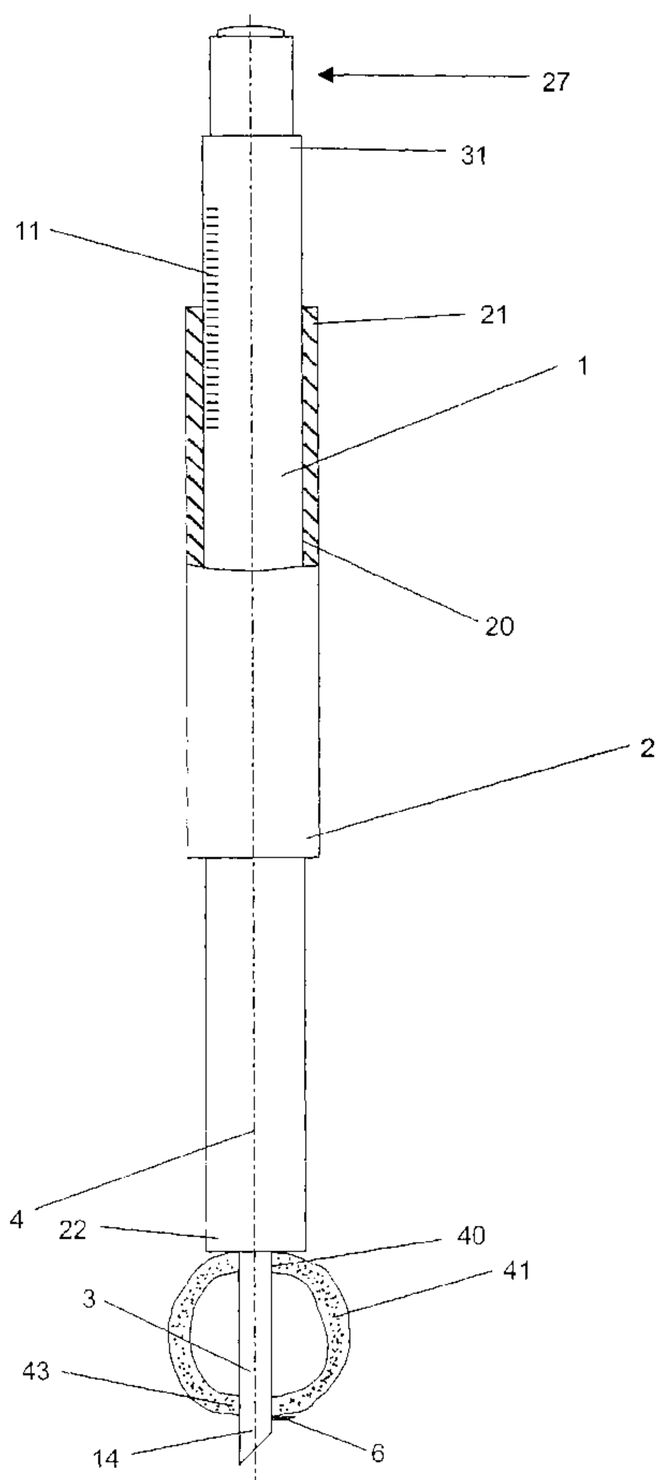
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(54) Titre : DISPOSITIF DE MESURE DE LONGUEUR ET DE PROFONDEUR UTILISE EN CHIRURGIE
(54) Title: DEVICE FOR MEASURING LENGTH AND DEPTH WHICH CAN BE USED IN SURGERY



(57) Abrégé/Abstract:
The invention relates to a device for measuring length and depth which can be used in surgery. Said device comprises A) two longitudinal, telescopic parts (1, 2) coaxially arranged in relation to the longitudinal axis (4); B) the second part (2) comprises a

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(57) Abrégé(suite)/Abstract(continued):
frontal end (22) and a central hole (20) extending through the second part (2) in a coaxial manner and the frontal end (22) can be applied to the surface of a bone; C) the first part (1) can be displaceably arranged in the central hole (20) of the second part (2) in a coaxial manner with respect to the longitudinal axis thereof (4) and a front part (3) comprises a tip (14) and said front part (3) can be introduced into a hole (40) in a bone (41) in such a manner that the tip (14) protrudes from the counter cortical substance of the bone (43); D) the first part (1) comprises displaceable stopping elements (27) having a hook (6) which can be inserted into or respectively retracted on the tip (14) of the front part (3) in a transversal manner in relation to the longitudinal axis (4).

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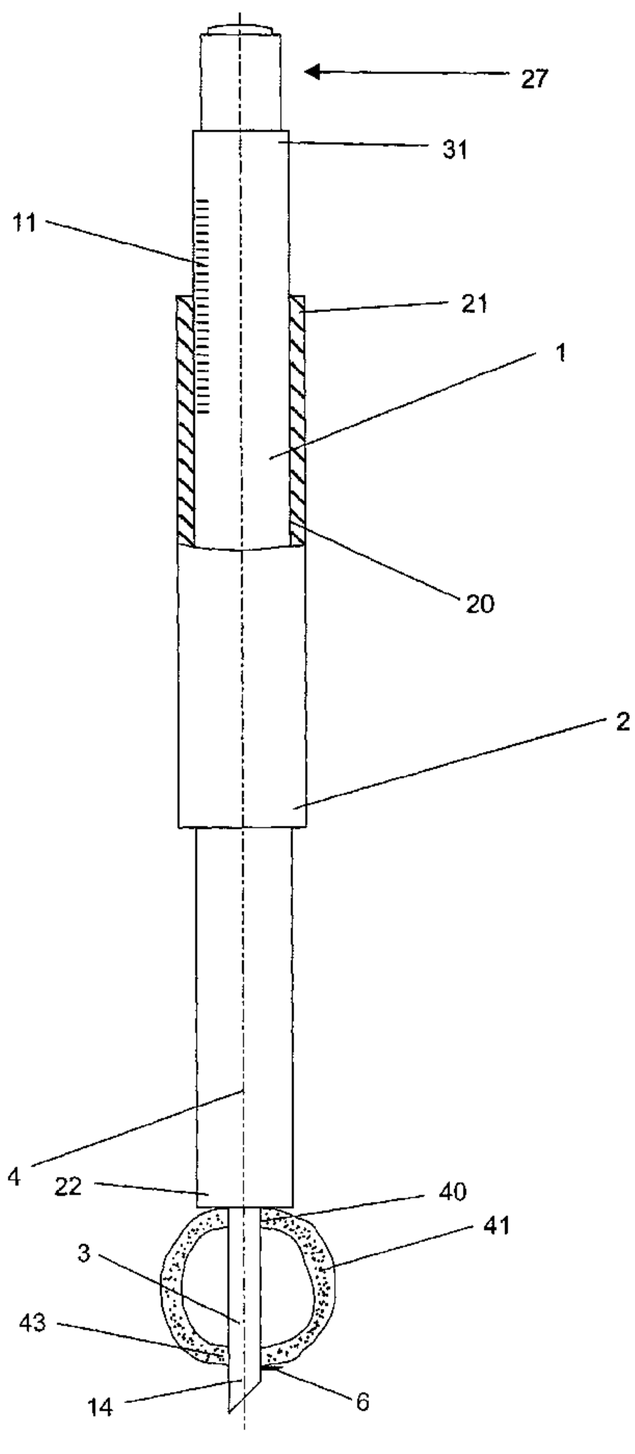
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[Fortsetzung auf der nächsten Seite]

(54) Title: DEVICE FOR MEASURING LENGTH AND DEPTH WHICH CAN BE USED IN SURGERY

(54) Bezeichnung: VORRICHTUNG ZUR LÄNGEN- UND TIEFENMESSUNG IN DER CHIRURGIE



(57) Abstract: The invention relates to a device for measuring length and depth which can be used in surgery. Said device comprises A) two longitudinal, telescopic parts (1, 2) coaxially arranged in relation to the longitudinal axis (4); B) the second part (2) comprises a frontal end (22) and a central hole (20) extending through the second part (2) in a coaxial manner and the frontal end (22) can be applied to the surface of a bone; C) the first part (1) can be displaceably arranged in the central hole (20) of the second part (2) in a coaxial manner with respect to the longitudinal axis thereof (4) and a front part (3) comprises a tip (14) and said front part (3) can be introduced into a hole (40) in a bone (41) in such a manner that the tip (14) protrudes from the counter cortical substance of the bone (43); D) the first part (1) comprises displaceable stopping elements (27) having a hook (6) which can be inserted into or respectively retracted on the tip (14) of the front part (3) in a transversal manner in relation to the longitudinal axis (4).

(57) Zusammenfassung: Vorrichtung zur Längen- und Tiefenmessung in der Chirurgie, umfassend A) zwei koaxial zu einer Längsachse (4) angeordnete, longitudinale und teleskopierbare Teile (1; 2), wobei B) das zweite Teil (2) ein vorderes Ende (22) und eine das zweite Teil (2) koaxial durchdringende Zentralbohrung (20) umfasst und das vordere Ende (22) an der Oberfläche eines Knochens zur Anlage bringbar ist; und C) das erste Teil (1) in der Zentralbohrung (20) des zweiten Teiles (2) koaxial zur Längsachse (4) verschiebbar ist und ein Vorderteil (3) mit einer Spitze (14) umfasst und dieses Vorderteil (3) in eine Bohrung (40) in einem Knochen (41) einführbar ist, so dass die Spitze (14) über die Gegenkortikalis (43) hinausragt; wobei D) das erste Teil (1) bewegbare Arretiermittel (27) mit einem an der Spitze (14) des Vorderteils (3) quer zur Längsachse (4) aus- respektive einfahrbaren Haken (6) umfasst.

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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

DEVICE FOR LENGTH AND DEPTH MEASUREMENTS IN SURGERY

The invention relates to a device for length and depth measurements in surgery, in accordance with the introductory portion of claim 1.

Bone screws are commonly used in osteosynthetic repair of, for example, bone fractures. Frequently, bone screws are screwed into a bone perpendicular to its longitudinal axis. In so doing, the bone screw penetrates into an opposite bone wall. However, the tip of the screw should not protrude excessively into the surrounding soft-tissue mantle, for this may result in irritation of or damage to the soft parts. An accurate determination of length of the borehole is therefore important for choosing the bone screw, which is to be inserted into a pre-drilled hole. In previously known devices for measuring length or depth, a piston with a hook is introduced through a borehole and hooked into an opposite bone wall on the soft-tissue side. Subsequently, a measuring sleeve is shifted on the piston in the direction of the bone surface, until the front end of the measuring sleeve comes into contact with this surface. However, in so doing, the danger exists that the hook may slip off the opposite bone wall and, consequently, the displacement of the measuring sleeve may pull the hook into the bone. This may lead to incorrect length measurements and, consequently, to the selection of a bone screw of the incorrect length.

The invention solves this problem and is designed to provide a length or depth measurement device, which enables a hook to extend beyond the opposite bone wall after the piston is moved into the borehole, so that a positive connection to the bone may be achieved. Moreover, reading the length does not have to occur in situ.

The invention accomplishes these objectives with a device for measuring length and depth in surgery, which have the distinguishing features of claim 1.

The present device comprises essentially two telescopic parts disposed coaxially with a longitudinal axis. The first part is constructed as a measuring piston and the second part as a measuring sleeve. The measuring piston may be shifted axially in a central borehole of the measuring sleeve and its front part may be inserted into a borehole in a bone. The measuring piston has a tip at its front part and also comprises movable arresting means, which are disposed movably within the measuring piston, and comprise a hook, which may be extended and retracted at the tip in a direction transverse to the longitudinal axis.

In order to make measurements, while the measuring sleeve is in a retracted position, the measuring piston is inserted into the borehole and pushed therethrough until the tip protrudes beyond the opposite bone wall. Subsequently, the hook at the tip is moved out of the front part. With the hook extended, the measuring piston can no longer be pulled out of the borehole and the device, as a whole, can no longer be withdrawn from the bone. The subsequent measurement process comprises the shifting of the measuring sleeve on the measuring piston in the direction of the bone surface, until the front end of the measuring sleeve rests on the bone surface. At the same time, the bone is clamped between the extended hook and the measuring sleeve. After the measurement process, the hook is retracted once again in a direction transverse to the longitudinal axis of the measuring piston and the device is pulled out of the borehole in the bone and removed from the field of the surgery.

In the preferred embodiment of the present device, the measuring sleeve and the measuring piston are equipped with locking means. The locking means hold the measuring piston in a selected position relative to the measuring sleeve, so that the device may be removed from the bone and the length measurement may be read outside of the surgical field. This allows for easy reading of the length measurement

outside of the surgical field. The operating surgeon may freely hold the device such that neither light reflections off the device nor the style/font of the measurement markings affect the surgeon's readings.

The advantages, achieved by the present device, are apparent in that, due to the present device:

- when the hook is extended, the measuring piston is prevented from slipping off an opposite bone wall;
- any unintentional shifting of the measuring piston relative to the measuring sleeve is prevented by a locking means, which are disposed between the measuring piston and the measuring sleeve and
- the length measurement does not have to be read in situ and thus good readability may be achieved.

In a further embodiment of the present device, the arresting means comprise a sliding element with an arresting mechanism, which may be moved coaxially with the longitudinal axis. At the front end of the sliding element, a rod with a wire is mounted coaxially with the wire forming the extended or retracted hook, depending on the axial position of the sliding element. A curved or angled central borehole in the front part of the first part brings about the bending of the hook. The sliding element is locked and unlocked by the arresting mechanism.

In yet another embodiment of the present device, the arresting means comprise a screw, which may be screwed into or out of the first part parallel to the longitudinal axis. A rod with a wire is mounted so that it is rotatable about the longitudinal axis but not movable axially and is coaxial with the longitudinal axis at the front end of the screw. Similar to the embodiment described above, the wire forms the extended or retracted hook, depending on the axial position of the screw. In another embodiment, an arresting mechanism, similar to that used as part of a conventional commercial

ballpoint pen, may be used along with a wire to form the hook at the tip of the first part

The invention and further developments of the invention are explained in even greater detail in the following by means of partially diagrammatical representations of several examples, of which

FIG. 1 shows a partial cross-sectional view of an embodiment of the device of the present device;

FIG. 2 shows a cross-sectional view of an embodiment of the device of the present device with a retracted hook;

FIG. 3 shows a cross-sectional view of an embodiment of the device of FIG. 2, with an extended hook;

FIG. 4 shows a cross-sectional view of another embodiment of the device of the present device;

FIG. 5 shows a partial cross-sectional view of another alternative embodiment of the device of the present device;

FIG. 6 shows a partial cross-sectional view of yet another alternative embodiment of the device of the present device; and

FIG. 7 shows a partial cross-sectional view of another embodiment of the device of the present device.

FIG. 1 shows the present device with a first part 1 and a second part 2, the first 1 part being constructed as a measuring piston and the second part 2 as a measuring sleeve. The first part 1 may be shifted parallel to the longitudinal axis 4 within the central borehole 20 in the second part 2. Depending on the position of the first part 1 relative to the second part 2, the tip 14 of the front part 3 of the first part 1 protrudes beyond the front end 22 of the second part 2. The front part 3 may be introduced into a borehole 40 in a bone 41, until the tip 14 protrudes beyond the bone portion 43 of the bone 41. The arresting means 27 is disposed within the first part 1 so that it may be displaced parallel to the longitudinal axis 4. A hook 6 is connected with the arresting means 27 and may be extended from or retracted into the front part 3 in a direction transverse to the longitudinal axis 4, so that the front part 3 can no longer be pulled out of the borehole 40 in the bone 41. Furthermore, a scale 11 is mounted at the first part 1, so that the length to be measured may be read on the scale 11 at the rear end 21 of the second part 2.

FIG. 2 illustrates the first part 1 with the front part 3 and a sleeve 28, the sleeve 28 is connected with the rear end 15 of the front part 3 and extends up to the rear end 31 of the first part 1. The front part 3 has a passage therethrough from the rear end 15 up to the tip 14. The borehole 16 is angled or curved at the tip 14 by means of a curvature 18 or an offset angle, so that the outlet of the borehole 16 at the tip 14 extends in a direction transverse to the longitudinal axis 4. From the curvature 18, the borehole extends up to the rear end 15 coaxially with the longitudinal axis 4 up to the tip 14. A sliding element 7 is inserted into a central borehole 30 of the sleeve 28 so that it may be shifted parallel to the longitudinal axis 4. The sliding element has a rear end 8, which protrudes beyond the rear end 31 of the first part 1, and a front end 9, which may contact the rear end 15 of the front part 3. A rod 10 is connected at a rear end 13 to the sliding element 7 and extends coaxially with the longitudinal axis 4 from the front end 9 of the sliding element 7 through the borehole 16 in the front part 3. The rod 10 has a wire 17 at a front end 12. The wire 17, which

is also coaxial with the longitudinal axis 4, extends from the front part 12 of the rod 10 through the borehole 16 in the front part 3. The wire 17 is bent in a direction transverse to the longitudinal axis 4 by the curvature 18 at the tip 14, thereby forming a hook.

In FIG. 2, the sliding element 7 is shown in its rear position. In this rear position, the rod 10 and the wire 17 are retracted into the borehole 16 towards the rear end 15 of the front part 3, so that the hook 6 is moved into the front part 3. The sliding element 7 is retracted with a return spring 5, which may be positioned within a cavity 19 in the sliding element 7 and which extends parallel to the longitudinal axis 4 from the front end 9 of the sliding element 7 to a position 23. One end of the return spring 5 is in contact with the boundary of the cavity at the position 23 and the other is in contact with the rear end 15 of the front part 3. Other than the sliding element 7, the rod 10 and the wire 17, the arresting means 27 comprises an arresting mechanism 36, which is in an inactive position when the hook 6 is retracted. FIG. 2 illustrates the present device in a position prior to measuring a length or a depth. The second part 2 is then in a position furthest to the rear, that is, the rear end 21 of the second part 2 is proximate the rear end 31 of the first part 1. A shoulder 37 in the central borehole 20 of the second part 2 provides a stopping surface for this furthest rearward position. The sleeve 28 and the rear end 15 of the front part 3 abut against the shoulder 37.

In FIG. 3 the arresting means27 is shown with the hook 6 is in its extended position. In order to achieve this position, the sliding element 7 is shifted forward in the sleeve 28, until the front end 9 of the sliding element 7 abuts the rear end 15 of the front part 3.

In this position, the arresting mechanism 36 is in its active position, that is, the hook 6 is fixed in an extended position. The arresting mechanism 36 comprises a piston 38, which is disposed axially displaceable in a blind hole 39. The hole 39 is positioned in the sliding element 7 coaxial with the longitudinal axis 4 and opened at

the rear end 8 of the sliding element 7. The blind hole 39 is bounded at a particular depth by the bottom 46. The piston 38 may be shifted manually by an operating means 29, that is, shifted towards the front end 9 of the sliding element 7. The operating means 29 protrudes beyond the rear end 8 of the sliding element 7. The path of travel of the operating means 29 parallel to the longitudinal axis 4 is controlled by a pin 44, which is guided in an elongated slot 45 in the wall of the sliding element 7.

To shift the piston 38, the operating means 29 is shifted towards the tip 14, until the operating means 29 contacts the rear end 47 of the piston 38 and subsequently shifts the piston 38 towards the tip 14. The path of travel of the piston 38 towards the tip 14 is limited by the front end 48 of the piston 38 contacting the bottom 46 of the blind hole 39 (FIG. 2). The piston 38 is biased into a rear position by a first spring 49, which, on the one end, abuts the piston 38 and, at the other end, abuts the bottom 46 of the hole 39. The operating means 29 are also brought into a rear position by a second spring 50. The second spring 50 is also be disposed in the hole 30 with one end contacting the shoulder 51 in the hole 39 and the other end contacting the operating means 29.

The arresting means 36 may be moved into two positions, an active position (FIG. 3), in which the sliding element 7 may be fixed in its forward position and the hook 6 may be fixed in its extended position, and an inactive position (FIG. 2), in which the arresting mechanism 36 does not hold the sliding element 7 and the hook 6 is held in its retracted position. The sliding element 7 is held in its forward position by balls 55, which snap into a first groove 52, located in the periphery of the central borehole 30 of the sleeve 28 (FIG. 3). The balls 55 may be shifted in a direction transverse to the longitudinal axis 4 and are supported in transverse boreholes 54, which pass diametrically through the sliding element 7. In the active position of the arresting mechanism 36 (FIG. 3), the balls 55 are held by the piston 38. In the inactive position of the arresting mechanism 36, that is, when the slide element 7 is in

its rear position, the balls 55 may snap into a second groove 53, which is located on the periphery of a piston 38. Accordingly, the sliding element 7 may be pushed towards its rear position by the force of the return spring 5 (FIG. 2) or towards its front position relative to the sleeve 28. The sliding element 7 is held in its rear position by a pin 57, which is mounted in a direction transverse to the longitudinal axis 4 at the rear end 15 of the front part 3 and received within a notch 56 of the rod 10, so that the movement of the sliding element 7 parallel to the longitudinal axis 4 and towards the rear end 31 of the sleeve 28 is limited by the notch 56.

FIGS. 1 to 3 illustrate the present device in use, for example, while taking the length measurement for a bone screw to be screwed into a bone 41. In order to measure length, the front part 3 of the first part 1 is inserted into the borehole 40 in the bone 41 until the tip 14 protrudes beyond the opposite bone wall 43. To accomplish this, the rear end 21 of the second part 2 is shifted as close as possible to the rear end 31 of the first part 1, that is, rear end 21 is positioned furthest to the rear (FIG. 2). Next, the hook 6 of the arresting means 27 is extended using the operating means 29, which is disposed at the rear end 31 of the first part 1 and fixed in an extended position. Subsequently, the second part 2 is shifted forward, that is, in a direction towards the front part 3, until the front end 22 of the second part 2 is in contact with the surface of the bone 41 (FIG. 3). At this point, the bone 41 is clamped between the front end 22 of the second part 2 and the hook 6. The second part 2 is held in position relative to the first part 1 by locking means 26 (FIGS. 5 to 7). In the next step, the hook 6 of the arresting means 37 is retracted by manipulating the operating means 29 and the device is removed from the borehole 40 in the bone 41. The length measured may be subsequently read from the scale 11 (FIG. 1) in the operating room outside of the field of surgery.

The embodiment, illustrated in FIG. 4, differs from the embodiment of FIGS. 2 and 3 in that the arresting means 27 comprises a screw 58 instead of the sliding element 7. The rear end 61 of the screw 58, protruding over the rear end 21 of the

first part 1, may be rotated manually. The screw 58 is provided with an external thread extending along its front part to a front end 60. The external thread 59 may be screwed into an internal thread 62 of the first part 1. The internal thread 62 is provided in the central borehole 30 of the sleeve 28 and extends up to the rear end 15 of the front part 3. Accordingly, the screw 58 may be screwed into the first part 1 until the front end 60 of the screw 58 contacts the rear end 15 of the front part 3. The hook 6 is in its retracted position, when the screw 58 is in its rear position. Otherwise, when the screw 58 is brought into its forward position, that is, where the screw 58 is screwed so far into the first part 1, that the front end 60 of the screw 58 contacts the rear end 15 of the front part 3, the hook 6 is fixed in its extended position. The hook 6 is fixed in this position by the threaded connection between the first part 1 and the screw 58.

The rear end 13 of the rod 10 has a spherical head 63. The rear end 13 having the spherical head 63 is positioned in a blind hole 64, which is located in the screw 58. The hole 64 extends coaxially with the longitudinal axis 4 and is open at the front end 60 of the screw 58. The spherical head 63 is fixed axially against the front end 60 of the screw 58, for example, by an insert 65 in the hole 64. Therefore, the rod 10 is fixed axially, but is connected to the screw 58, so that the rod 10 may rotate about the longitudinal axis 4.

FIGS. 5 to 7 illustrate the present device of one embodiment of FIGS. 1 to 4 with locking means 26 for selectively locking of the relative axial position between the first part 1 and the second part 2.

FIG. 5 shows an embodiment of the present device, where the locking means 28 comprises a flexible flap 68, which is flexible in a direction transverse to the longitudinal axis 4, and teeth 69, which are mounted on the first part 1 parallel to the longitudinal axis 4. A rigid end 71 of the flexible flap 66 is fastened to the second part 2 proximate the rear end 21 of the second part 2. The flexible flap 66 is provided

at its free end 70 with protrusion 67, which extends towards the central borehole 20 of the second part 2. The protrusion 67 engages the teeth 69, so that, by these means, the first part 1 may be fixed against axial movement with respect to the second part 2. The teeth 69 may have, for example, notches at millimeter intervals, so that the first part 1 may be fixed in millimeter intervals relative to the second part 2. The protrusion 67 may be formed, for example, by a pin 68, whose tip engages the teeth 69.

FIG. 6 shows an embodiment of the present device, where the locking means 21 may comprise a fixing screw 72 having a screw axis 78 extending in a direction transverse to the longitudinal axis 4. The shaft 73 of the fixing screw 72 may be passed through a borehole 79 in the second part 2 and screwed into an internal thread 77 of a bushing 75, so that the front end 78 of the fixing screw 72 extends into the central borehole 20 of the second part 2 and may be pressed against the first part 1. The bushing 75 is fastened at the second part 2. The head 74 of the fixing screw 72 protrudes over the bushing 75 and may be rotated manually, so that the first part 1 and the second part 2 may be locked together by tightening the fixing screw 72. The internal thread 77 may also be provided in the borehole 79 at the second part 2 if the wall of the second part 2 between the outer surface and the central borehole 20 is sufficiently thick.

FIG. 7 shows an embodiment of the present device where the locking means 26 comprises a flap 80 connected with the second part 2 that may be elastically deformed and which deforms in a direction transverse to the longitudinal axis 4. A clamping sleeve 81, which may be shifted on the second part 2 parallel to the longitudinal axis 4, presses the flap 80 laterally against the first part 1, so that the first part 1 may be fixed relative to the second part 2. In order to loosen or tighten the locking means 26, the elastically deformable end 84 of the flap 80 has a protrusion 82 adjacent the wall of the inner cone 83. The inner cone 83 tapers towards the rear end 21 of the second part 2 and is provided in the clamping sleeve 81. If the clamping

sleeve 81 is shifted towards the front end 22 of the second part 2, the inner cone 83 presses on the protrusion 82, and, thus, the flap 80 is pressed laterally against the first part 1. To loosen the locking means 26, the clamping sleeve 81 is shifted axially towards the rear end 21 of the second part 2, until the inner cone 83 disengages the protrusion 82. The axial shifting of the clamping sleeve 81 towards the rear end 21 of the second part 2 is limited by a first stop 65 at the rear end 21 of the second part 2 and axial shifting towards the front end 22 of the second part 2 may be limited by a second stop 86.

After the front end of the second part 2 is brought into contact with the surface of the bone 41, the second part 2 is held in position relative to the first part 1 by the locking means 26. So, after the hook 6 of the arresting means 27 is retracted, the device may be pulled out of the borehole 40 in the bone 41 without shifting the axial position of the first part 1 relative to that of the second part 2, which would otherwise be able to shift.

Claims

1. A device for measuring length and depth in surgery, comprising

A) two longitudinal parts (1; 2), which are disposed coaxially to a longitudinal axis (4) and can be telescoped,

B) the second part (2) comprising a rear end (21), a front end (22) and a central borehole (20), which passes through the second part (2) coaxially, it being possible to bring the front end (22) in contact with the surface of a bone; and

C) the first part (1) being displaceable in the central borehole (20) of the second part (2) coaxially with the longitudinal axis (4), comprising a front part (3) with a tip (14) and a rear end (31) the front part (4) of the first part (1) being introduceable in a borehole (40) in a bone (41), so that the tip (14) protrudes beyond the opposing corticalis (43),

characterized in that

d) the first part (1) comprises movable arresting means (27) with a hook (6), which can be extended or retracted transversely to the longitudinal axis (4) at the tip (14) of the front part (3).

2. The device of claim 1, characterized in that it comprises locking means (26), by means of which the first part (1) can be fixed disconnectably in its axial position relative to the second part (2).

3. The device of claim 2, characterized in that the locking means (26) comprise

E) a flexible flap (66), mounted at the second part (2), with a free end (70), which elastically can yield transversely to the longitudinal axis (4), and an elevation (67) at the free end (70), which is directed towards the central borehole (20) in the second part 2; and

F) a denticulation (69), which extends parallel to the longitudinal axis (4) at the first part (1),

G) it being possible to bring the elevation (67) into engagement with the denticulation (69).

4. The device of claim 2, characterized in that the locking means comprise

H) a fixing screw (72) with a screw axis (76) extending transversely to the longitudinal axis (4), a screw head (74), a front end (79) and a screw shaft (73) adjoining the front end (79), and

I) a borehole (79) in the second part (2), which extends coaxially with the screw axis (76) and through which the screw shaft (73) can be passed, so that the front end (79) of the fixing screw (72) extends into the central borehole (20) and can be pressed laterally onto the first part (1).

5. The device of claim 2, characterized in that the locking means (26) comprise

K) a flap (80), which can be fastened to the second part (2) and deformed elastically transversely to the longitudinal axis (4), with an elevation (82) protruding transversely to the longitudinal axis (4) and

L) a clamping sleeve (81), which can be shifted on the second part (2) parallel to the longitudinal axis (4), with an internal cone (83), which tapers towards the rear end (21) of the second part (2),

M) when the clamping sleeve (81) is shifted towards the front end (22) of the second part (2), the internal cone (83) being pressed onto the elevation (82), so that, by these means, the flap (80) is pressed into the central borehole (20) of the second part (2) and the first part (1) is fixed relative to the second part (2).

6. The device of one the claims 1 to 5, characterized in that the arresting means (27) comprise

N) a sliding element (7) with a rear end (8) and a front end (9), which can be moved coaxially with the longitudinal axis (4),

O) a rod (10), which is connected axially firmly at the front end (9) with the sliding element (7) and is disposed coaxially with the longitudinal axis (4), with a front end (12) axially opposite to the sliding element (7),

P) a wire (17), which is connected axially firmly with the front end (12) of the rod (10), and

Q) an arresting mechanism (36) for disconnectably locking the sliding element (7) axially,

R) it being possible for the hook (6) of the locking means (27) to be formed by the wire (17).

7. The device of one of the claims 1 to 5, characterized in that the arresting means (27) comprise

S) a screw (58), which can be screwed into or out of the first part (1) parallel to the longitudinal axis (4) and has a front end (60),

T) a rod (10), which is fixed at the front end (60) of the screw (58) with respect to the longitudinal axis (4), but can be rotated about the latter, with a front end (12) axially opposite to the screw (58) and

U) a wire (17), which is connected axially firmly with the front end (12) of the rod (10)

V) it being possible to form the hook (6) of the arresting means (27) by means of the wire (17).

8. The device of one of the claims 1 to 7, characterized in that

W) the first part (1) comprises a central borehole, which extends from the rear end (31) to the tip (14) and is angled or curved in the front part (3) at the tip (14) by means of a curvature (18) or an offset angle, so that the outlet of the borehole (16) at the tip (14) is directed transversely to the longitudinal axis (4) and

X) the arresting means (27) at the tip (14) comprise a wire (17), which can be shifted in the borehole (16) and can be converted by the curvature (18) into a part, which is

coaxial with the longitudinal axis (4) and a part, which forms the hook (6) and extends transversely to the longitudinal axis (4).

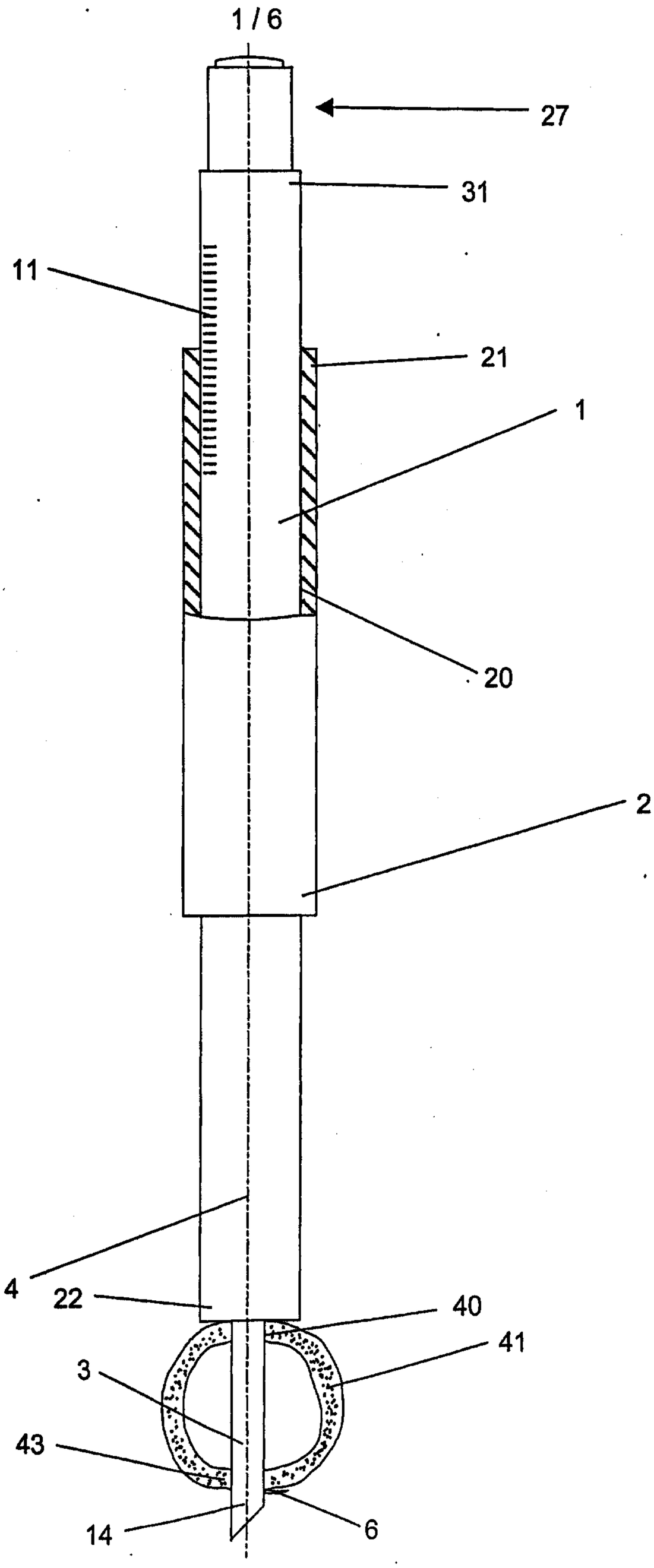


Fig. 1

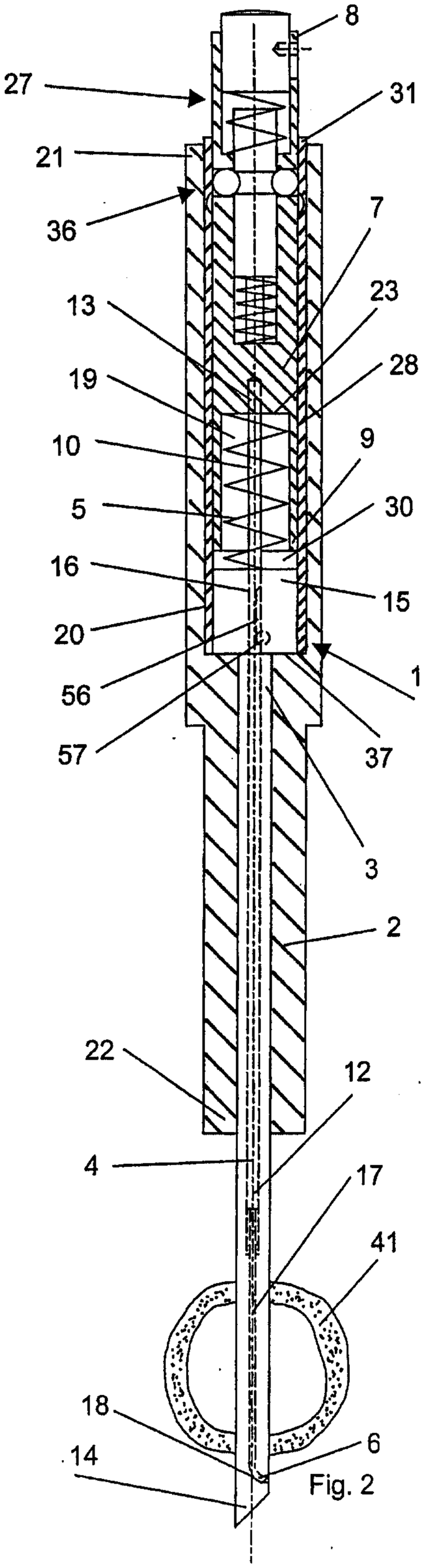

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Fig. 2

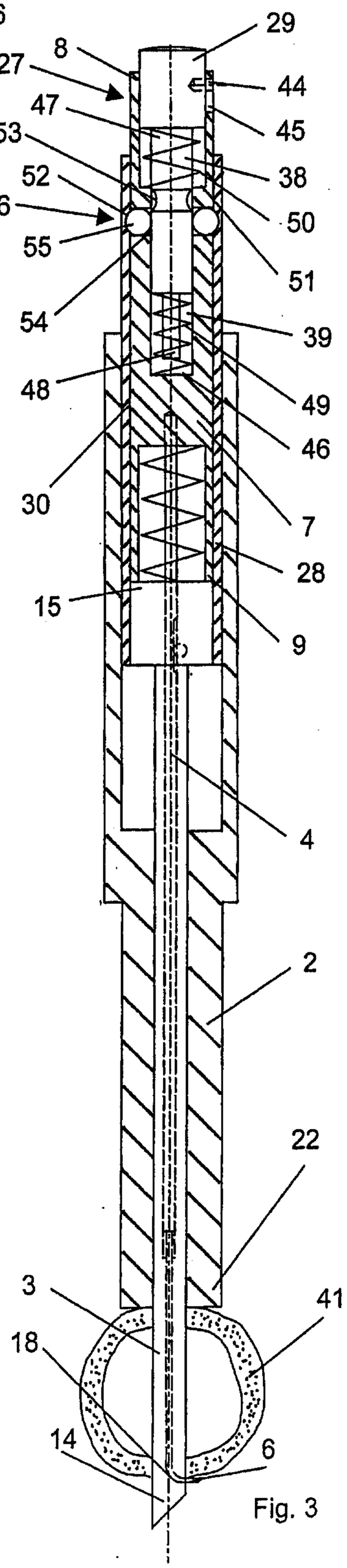

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Fig. 3

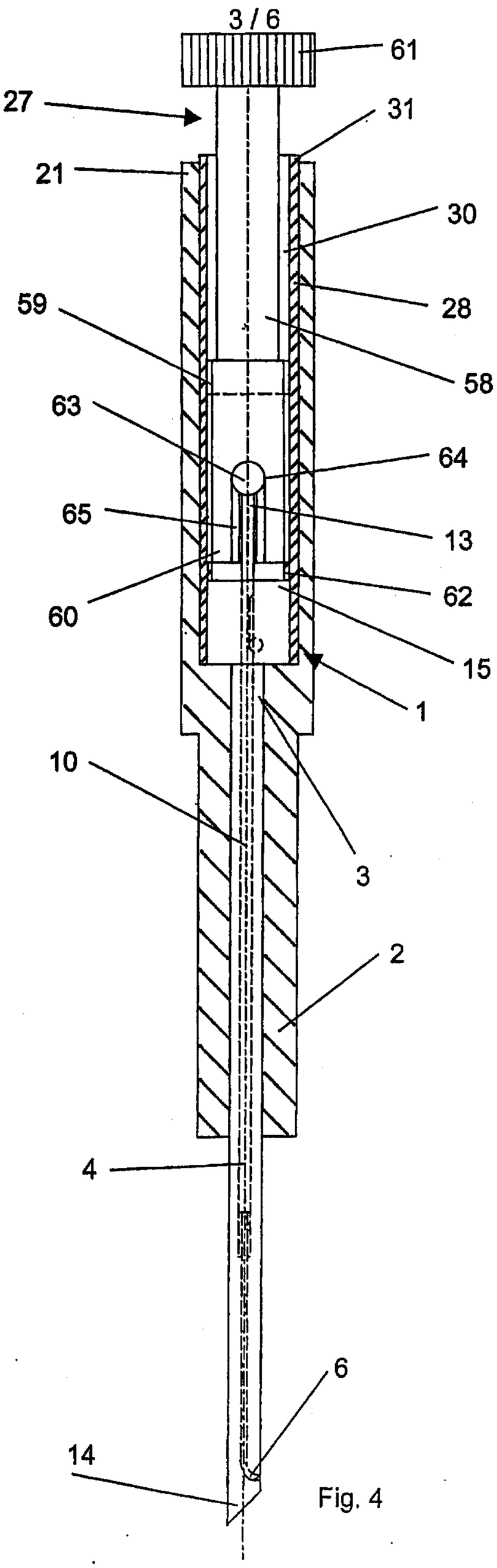


Fig. 4

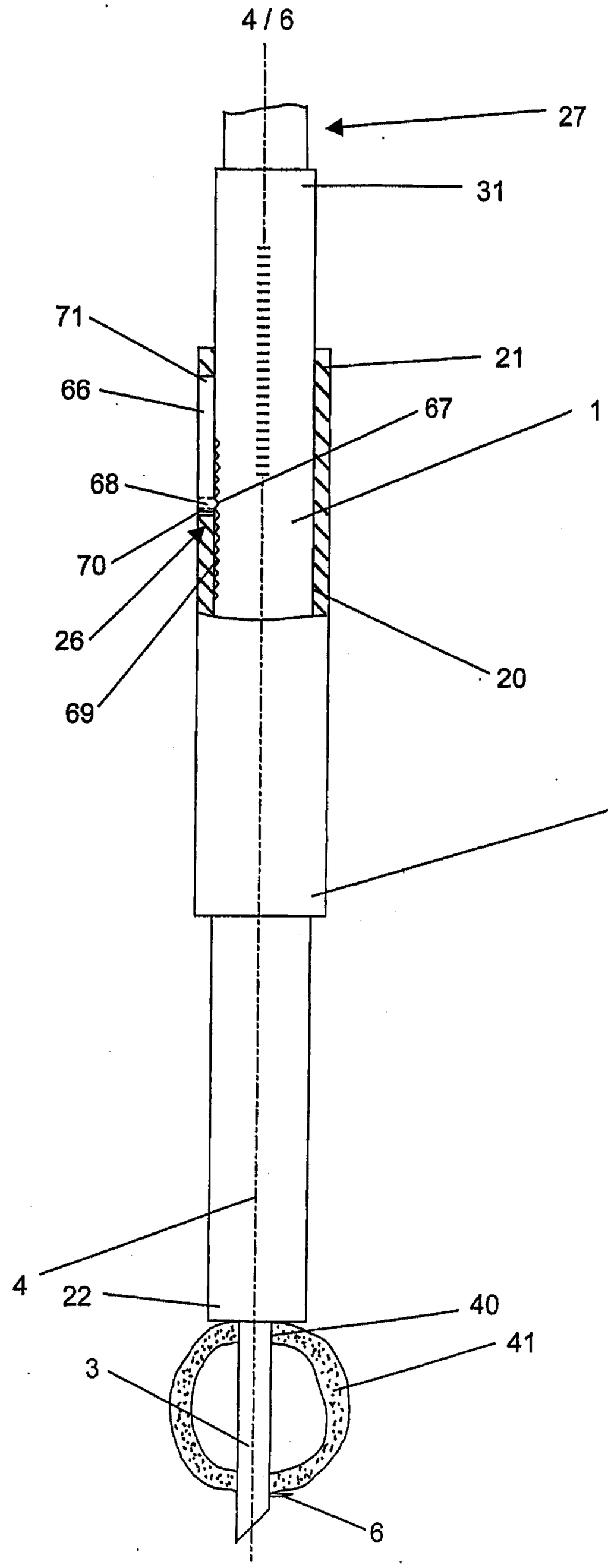


Fig. 5

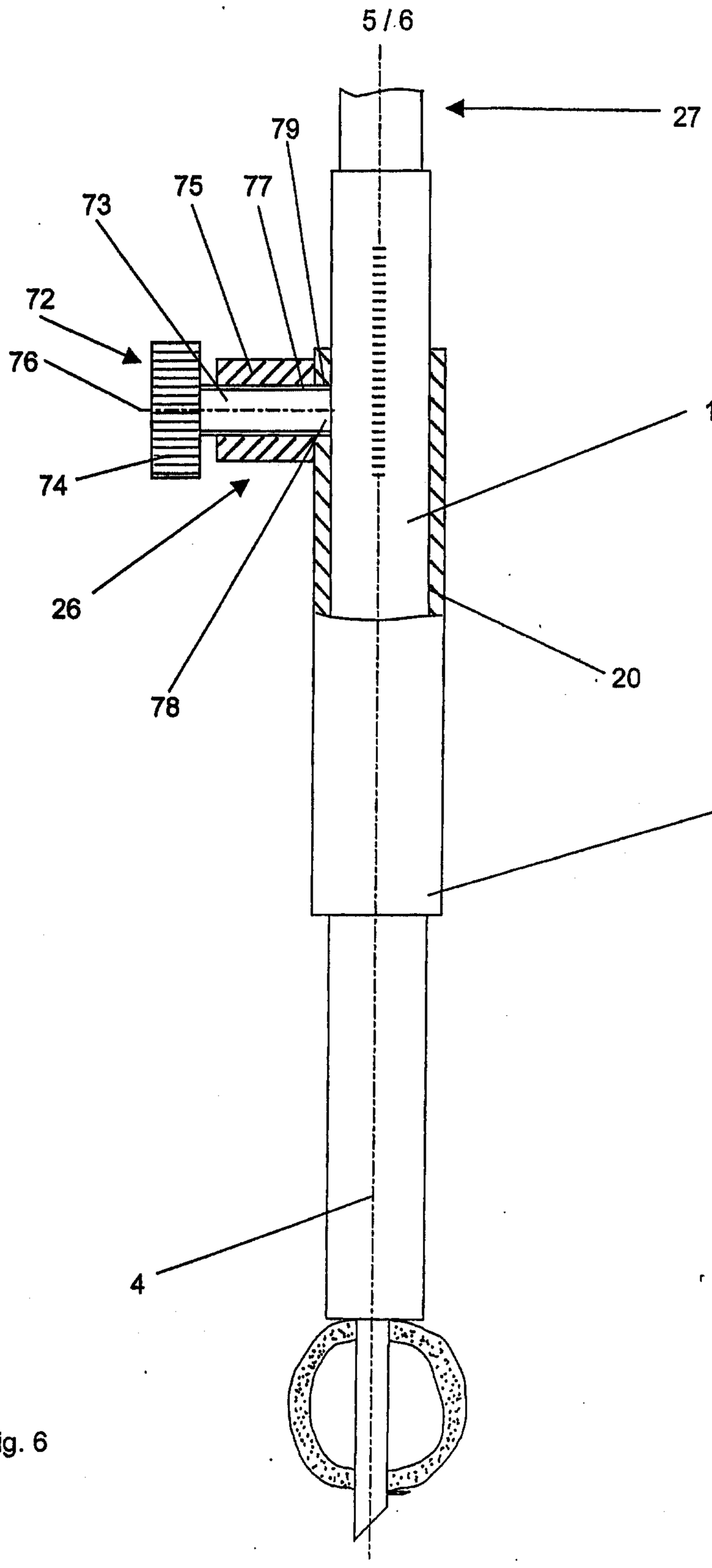


Fig. 6

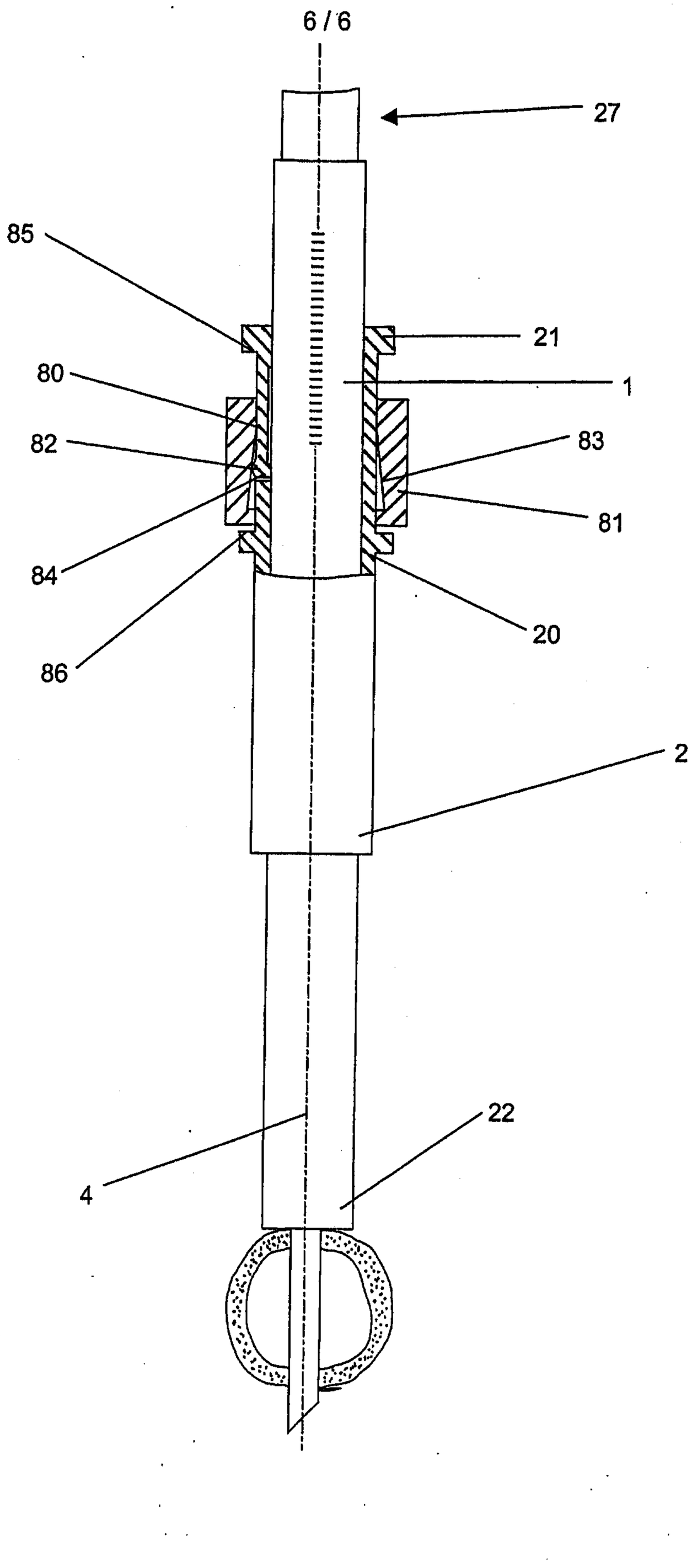
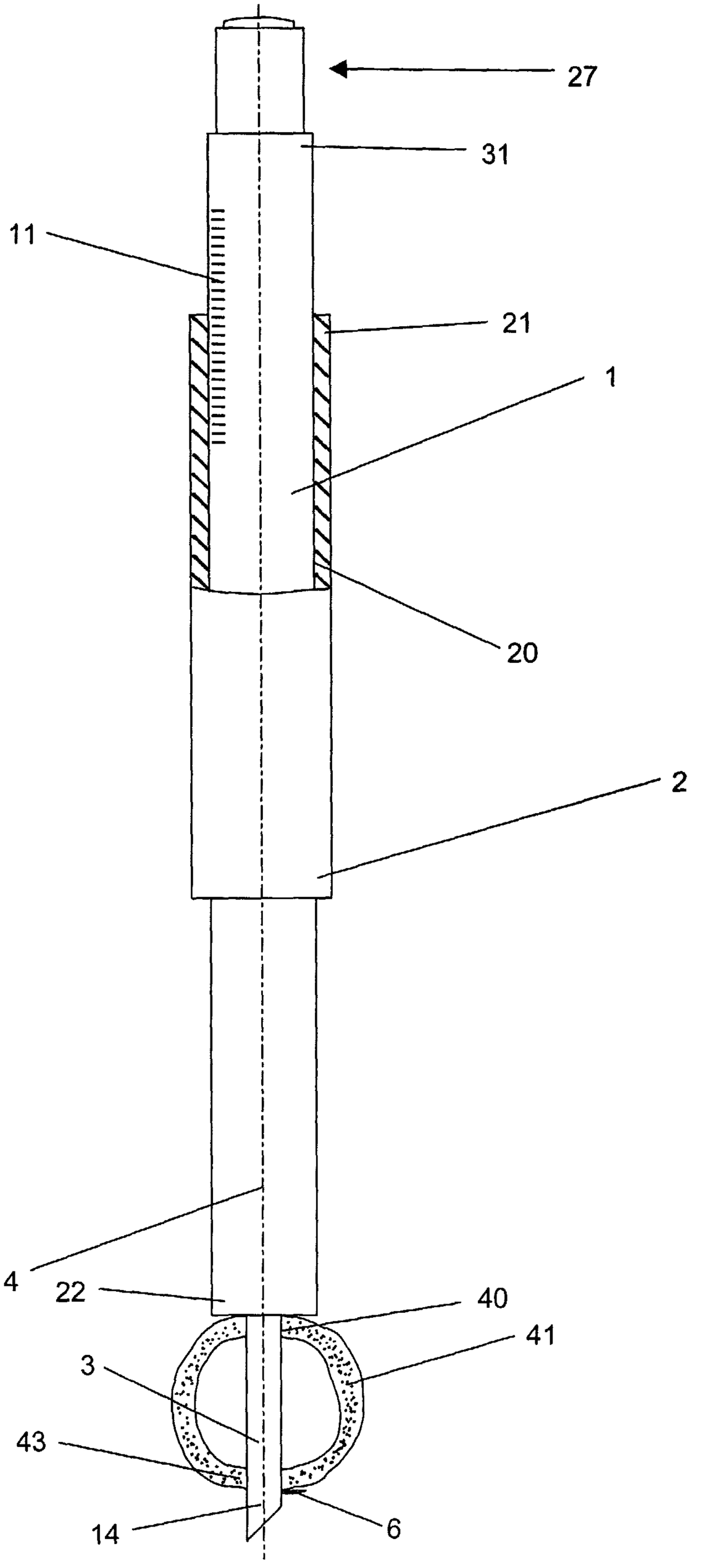


Fig. 7


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