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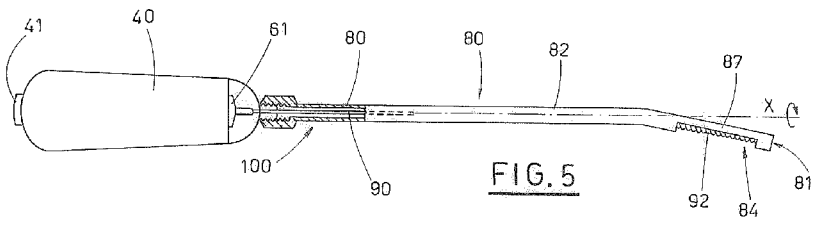

FIG. 5

(57) Abstract: The invention concerns a kit for percutaneous removal of body tissues from an organism, comprising: a first cannula (80) percutaneously insertable in an organism and provided with a relative lateral surface and a shaft (90) for conveying body tissue, which shaft (90) is insertable in the first cannula (80), is rotatable in the first cannula (80), and comprises a threaded portion (92), coaxial with an axis of the conveyor shaft (90), for conveying body tissues when the conveyor shaft (90) rotates; in which the first cannula (80) is provided with a lateral through-hole (84) afforded on a relative lateral surface in proximity of a relative distal end (81) and in which the first cannula (80) and the conveyor shaft (90) are conformed with respect to one another such that when the conveyor shaft (90) is inserted internally of the first cannula (80), the threaded portion (92) of the conveyor shaft (90) is positioned at the through hole (84) of the first cannula (80) such as to convey body tissue from an organism consequently to activation in rotation of the conveyor shaft (90).

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KIT FOR PERCUTANEOUS REMOVAL OF BODY TISSUES

FIELD OF THE INVENTION

The present invention relates to the field of devices for percutaneous removal of body tissues from an organism. More specifically, the invention relates to a percutaneous removal of soft tissues (liver, breast, kidney biopsies, etc.), of neoformations (nodules, cysts, masses) or hernias, in particular hernias of the disc.

DESCRIPTION OF THE PRIOR ART

Over the years, for collection of tissue samples from a living organism, Medicine has proposed progressively less-invasive methods. Therefore, where possible, tissue removal involving the classic surgical approach (i.e. a surgical operation) is avoided, with a preference for a laparoscopic intervention (otherwise known as a surgical endoscopy), or more preferably a percutaneous removal.

Laparoscopic removal requires an incision of the tissues of sufficient dimensions for insertion of a laporoscope into the organism and therefore much smaller than an incision required for a classic surgical removal.

Removal of tissue performed percutaneously is still less invasive and typically is done with a sharp instrument able to penetrate the tissue up to the removal site; therefore no actual incision is required. Usually, in percutaneous removal of tissues a device is used for biopsies known as "aspiration needle" which can remove small quantities of tissues, especially liquids.

A method has recently been developed for percutaneous removal of semi-solid or cartilaginous tissues that can be actuated such as to perform nucleotomy or discectomy interventions (i.e. removal of the hernia of the pulpy nucleus of the intervertebral disc), in which the aspiration needles cannot be used as they are not suitable for aspirating the semi-solid and cartilaginous material of the pulpy nucleus.

With reference to figures 1-4, these methods comprise insertion, with ecographic control, of a coaxial needle 10 introducible percutaneously into an organism up to the removal site 20, i.e. up to when the distal end 11 of the coaxial needle 10 has penetrated into a removal site 20, meaning in an intervertebral disc at the hernia to be removed. As can be seen in figure 1, the coaxial needle 10 is composed of a cannula 30 provided at a distal end thereof with means 32 for coupling with a handgrip 40, and a chuck 50 (also known as a blade or needle) slidably inserted in the cannula 30. Once the distal end of the coaxial needle 11 is correctly inserted in the removal site, the chuck 50 is extracted from the cannula 30 in direction X indicated by the arrow of figure 2. The cannula, decoupled from the chuck, will therefore exhibit, at a distal end thereof, an opening 31 positioned in the removal site 20 for enabling introduction of a portion of tissue to be removed in a housing defined by the internal wall 33 of the cannula 30. At this point a conveyor shaft 60 is inserted into the cannula, which shaft 60 has a longitudinal extension that is greater than that of the cannula 30. The conveyor shaft 60 is couplable at a relative proximal end 61 to the handgrip 40 and is provided, at a distal end thereof, with a threaded portion 62 that, when the conveyor shaft 60 is inserted in the cannula 30, projects partially from the opening 31 of the cannula 30 (as can be observed in figure 3). Thus, when the conveyor shaft 60 is set in rotation about the relative longitudinal axis Y by an actuator positioned internally of the handgrip 40, the threaded portion, which is in contact with the semi-solid tissue internally of the disc nucleus, cooperates with the cannula, functioning as an Archimedes screw and enabling removal of a portion of the tissue and the subsequent conveying thereof internally of the cannula 30 towards the handgrip 40. In fact, the threaded portion in rotation causes the movement of the semi-solid tissue of the pulpy nucleus in the direction K indicated in figure 3.

Although this percutaneous removal method and the means 10, 30, 40, 60 with which it is actuable are less invasive than the methods and the means for surgical or laparoscopic removal previously used, the percutaneous removal of the tissues is done at a removal speed that is quite slow and therefore

requires a relatively long time. This leads to a longer period of discomfort for the patient undergoing the removal intervention.

Further, with the above method it is not possible to remove the entire hernia of the intervertebral disc without reiterating the step of inserting the coaxial needle 10 (and therefore the cannula 30) in such a way as to be able to remove part of the pulpy nucleus even from at least a further portion of the disc or, preferably from at least a different portion of the hernia.

To optimise removal times the cannula 30 cannot have an internal diameter, and consequently an external diameter, that are too small. Thus each insertion of the coaxial needle comprising the cannula 30 bears a not insignificant risk of damaging tissues, in particular nervous tissues. This might happen either during the first introduction of the coaxial needle 10 or during the successive introductions. The successive introductions might be necessary in a case in which the first attempt at introducing the coaxial needle 10 is not suitable for positioning the distal end in the hernia or in a case in which it is necessary to perform the removal a plurality of points of the hernia.

SUMMARY OF THE INVENTION

The main aim of the present invention is to provide means for performing a removal of a body tissue percutaneously, in shorter times with respect to the prior art, in particular, in a case of removals of solid tissues, or semi-solid tissues and more in particular for performing nucleotomy or herniotomy of the intervertebral disc.

A further aim of the present invention is to provide means for performing a removal of a body tissues percutaneously, which involves a lower residual risk of involuntarily cause lesions of the other body tissues, in particular in the case of nucleotomy or herniotomy of the intervertebral disc.

This aim is attained with a kit for percutaneous removal of body tissues from an organism, comprising:

a first cannula percutaneously insertable in an organism and provided with a

relative lateral surface; and

a shaft for conveying body tissue, which shaft is insertable in the first cannula, is rotatable in the first cannula, and comprises a threaded portion, coaxial with an axis of the conveyor shaft, for conveying body tissues when the conveyor shaft rotates;

characterised in that the first cannula is provided with a lateral through-hole afforded on a relative lateral surface in proximity of a relative distal end;

and in that the first cannula and the conveyor shaft are conformed with respect to one another such that when the conveyor shaft is inserted internally of the first cannula, the threaded portion of the conveyor shaft is positioned at the through hole of the first cannula such as to convey body tissue from an organism consequently to activation in rotation of the conveyor shaft.

Clearly the kit of the invention comprises the first cannula and the conveying shaft, which are couplable to a grip of a known type and, in the case of the shaft, to actuating means for setting the shaft of known type in rotation, with known coupling modes. IN fact, the first cannula and the shaft can advantageously be of a single-use type, while the grip and the actuating means can be re-usable.

In the first cannula, comprised in the kit of the invention, the through-hole, by virtue of the relative lateral arrangement thereof, can advantageously have a considerably larger dimension than that of the opening 31 afforded in the known-type cannula 30 (figures 1, 2). This opening has dimensions correlated to the internal diameter of the cannula 30.

Additionally the fact that the hole is a through-hole enables the first cannula to maintain, when coupled to the conveyor shaft, a structural rigidity which is sufficient to enable removal and conveying of the tissues at the through-hole, even when the through-hole has a considerably larger dimension than the distal opening 31 afforded in the cannulas 30 of known type.

It follows that, according to the invention, the quantity of tissue to be removed,

in contact with the threaded portion of the shaft (which is arranged at the through-hole of the first cannula) is greater than the prior art. This involves shorter removal time and/or the possibility of reducing the external diameter of the first cannula, and therefore the risk connected with the insertion thereof in the organism, without this leading to an increase in the removal time with respect to the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

Obviously, since the invention relates to percutaneous insertions, the term "organism" relates to an animal, and preferably a human, organism.

The characteristics of the invention are set out in the following, with particular reference to the accompanying tables of drawings, in which:

figure 1 is a section view of a coaxial needle of known type;

figure 2 is a longitudinal view of a cannula of known type comprised in the coaxial needle of figure 1;

figure 3 is a longitudinal view of a device for percutaneous removal of tissues of known type and insertable in the cannula of figure 2;

figure 4 is a longitudinal view, partially cutaway, of the device of figure 3 inserted in and coupled to the cannula of figure 2;

figure 5 is a longitudinal view, partially cutaway, of an embodiment of the kit of the invention;

figure 6 is a longitudinal view, partially cutaway, of a further embodiment of the kit of the invention;

figures 7 and 8 are larger-scale views, respective lateral and from above, of the discal end of an embodiment of the new cannula comprised in the kit of the invention;

figure 9 is an embodiment of a further new component of a still further

embodiment of the kit of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to figures 5-8, numeral 100 denotes a kit for percutaneous removal of body tissues from an organism of the invention, comprising: a first cannula 80 percutaneously insertable in an organism and provided with a relative lateral surface; and a shaft 90 for conveying body tissue, which shaft 90 is insertable in the first cannula 80, is rotatable in the first cannula 80, and comprises a threaded portion 92, coaxial with an axis of the conveyor shaft 90, for conveying body tissues when the conveyor shaft 90 rotates. The first cannula 80 is provided with a lateral through-hole 84 afforded on a relative lateral surface in proximity of a relative distal end 81. The first cannula 80 and the conveyor shaft 90 are conformed with respect to one another such that when the conveyor shaft 90 is inserted internally of the first cannula 80, the threaded portion 92 of the conveyor shaft 90 is positioned at the through hole 84 of the first cannula 80 such as to convey body tissue from an organism consequently to activation in rotation of the conveyor shaft 90.

In the proposed kit, the conveyor shaft 90 is preferably flexible and the first cannula 80 comprises a proximal portion 82 having a straight development; and a remaining distal portion 87 having a straight development and comprising the distal end 81 of the first cannula 80 and the through-hole 84, the distal portion 87 being inclined by an angle with respect to the proximal portion 82 (figure 5).

More preferably the distal portion 87 of the first cannula 80 is inclined with respect to the proximal portion 82 of the first cannula 80 by an angle comprised between 1 and 30 degrees, advantageously between 5 and 25 degrees, more advantageously between 15 and 25 degrees.

Also preferable is a kit 100 in which the conveyor shaft 90 is flexible and the first cannula 80 comprises: a proximal portion 82 having a straight development; and a remaining distal portion 87, comprising the distal end 81 of the first cannula 80 and the through-hole 84, the distal portion 87' having a

curved development (figure 6).

The inclined or curved distal portion 87, 87' of the first cannula 80 enables manoeuvring around any obstacles present in the percutaneous insertion trajectory of the cannula. The curved-developing distal portion 87' of the first cannula 80 is preferably conformed as an arc of circumference which extends to an angle of up to 180°.

The inclined or curved distal portion 87, 87' of the first cannula 80 enables, following a rotation of the first cannula 80 along a longitudinal axis X of the remaining proximal portion 82, positioning the through-hole 84 in a plurality of positions of the removal site, arranged along the arc of circumference described by the through-hole 84 during the rotation of the first cannula 80. This is particularly preferable in a case in which the removal site is a pulpy nucleus, and more preferably in a discal hernia. The rotation of the first cannula 80 can be performed by rotating the handgrip 40 to which both the cannula 80 and the conveyor shaft 80 comprised in the kit 100 of the invention have been coupled.

The distal portion, inclined or curved 87, 87' of the first cannula 80 preferably has a length comprised between 2 and 6 cm, more preferably between 2.5 and 4.5 mm, advantageously between 2.5 and 4 mm. These lengths enable the through-hole 84 to describe an arc of circumference during the rotation of the first cannula 80 which falls in the removal point or enables the through-hole to be arranged on a further removal site arranged on the described arc.

In this way a subsequent reintroduction of the first cannula 80 is not required for removing a further portion of tissue from a further position in the removal site. Therefore by using the kit 100 of the invention, in which the distal portion of the first cannula is inclined or curved, the risk connected with the percutaneous removal is further reduced and the quantity of tissue that can be removed with a single percutaneous introduction of the first cannula 80 is increased.

The first cannula 80 is advantageously made of a memory shape material,

especially when the cannula 80 comprises a distal portion 87, 87' that is inclined or curved.

The through-hole 84 made on the first cannula 80 preferably has a longitudinal development comprised between 3 and 30 mm, more preferably between 10 and 30 mm, advantageously between 10 and 25 mm.

The transversal development of the through-hole 84 is determined by the relative maximum depth (figure 8).

Kits 100 according to the invention are preferred in which the through-hole 84 is obtainable by making a lateral undercut on the lateral surface of the first cannula 80, the undercut having a maximum depth P, measured along an external diameter of the first cannula 80, comprised between 45% and 60% of the external diameter D of the first cannula 80. This enables the threaded portion of the shaft, when it is coupled to the cannula (for example by means of the handgrip) to be immersible into the tissue removal site, thus further facilitating the removal of the tissue. The maximum depth is preferably comprised between 50 and 60% of the external diameter D of the cannula 80.

In a particularly preferred embodiment of the kit 100 of the invention, the distal end 81 of the first cannula 80 is closed and sharpened such as to facilitate the percutaneous insertion into the organism. This embodiment of the first cannula is particularly preferable when the cannula has an external diameter comprised between 0.72 mm and 2.5 mm as this means that a chuck is no longer needed to be inserted in the first cannula, which closes the distal end during the percutaneous insertion of the cannula in the organism.

The kit 100 of the invention preferably comprises an element 76 for percutaneous introduction having a longitudinal development and percutaneously insertable in an organism and having a relative longitudinal development that is greater than the longitudinal development of the first cannula 80. The element 76 for percutaneous introduction is entirely and slidably insertable in the first cannula 80, such as to guide the insertion of the first cannula 80 into the organism when the element 76 is percutaneously

inserted in the organism. In order to be slidably insertable in the first cannula 80 the percutaneous introduction element 76 can have an external diameter that is smaller by at least 0.1 mm than the internal diameter of the first cannula 80.

This enables actuating a new removal method which comprises the following steps:

predisposing a percutaneous introduction element 76 percutaneously and having a longitudinal development inserted percutaneously in an organism with a relative distal end inserted in a removal point internally of the organism and a relative distal end external of the organism; the percutaneous introduction element 76 having a relative longitudinal development that is greater than the longitudinal development of the first cannula 80 and being entirely and slidably insertable in the first cannula 80;

percutaneously inserting the first cannula 80 into the organism using as a guide the percutaneous introduction element 76, inserted into the organism, realising a relative sliding between the percutaneous introduction element 76 and the first cannula and with the percutaneous introduction element 76 inserted internally of the first cannula 80.

This method exhibits the indisputable advantage of using the percutaneous introduction element 76 in the first percutaneous insertion. As this element has an external diameter that is smaller than that of the first cannula 80, with this method the risk of lesions during the positioning step of the first cannula 80 are further reduced.

In a further embodiment, the method of the invention comprises following steps:

predisposing a second cannula 70 percutaneously insertable into an organism, comprising: a butt 72, at a proximal end thereof;

a pre-fracture line 74 arranged in proximity of the butt 72, preferably adjacent

to the butt 72; a distal portion 76 thereof, having a longitudinal development originating from the pre-facture line 74 and being percutaneously insertable in an organism; the distal portion 76 of the second cannula 70 having a relative longitudinal development that is greater than the longitudinal development of the first cannula 80 and being entirely and slidably insertable in the first cannula 80;

percutaneously inserting the distal portion 76 of the second cannula in an organism in such a way that a relative proximal end 71 is at a removal point internally of the organism and the pre-fracture line is external of the organism;

separating the butt 72 from the distal portion 76 of the second cannula 70 at the pre-fracture line;

percutaneously inserting the first cannula 80 into the organism, using as a guide the distal portion 76 of the second cannula 70, inserted in the organism, and realising a relative sliding between the distal portion 76 and the first cannula 80 and with the distal portion 76 inserted internally of the first cannula 80.

This method enables using, for assisted localisation of the removal point, a coaxial needle 75 (see figure 9) comprising: the second cannula 70 with an external diameter that is smaller than that of the first cannula 80 and provided with the pre-fracture line 74, and a butt 72; and a chuck 73 insertable in the second cannula 70.

Therefore a relative embodiment of the kit 100 is particularly preferred which enables actuating the further proposed removal method. The kit 100 comprises: a second cannula 70 percutaneously inserted in an organism, provided:

at a proximal end of a butt 72;

with a pre-fracture line 74 arranged in proximity of the butt 72, preferably adjacent to the butt 72;

with a distal portion 76 having a longitudinal development that originates from the pre-fracture line 74 and is percutaneously insertable in an organism; the distal portion 76 of the second cannula 70 having a longitudinal development that is greater than the longitudinal development of the first cannula 80 and entirely and slidably insertable in the first cannula 80 such as, when the distal portion is inserted percutaneously in the organism, to be a guide for the percutaneous insertion of the first cannula 80 into the organism.

The last above embodiment of the kit 100 advantageously further comprises the chuck 73, insertable in the second cannula and provided with a further butt 74.

Also particularly advantageous is a kit 100 further comprising a handgrip 40 bearing activating means for activating the conveyor shaft 90 in rotation, the grip being conformed such as to couple with a first cannula 80 and with the conveyor shaft 90 in such a way that when the conveyor shaft 90 is inserted internally of the first cannula 80 the threaded portion 92 of the conveyor shaft 90 is at the through-hole 84 of the first cannula 80 in order to convey body tissues from an organism consequently to the activation in rotation of the conveyor shaft 90 by the activating means. This embodiment of the kit 100 enables assembling a new device for percutaneous removal of body tissues comprising:

any embodiment of the first cannula 80 that is percutaneously insertable in a previously-described organism and provided with a lateral through-hole 84 made on the relative lateral surface in proximity of a distal end 81 thereof; and

a shaft 90 for conveying body tissue, which shaft 90 is insertable in the first cannula 80, is rotatable in the first cannula 80, and comprises a threaded portion 92, coaxial with an axis of the conveyor shaft 90, for conveying body tissues when the conveyor shaft 90 rotates; and

a handgrip 40 bearing activating means for activating the conveyor shaft 90 in rotation, the handgrip 40 being conformed such as to couple with the first cannula 80 and with the conveyor shaft 90 in such a way that when the

conveyor shaft 90 is inserted internally of the first cannula 80, the threaded portion 92 of the conveyor shaft 90 is positioned at the through-hole 84 of the first cannula 80 such as to convey body tissues from an organism consequently to activation in rotation of the conveyor shaft 90 by the activating means.

The handgrip 40 can be advantageously single-use in order to limit danger of infections caused by a careless etherisation, necessary in a case where a same handgrip is used several times.

The handgrip 40 preferably comprises a command button 41 of the activating means positioned at a first opposite end of the end provided for coupling with the conveyor shaft 90 and the first cannula 80.

The longitudinal development of the first cannula 80 can be comprised between 5 and 30 cm, preferably between 5 and 25 cm and advantageously between 10 and 25 cm.

The external diameter of the first cannula 80, which is percutaneously insertable in an organism, can be comprised between 0.72 mm (21 gauge) and 3.70 mm (7 gauge), preferably between 0.72 mm and 3 mm, more preferably between 1 mm and 2.5 mm.

The threaded portion 92 of the conveyor shaft 90 can extend longitudinally for the whole longitudinal development of the first cannula 80 or have a longitudinal development that is less than the longitudinal development of the first cannula 80. The conveyor shaft 90 advantageously comprises at least a further threaded portion (not shown) arranged at an intermediate position between the threaded portion 92 and the proximal end of the conveyor shaft 90 in order to cooperate with the conveying of the tissues removed along the first cannula 80.

The threaded portion 92 preferably comprises a helical cutting profile.

The conveyor shaft 90, in the portions thereof not involved with the threaded portion 92 or the further threaded portion, exhibits a transversal section that is

smaller than a transversal section of the threaded portions 92.

The above has been described by way of non-limiting example, and any constructional variants are understood to fall within the protective scope of the present technical solution, as described above and claimed in the following; in particular the characteristics of the invention denoted as preferential can be combined with one another in further embodiments of the invention.

CLAIMS

1). A kit for percutaneous removal of body tissues from an organism, comprising:

a first cannula (80) percutaneously insertable in an organism and provided with a relative lateral surface; and

a shaft (90) for conveying body tissue, which shaft (90) is insertable in the first cannula (80), is rotatable in the first cannula (80), and comprises a threaded portion (92), coaxial with an axis of the conveyor shaft (90), for conveying body tissues when the conveyor shaft (90) rotates;

characterised in that

the first cannula(80) is provided with a lateral through-hole (84) afforded on a relative lateral surface in proximity of a relative distal end (81);

and in that

the first cannula (80) and the conveyor shaft (90) are conformed with respect to one another such that when the conveyor shaft (90) is inserted internally of the first cannula (80), the threaded portion (92) of the conveyor shaft (90) is positioned at the through hole (84) of the first cannula (80) such as to convey body tissue from an organism consequently to activation in rotation of the conveyor shaft (90).

2). The kit of the preceding claim, wherein the conveyor shaft (90) is flexible and the first cannula (80) comprises a proximal portion (82) having a straight development; and a remaining distal portion (87) having a straight development, comprising the distal end (81) of the first cannula (80) and the through-hole (84), the distal portion (87) being inclined by an angle with respect to the proximal portion (82).

3). The kit of the preceding claim, wherein the distal portion (87) of the first cannula (80) is inclined with respect to the proximal portion (82) of the first

cannula (80) by an angle comprised between 1 and 30 degrees.

4). The kit of claim 1, wherein the conveyor shaft (90) is flexible and the first cannula (80) comprises: a proximal portion (82) developing straight; and a remaining distal portion (87'), comprising the distal end (81) of the first cannula (80) and the through-hole (84), the distal portion (87) having a curved development.

5). The kit of any one of claims from 2 to 4, wherein the distal portion (87) of the first cannula (80) has a length comprised between 2 and 6 cm.

6). The kit of any one of the preceding claims, wherein the first cannula (80) is made of a material having a shape memory.

7). The kit of any one of the preceding claims, wherein the through-hole (84) is obtainable by fashioning a lateral undercut on the lateral surface of the first cannula (80), the undercut having a maximum depth (P), measured along an external diameter of the first cannula (80), comprised between 45% and 60% of the external diameter (D).

8). The kit of any one of the preceding claims, wherein the distal end (81) of the first cannula (80) is closed and sharpened in order to facilitate percutaneous insertion thereof into the organism.

9). The kit of any one of claims from 1 to 7, further comprising: an element (76) for percutaneous introduction having a longitudinal development and percutaneously insertable in an organism and having a relative longitudinal development that is greater than the longitudinal development of the first cannula (80), the element (76) for percutaneous introduction being entirely and slidably insertable in the first cannula (80) such as to guide the insertion of the first cannula (80) into the organism when the element (76) is percutaneously inserted in the organism.

10). The kit of any one of claims from 1 to 7, comprising a second cannula (70) percutaneously insertable into an organism, comprising:

a butt (72), at a proximal end thereof;

a pre-fracture line (74) arranged in proximity of the butt (72);

a distal portion (76), developing longitudinally and originating from the pre-fracture line (74) and percutaneously insertable into an organism; the distal portion (76) of the second cannula (70) having a relative longitudinal development that is greater than the longitudinal development of the first cannula (80) and being entirely and slidably insertable in the first cannula (80) such as to guide the percutaneous insertion of the first cannula (80) into the organism when the distal portion (76) is percutaneously inserted in the organism.

11). The kit of any one of the preceding claims, further comprising a handgrip (40) bearing activating means for activating the conveyor shaft (90) in rotation, the handgrip (40) being conformed such as to couple with the first cannula (80) and with the conveyor shaft (90) in such a way that when the conveyor shaft (90) is inserted internally of the first cannula (80), the threaded portion (92) of the conveyor shaft (90) is positioned at the through-hole (84) of the first cannula (80) such as to convey body tissues from an organism consequently to activation in rotation of the conveyor shaft (90) by the activating means.

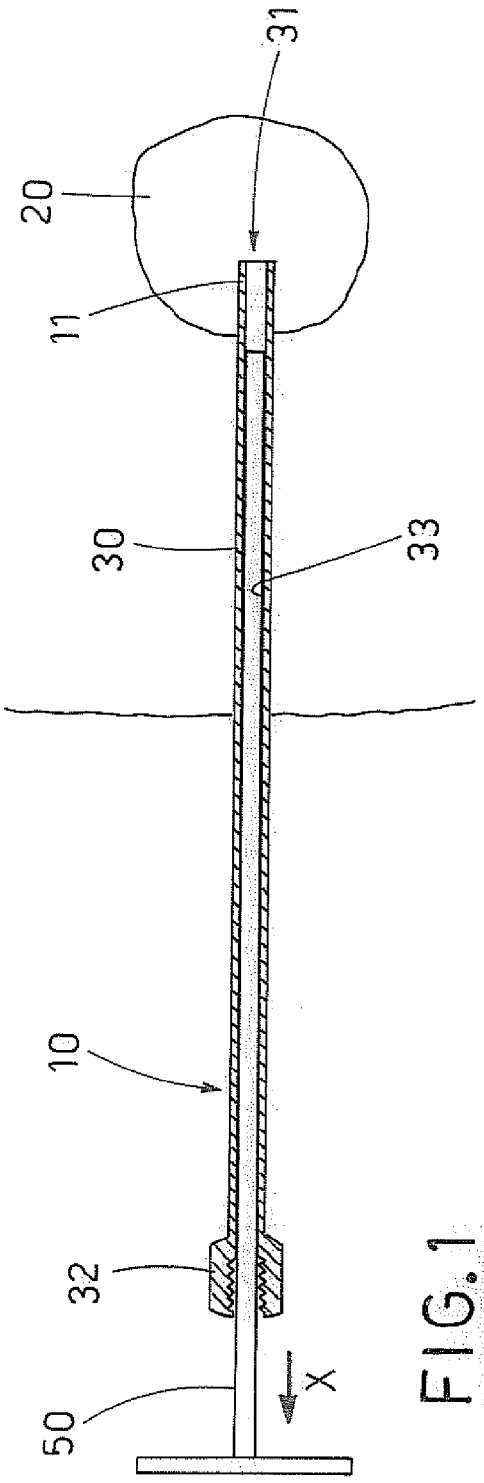


FIG. 1

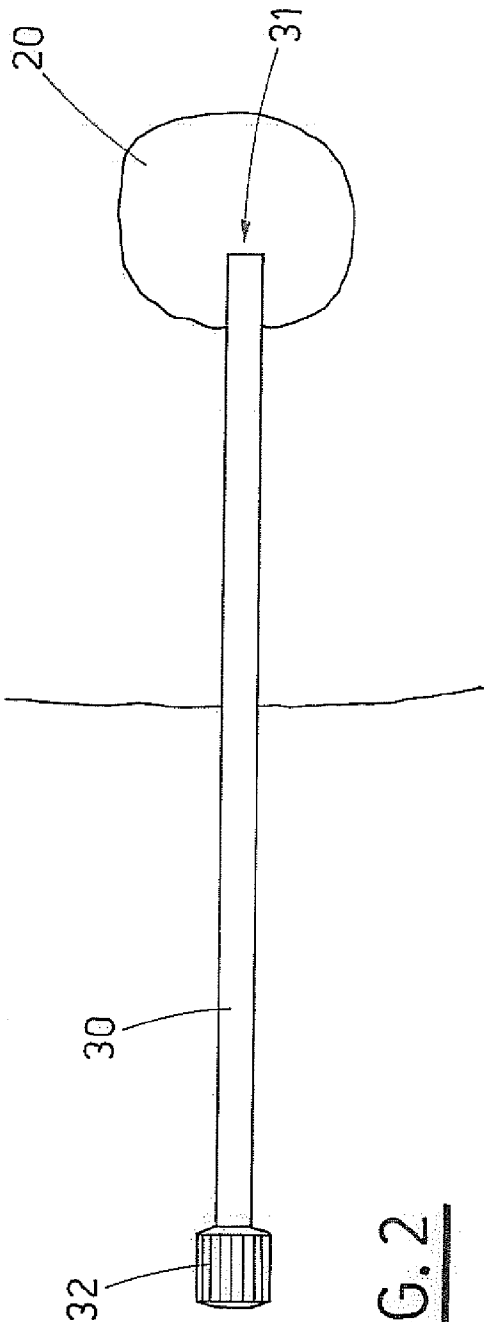


FIG. 2

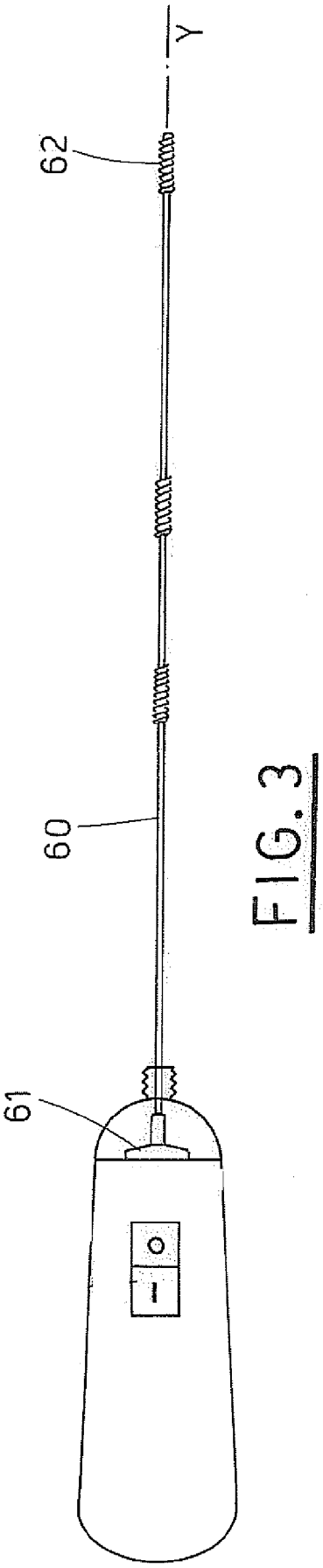


FIG. 3

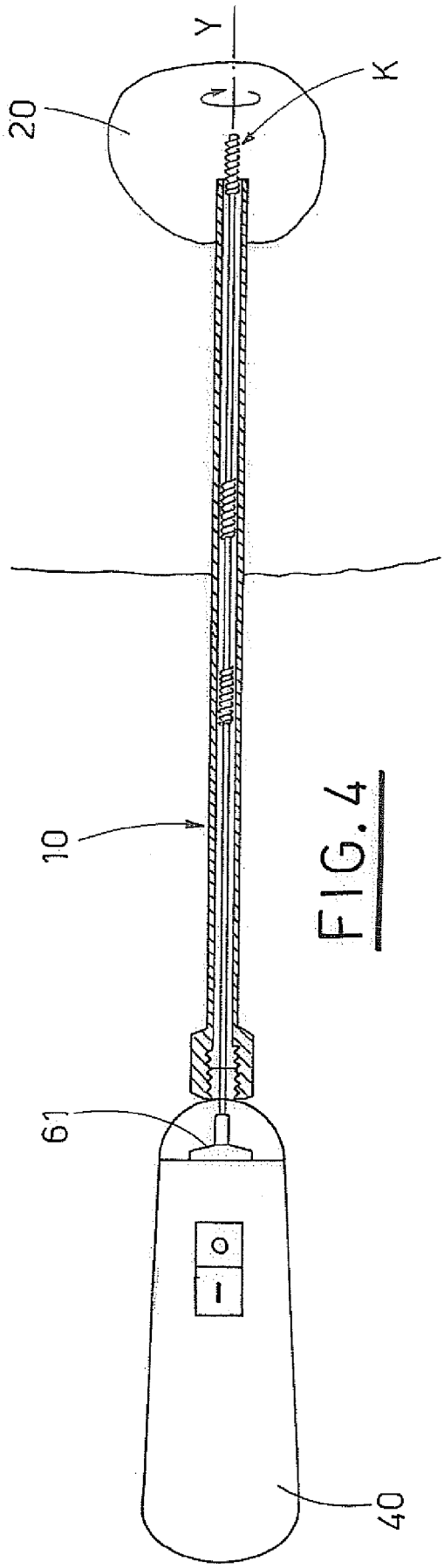
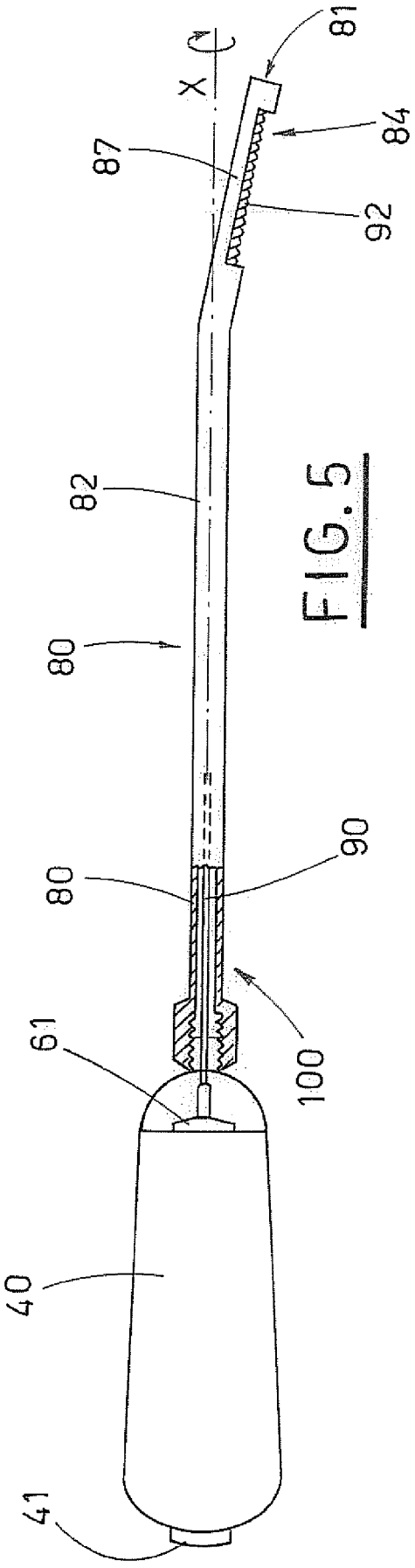


FIG. 4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84
87
92
82
80
90
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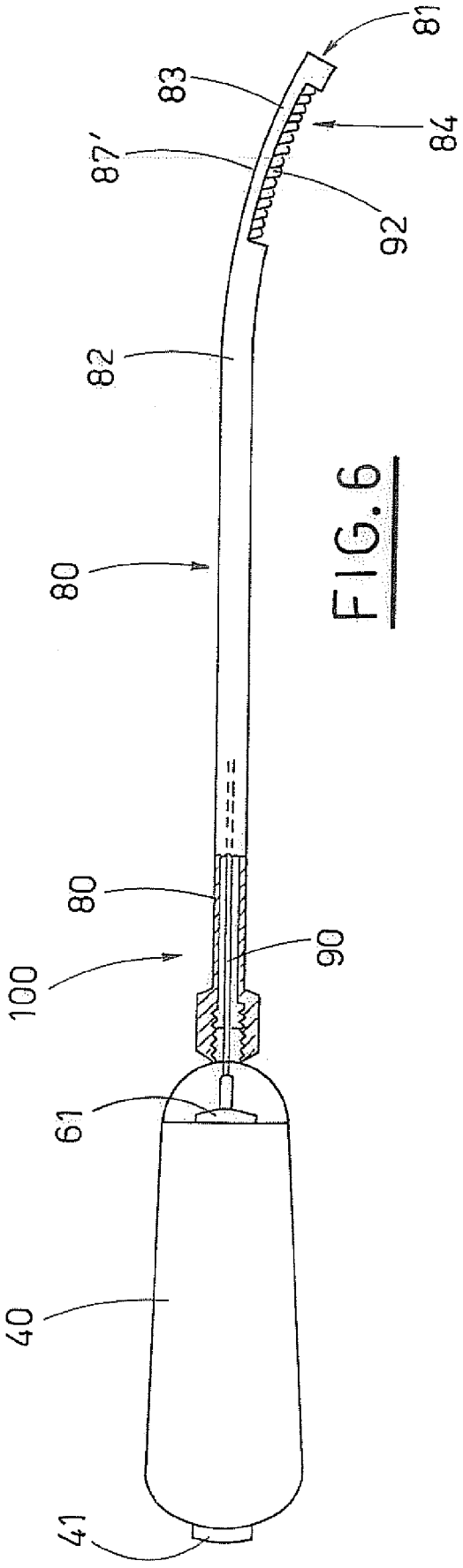
61
100
40
41

FIG. 5


81
83
84
87'
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100
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FIG. 6

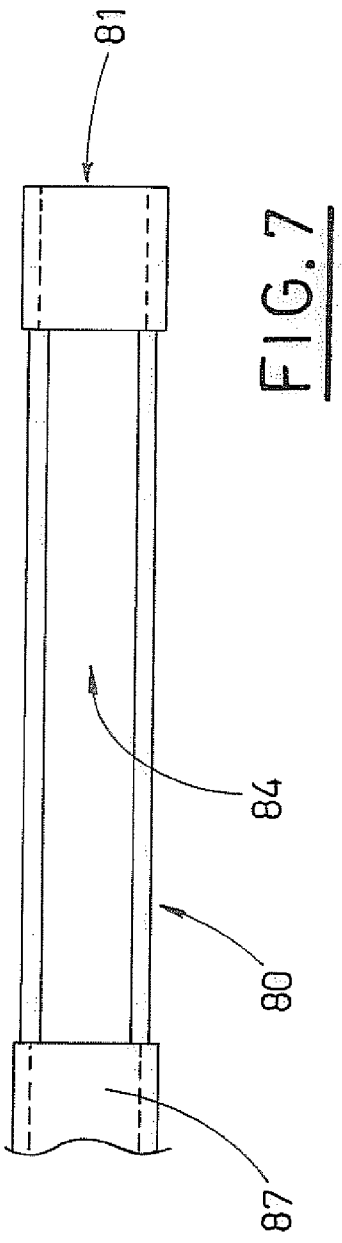

FIG. 7

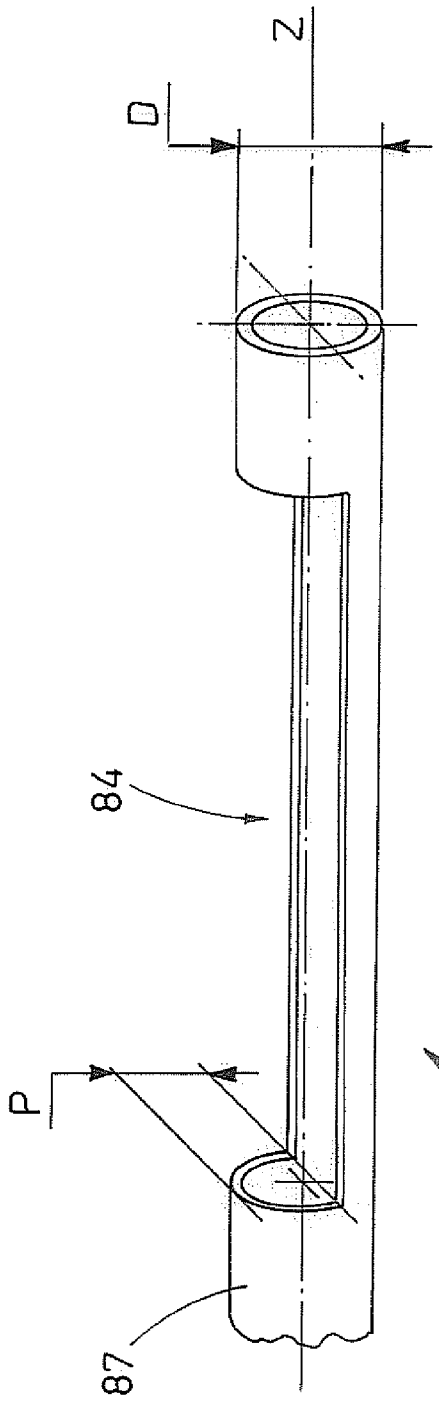

FIG. 8

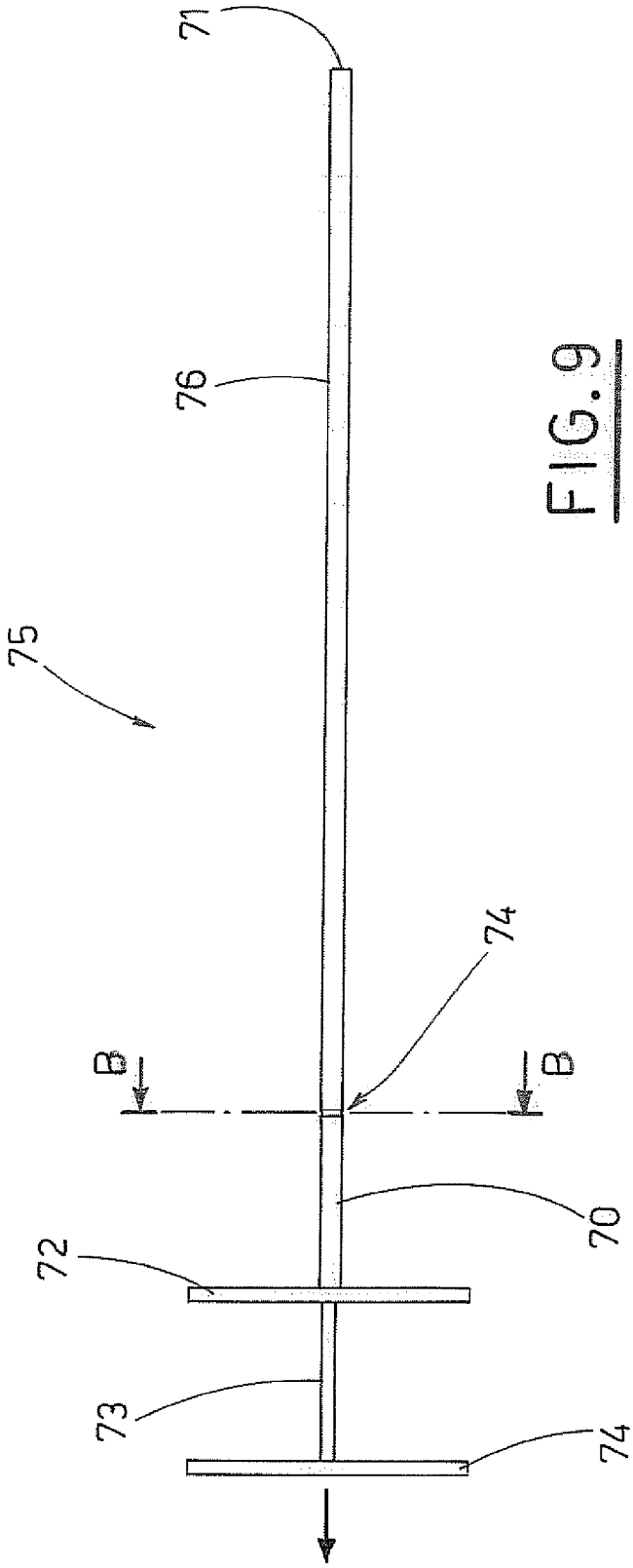

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2012/054026

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B10/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/143270 A1 (MILLER LARRY SHERWIN [US]) 3 October 2002 (2002-10-03) paragraphs [0010] - [0025]; figures 1,3,4	1,4,7,11
X	US 3 945 375 A (BANKO ANTON) 23 March 1976 (1976-03-23) figure 2	1,7,11
X	US 2008/249553 A1 (GRUBER WILLIAM HARWICK [US] ET AL) 9 October 2008 (2008-10-09) paragraphs [0137], [0141]; figures 1,2a,8b,10,28,31,33,35,40a,40b,41	1-7,11
A	WO 2006/015302 A1 (STEN X [US]; SCHOMER DONALD [US]; SOLSBERG MURRAY D [US]; WAY BRYCE [U) 9 February 2006 (2006-02-09) figures 5,24	1-7,11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 October 2012	10/01/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Grieb, Christian

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2012/054026

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-7, 11

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7, 11

A kit for percutaneous removal of body tissues, comprising a cannula with a lateral through-hole and a rotatable, threaded conveyor shaft insertable in the cannula, wherein wherein the cannula comprises a distal portion inclined with respect to a proximal portion and the conveyor shaft is flexible (claim 2);

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2. claims: 1, 8-10

A kit for percutaneous removal of body tissues, comprising a cannula with a lateral through-hole and a rotatable, threaded conveyor shaft insertable in the cannula, further comprising an element for percutaneous introduction (claim 9 or 10);

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2012/054026

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002143270 A1	03-10-2002	AU 2002255862 A1	15-10-2002
		US 2002143270 A1	03-10-2002
		WO 02078518 A2	10-10-2002
US 3945375 A	23-03-1976	NONE	
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		WO 2006015302 A1	09-02-2006