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(71) Applicant *(for all designated States except US)*: **A.H. BEELEY PTY LTD** [AU/AU]; PO Box 673, 85 Bussell Highway, Busselton, Western Australia 6280 (AU).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **BEELEY, Antony Hugh** [AU/AU]; 65 Siesta Park, Siesta Park, Western Australia 6280 (AU).

(74) Agent: **WRAYS**; Ground Floor, 56 Ord Street, West Perth, Western Australia 6005 (AU).

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(54) **Title**: APPARATUS AND METHOD OF LAPAROSCOPIC PORT SITE SUTURE

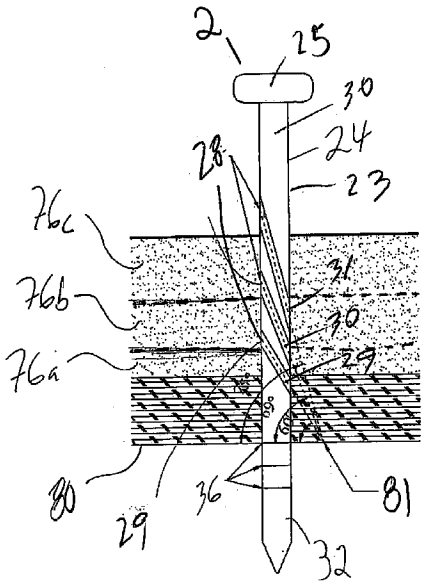

Fig. 5

(57) **Abstract**: A surgical device for guiding a needle during suturing of an incision comprising a body for insertion in the incision having a first passage to conduct an end of the needle below a location surrounding the incision, wherein a distal portion of the body comprises means for indicating the location to which the needle will be conducted. Methods for suturing an incision using the surgical device are also provided.

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Apparatus and Method of Laparoscopic Port Site Suture

Field of the Invention

The present invention relates to the medical field and more particularly to apparatus and methods applied during surgical procedures for suturing incisions

Background Art

Invasive surgical procedures which involves the cutting of one or more incisions to access a biological cavity are widespread. The size of different types of incisions may vary depending on the type of surgical procedure being performed. For example, it might be desirable or required to perform only small incisions in order to access a biological cavity. A patient's body may be punctured in order to insert, for example, a telescope into the patient's body to view the inside of a biological cavity. Also, a small incision may be made to insert in the biological cavity a tube that delivers gas (usually CO_2) in order to insufflate the cavity thus providing a viewing space for the telescope and a working space for surgical instruments provided via other small incisions.

As an example, laparoscopic surgery (key hole surgery) procedures are performed by passing instruments down hollow tubes inserted through small incisions made in an abdominal wall. These tubes are called ports. The ports may vary in diameter from 0.5 cm to 1.5 cm. As previously explained, the abdomen is insufflated through the small incisions in order to provide a working and viewing space within the abdomen.

Upon completion of the laparoscopic surgical procedure, the incision(s) may need to be sutured. The suture method is cumbersome and difficult because the incisions are usually small and deep. Thus, a surgeon typically is unable to get his fingers into the incision to perform the suturing procedure. Instead, a surgeon must pass a needle and suture through the tissue on one side of the incision and into the patient's body; manipulate the needle and suture with forceps via the small incision, and then pass the needle and suture through the tissue on the other side of the incision and out of the body.

Moreover, when ports having diameters of 1 cm or more, especially in the lower part of the abdomen (below the level of the umbilicus), there is a high risk of developing a hernia through the port site (port site hernia). Also, it is occasionally necessary to enlarge a port site by stretching it with a dilator in order to deliver for example a large gallstone (3 or 4 cm in diameter). In such cases a port site hernia is almost certain to occur unless the muscle and peritoneum of the port site is properly sutured. Further, a port site hernia will require a further operation at a later date to repair it and this may be a very difficult procedure.

Port site hernias can be avoided by suturing the muscle layer together with the peritoneum (lining of the inner aspect of the abdominal wall) of the port site. In order to suture them properly it is important that the working and viewing space created by insulffation of the cavity be maintained through continual pumping of the gas into the cavity (as the gas gradually escapes during the procedure, primarly through the incisions). Enlargement of the incisions will result in an increased discharge of gas from the abdomen and therefore in a reduction of the working and viewing space. Also, when performing the suturing of the incisions the ports must be extracted from the incisions, allowing exit of the gas and thus reducing even more the working and viewing space. This creates a series of inconveniences when suturing the patient. Upon release of the gas, the abdominal wall lies in contact with the intra abdominal organs such as the bowel so that the risk of picking up the bowel wall during the suture procedure of the incisions is greatly increased.

Summary of the Invention

According to a first aspect of the invention there is provided a surgical device for guiding a needle during suturing of an incision comprising a body for insertion in the incision having a first passage to conduct an end of the needle below a location surrounding the incision, wherein a distal portion of the body comprises means for indicating the location to which the needle will be conducted.

Preferably, the indicating means may comprise a marking on the distal portion.

Preferably, the location is adjacent to the marking.

Preferably, the first passage traverses obliquely the body.

Preferably, the first passage traverses the body at an angle of about 30° with respect to a side wall of the body.

The indicating means may comprise a first mark for providing a visual indication of a specific depth of the body within the incision.

The indicating means may comprise a second mark for providing a visual indication of an angular rotation of the body thereby providing an indication of the location to which the end of the needle will be conducted.

There may be a series of first marks in spaced apart relation.

There may be two opposed second marks.

Preferably, each of the opposed second marks extend from the first passage to a distal end of the body.

Preferably, the distal end is configured for entry into the incision.

Preferably, the distal end is of tapered configuration.

Preferably, the body is adapted to sealingly engage the incision.

In one arrangement the body further comprises a second passage.

Preferably, the second passage traverses obliquely the body at a second angle relative to the longitudinal axis of the body,

Preferably, the second angle being different than a first angle at which the first passage traverses obliquely the body.

In a further arrangement, the body comprises three or more passages, each of the three or more passages traversing obliquely the body at angles relatively to the longitudinal axis of the body.

Preferably, the angles being different from each other.

Preferably, the passages are arranged to conduct the end of the needle to a same location relative to the incision.

Preferably, the same location is located 1.5 cm radially outwards from the the marking

Preferably, the body comprises transparent material.

The body may be defined by a trocar.

According to a second aspect of the invention there is provided a surgical device for guiding a needle during suturing of an incision comprising a body for insertion in the incision having a plurality of passages to conduct an end of the needle below a location surrounding the incision, wherein a distal portion of the body comprises means for indicating the location to which the needle will be conducted.

Preferably, the plurality of passage traverses obliquely the body at angles relatively to the longitudinal axis of the body,

Preferably, the angles being different with respect to each other.

According to a third aspect of the invention there is provided a dilator for determining the diameter of an incision, the dilator comprising at least one mark indicating the diameter of the dilator at the location of the at least one mark.

According to a fourth aspect of the invention there is provided a tool for guiding a surgical instrument with respect a biological cavity, the tool comprising at least one end adapted to receive the surgical instrument.

According to a fifth aspect of the invention there is provided a method for suturing an incision in a biological cavity comprising the steps of:

obturating the incision to avoid gas discharge from the biological cavity; and

suturing the incision.

According to a sixth aspect of the invention there is provided a method for suturing an incision in a biological cavity comprising the steps of:

inserting a body in the incision having at least one first passage to conduct a first end of a thread to a location below the incision; the body being inserted into the incision until at least one first mark on the body reaches a location of the incision;

inserting a first end of a thread inside the biological cavity through the at least one first passage;

extracting a second end of the thread from the at least one passage;

rotating the body around its longitudinal axis until at least one second mark on the body reaches a location around the incision;

extracting the first end of the thread outside of the biological cavity through the at least one first passage;

extracting the body from the incision;

uniting the first end of the thread with a second end of the thread for closing of the incision.

Preferably, the previous steps are repeated a plurality of times for finishing to complete closure of the incision using at least one thread.

Preferably, the first end of the thread is inserted into the biological cavity attached to a distal end of a needle.

Preferably, the distal end of the needle comprises fastening means to releasably attach a thread.

Preferably, fastening means to releasably attach a thread comprise at least one indentation having at least one extension extending into the body of the needle onto which the thread is mounted.

Preferably, the first end of the thread is removed from the distal end of the needle.

Preferably, the distal end of the needle is extracted from the at least one first passage.

Alternatively, the distal end of the needle is extracted from incision but kept within the passage of the body so as to allow rotation of the body.

Preferably, the body is raised to extract a second end of the thread from the at least one passage.

Preferably, the body is rotated 180 degrees around its longitudinal axis.

Preferably, the first end of the thread is extracted from the biological cavity through the at least one first passage via the distal end of the needle.

Preferably, the method further comprises inserting a telescope into the biological cavity for inspection inside the cavity.

Alternatively, the telescope is inserted inside the body for inspection inside the biological cavity.

Preferably, the method further comprises inserting a forceps into the biological cavity for either removing the thread from the distal end of the needle or hooking the thread to the needle.

Preferably, the first end of the thread is released from the distal end of the needle via the forceps.

Preferably, the first end of the thread is mounted on the distal end of the needle via the forceps.

Preferably, the method further comprises delivering gas into the biological cavity.

Preferably, the method is performed during laparoscopic surgery.

Preferably, the method is performed on a port site incision.

Preferably, the suturing comprises suturing the muscle layer and the peritoneum of the abdomen.

Preferably, the method further comprises the step of selecting the diameter of the body by use of a dilator.

Preferably, the dilator is a graded dilator.

Preferably, the body is defined by a trocar.

According to a seventh aspect of the invention there is provided a method for suturing an incision in a biological cavity comprising the steps of

inserting a body in the incision having at least one first passage to conduct a first end of a thread to a location below the incision;

inserting a first end of a thread inside the biological cavity through the at least one first passage;

extracting a second end of the thread from the at least one passage;

rotating the body around its longitudinal axis until at least one second mark on the body reaches a location around the incision;

extracting the first end of the thread outside of the biological cavity through the at least one first passage;

extracting the body from the incision;

uniting the first end of the thread with a second end of the thread for closing of the incision.

According to an eight aspect of the invention there is provided a method for guiding at least one portion of a surgical instrument into a biological cavity, the method comprising:

inserting a guide having an end adapted to receive at least one end of the surgical instrument;

contacting the end of the guide against a location of a wall of the biological cavity;

making an incision at the location;

inserting the at least one end of the surgical instrument in the incision;

contacting the end of the guide against the at least one end of the surgical instrument; and

inserting the at least one portion of the surgical instrument in the cavity through the incision with assistance of the guide.

Brief Description of the Drawings

The present invention will be better understood by reference to the following description of several specific embodiments thereof as shown in the accompanying drawings, in which:

Figure 1 is a schematic view of a fragmentary cross-section of the body of a patient at a location surrounding an incision to be sutured, with various apparatus and devices used in a surgical procedure being conducted on the patient shown schematically in position;

Figure 2 is a view of an apparatus according to a first embodiment of the invention inserted into the incision;

Figure 3 is front view of the apparatus according to the first embodiment of the invention;

Figure 4 is back view of the apparatus according to the first embodiment of the invention;

Figure 5 is a view of an apparatus according to a second embodiment of the invention inserted into the incision;

Figure 6 is front view of the apparatus according to the second embodiment of the invention;

Figure 7 is back view of the apparatus according to a second embodiment of the invention;

Figure 8 is a detail of a cross-section of an arrangement of the surgical instruments according to the first or second embodiment;

Figure 9 is a side view of a dilator for use in conjunction with the apparatus according to the first or second embodiment of the invention;

Figure 10 is a side of a tool for locating an incision and guiding a surgical instrument;

Figure 11 is an end view of a tool for locating an incision and guiding a surgical instrument according to a fifth embodiment of the invention;

Figures 12 to 23 are successive diagrammatic sectional views illustrating the method for suturing of an incision with single sutures using the surgical instrument according to the first embodiment of the invention;

Figure 24 is a top view of an incision being sutured by a method using the first embodiment of the invention;

Figure 25 is a top view of an incision sutured by a method using the first embodiment of the invention;

Figures 26 to 51 are successive diagrammatic sectional views illustrating the method for suturing of an incision with a continuous suture using the surgical instrument according to the first embodiment of the invention; and

Figures 52 to 54 are successive diagrammatic sectional views illustrating the method for providing a surgical instrument to a body according to an eighth embodiment of the invention.

Detailed Description of Specific Embodiment(s)

The embodiments to be described relate to apparatus and methods for suturing incisions.

Figure 1 is a schematic cross-sectional view of a section of the abdomen of a patient undergoing laparoscopic surgery. In the surgical procedure, a first incision 11 is made in the abdominal wall 10 of the patient, which subsequently needs to be closed. Apparatus 1 according to the first embodiment of the invention is used in the procedure for closing the incision 11. As part of the laparoscopic surgical procedure second and third incisions perforate the abdominal wall for insertion of a port 14 and telescope 22. The port 14 facilitates delivery of instruments such as forceps (not shown) into the abdomen 16 for the procedure. Organs 18 within the abdomen are separated from the abdominal wall 10 by a space 20. Space 20 provides the working space required to perform the suture procedure and the viewing space so that the telescope 22 may provide images of the procedure within the abdomen 16. It should be noted that Figure 1 is schematic only and the

location and disposition of the apparatus 1, port 14 and telescope 22 can vary according to the location and type of surgical procedure being performed.

A gas may be delivered into the abdomen to maintain the space 20, thus not allowing contact between the abdominal wall 10 and the organs 18.

The incision 11 is sutured with the aid of the apparatus 1. The apparatus 1 is inserted into the incision 11, as will be explained.

Referring to figures 2 to 3, the apparatus 1 according to a first embodiment comprises a body 24. The body 24 is located at a specific height with respect, for example, the inner surface 26 of the abdominal wall.

The body 24 comprises an elongated portion configured as a shaft 30 of circular cross-section. The shaft 30 has a distal end 32 which defines a conical section 34.

The body 24 comprises a passage 28 adapted to receive a needle 52 and guide a distal end of the needle 52 below a location surrounding the incision. The passage 28 has opposed ends 28a, 28b opening onto opposed sides of the body 24. Passage 28 traverses the body 24 obliquely.

The distal end 32 of the body 24 comprises markings 36, 37. The markings comprise one or more first marks 36 configured as horizontal marks. In the arrangement shown there are three horizontal marks 36a, 36b and 36c spaced apart along the distal end of the needle 52. The marks 36 may be seen with the aid of the telescope 22 when the body 24 is inserted in the incision 11.

The marks 36 provide an indication of the depth of insertion of the elongated portion 30 in the incision 11 and thus facilitate accurate suture placement. The marks 36 allow a surgeon to adjust the depth at which the distal end of the needle 52 will perforate the peritoneum 80. The adjustment in depth of body 24 allows accurate suturing of any depth of incision. Varying the depth of insertion of the body within the incision controls the location at which the distal end of the needle

52 perforates the side walls of the incision 11. This allows adjustment of the location of the body 24 to the thickness of the muscle layer that a particular patient has.

One or more second marks 37 are provided on the body 24 to provide a visual indication of the angular orientation of the body and thereby provide an indication of the azimuthal location of the needle 52. In the arrangement shown, there are two vertical marks 37a and 37b disposed in diametrically opposed relation; that is, the vertical marks 37a and 37b are located in opposed sides of the body 24 (see figure 3, 6 and 4, 7). This provide a surgeon with an indication as to the location at which the distal end of the needle 52 will emerge from the tissue surrounding the incision 11 and enter the abdominal cavity.

The first vertical mark 37a extends from the end 28a of passage 28 to the distal portion 32 of the body 24 (see figure 6). The first vertical mark 37a is visible by the telescope and provides en visual indication of indicates the location at which the distal end of the needle 52 will pierce the peritoneum 80 (for example, 1.5 cm radially outwards form the first vertical mark 36b). The second vertical mark 37b extends from the opposing end 28b of passage 28 to the distal portion of the body 24 (see figure 4).

The first vertical mark 37a and the second vertical mark 37b have different lengths. This allows the first and second vertical marks 37a and 37b to be visually distinguished from each other. This is useful while suturing the incision 11. As will be explained with reference to the method for suturing the incision 11, after inserting the distal end of the needle 52 at a first suture site for delivery of a tread 38 (see figure 12) the body 24 is rotated to form a second suture site. The second vertical mark 37b provides an indication up to which degree the body 24 has to be rotated in order that the second suture site will be formed opposite to the first suture site.

In the arrangement shown in figures 2 to 4 passage 28 traverses the elongate element 30 at an angle of about 30° with respect to the longitudinal axis of the

elongate element 30. In other arrangements the passages 28 may traverse the elongate element 30 at angles other than 30°. Differently oriented passages 28 take into account the different level of obesity in patients. Obese patients may require relatively steeper passages 28, as will be explained with reference to figure 5.

The body 24 is of uniform diameter along its length to permit axial movement of the body 24 within the incision 11 during insertion and any adjustment of the depth of penetration, as well as rotation within the incision. This may allow maintenance of sealing contact between the body 24 and the body tissue surrounding the incision to avoid loss of air from the pneumoperitoneum.

Moreover, the protruding proximal portion 23 of the body 24 extends above the abdominal wall 10 allowing the body 24 to be held byhe surgeon's hand. The surgeon, to achieve a greater bite of muscle and peritoneum, may push the body 24 sideways while maintaining the elongate element 30 generally perpendicular to the abdominal wall 10. Upper portion 25 of the body 24 may be configured to assist in the movement of the body 24 while the surgeon locates the body 24 within the incision 11 and subsequently performs the suture process.

Also, the protruding proximal portion 23 of the body 24 allows verification that the body 24 is retained generally perpendicular to the abdominal wall 10. Tilting of the body 24 is to be avoided, otherwise the distal end of the needle 52 might either exit the peritoneum at a non-suitable location or, if the tilt is excessive, the needle will stay in the abdominal wall and fail to enter the peritoneal cavity.

Figures 5 to 7 show an apparatus 2 according to a second embodiment of the invention. In the arrangement shown in figures 5 to 7, the apparatus 2 comprises a body 24 is similar to the body 24 previously described and shown in figures 2 to 4, and so similar reference numerals are used to identify similar parts.

The body 24 of apparatus 2 according to the second embodiment of the invention comprises a plurality of passages 28 traversing the body 24. In the arrangement

shown there are three passages 28 comprising first passage 29, second passage 30 and third passage 31. The passages 29, 30 and 31 are oriented at different angles with respect to each other. As shown in figure 5, passages 30 and 31 traverse the body 24 at steeper angles than passage 29. However, the passages 29, 30 and 31 are arranged such that the distal end of the needle 52 (traversing any of the passages 28, 29 and 31) arrives adjacent the body 24 at a same location 81 on the peritoneum 80, as depicted in figure 5. For example, a suitable location is positioned about 1.5 cm radially from the intersection of the vertical mark 37 with the horizontal mark 36a.

The plurality of passages 28 allow the body 24 to be used with a range of patients, regardless of the thickness of the patient's fat layer. For example, figure 5 shows an abdominal wall 10 with three different fat layers (76a, 76b and 76c). Fat layer 76a might be of a slim patient, fat layer 76b of a normal patient and fat layer 76c of an obese patients. To suture an incision 11 in the slim patient passage 28 may be used. In the normal patient passage 28 will be covered by the fat layer 76b, thus, passage 29 may be used for suturing a patient. In an obese patient the only available passage is passage 30 because the fat layer 76c covers passage 28 and 29.

The body 24 according to the first and second embodiment of the invention may be a biocompatible material such as an appropriate plastics material or metal such as stainless steel.

An alternative arrangement of the first and second embodiment of the invention is shown in figure 8. Figure 8 shows a body 24 similar to the body 24 previously described and shown in figure 2 and similar reference numerals are used to identify similar parts. Referring to figure 8, the body 24 comprises a hollow tubular element 30 having counterpart apertures 46a and 46b adapted to define the passage 28 for receiving a needle 52. The apertures 46a and 46b are located each at opposite locations of the body 24 and at different heights with respect to each other such that the needle 52 transverses obliquely the body 24. Apertures 46a and 46b include at the inside of the body 24 guiding and sealing means to

guide the distal end of the needle 52 trough the body 24 and to avoid gas discharge through the apertures 46. As shown in figure 8, the guiding and sealing means comprise cuffs 48 that provide a tight seal around the needle 52. According to this arrangement, a telescope and/or other surgical instruments (not shown) may extend through the tubular body 24 to the distal end (not shown) of the body 24. For this the distal end (not shown) thereof (when, of course, the passage 28 is not occupied by the needle 52) may comprise a transparent section that permits viewing the area below the incision. Guiding means for guiding the telescope through the body 24 are provided inside the body 24. The guiding means are bevels 50 located adjacent to cuffs 48 to direct the distal end of the telescope (not shown) away from cuffs 48 as the telescope is delivered through the body 24.

In another arrangement, the gas may be delivered to the abdomen trough the tubular body 24. For this the distal end (not shown) of the body 24 comprises an aperture (not shown) for delivery of the gas to the abdomen. Also, the proximal end (not shown) of the body 24 may comprise a valve system to prevent gas from escaping the abdomen via the body 24 and permitting the introduction of, for example, surgical instruments and/or a telescope.

A third embodiment of the invention (which is not shown) a trocar is configured to incorporate the passage(s) 28 and also the marks 36 and 37. The trocar may be supplied with a port. With such an arrangement, the passage(s) and the marks 36 are located at the distal end of the trocar. This enables the trocar, supplied with the port, to be used for suturing its incisions (instead of a separate body 24). Trocars are regularly used to introduce ports in abdominal walls. Thus, with this embodiment it is possible to suture the incision in which the ports are inserted with the same trocar used to insert the port. In this way it is not necessary to have a separate surgical instrument, such as body 24, to suture the port site. Passage(s) 28 and marks 36 and 27 may be included in any type of trocar. Alternatively, the trocar may include a single passage and/or any of marks 36 or 37.

In figure 9 there is shown a dilator 70 used for increasing the size of an incision for extraction of, for example, a large specimens such as excised colons or gallstones. The dilator 70 may also be used to establish the diameter of the body 24, trocar or any other surgical instrument required for suturing an incision after the extraction of the specimen. The dilator 70 comprises a distal end 72 conical in shape and having a plurality of marks 74 that extend at spaced intervals along the longitudinal axis of the dilator 70. Associated with each mark each mark 74 is an indication of the diameter of the dilator at the location of the mark 74. This provides and indication of the diameter of an incision after it has been increased via the dilator. In operation, the user inserts the dilator 70 into the incision until the desired expansion of the incision is reached. A telescope can provide an image of the area below the incision showing the mark 74 of the dilator 70 that coincides, for example, with the lower surface of the abdominal wall (not shown) thus providing an indication of the expanded diameter of the incision 11. This permits the user to choose a body 24, trocar or any other surgical instrument that has the diameter measured by the dilator and which is suitable for insertion in incision 11.

Figures 10 and 11 show a tool 71 adapted to indicate the location of an incision to be made for insertion of a surgical instrument. The tool 71 is also adapted to guide the surgical instrument 24 though the incision 11 (see figures 52 to 54).

The tool 71 comprises a rod 73 having an end 75 adapted to receive a surgical instrument. In the arrangement shown, the end 75 of the tool is cup shaped. The surgical instrument may be, for example, a body 24, a trocar as previously described, among others.

Figures 12 to 23 illustrate the method for suturing of an incision using an apparatus 1 according to the first embodiment of the invention. As shown in the figures 12 to 23 an abdominal wall 10 comprises a fat layer 76, a muscle layer 78 and the peritoneum 80 (lining of the inner aspect of the abdominal wall). As previously described, in order to avoid complications and further surgery it is important that the muscle layer 78 be sutured with the peritoneum 80, being

careful to ensure that no organ 18 is caught during the suture procedure . Thus, during suturing of the incision, the gas content in the abdomen must be kept substantially constant so the working and viewing space 20 is maintained. This may be accomplished by obturating the incision to avoid gas discharging from the abdomen during the suturing process.

As shown in figure 12, the body 24 is introduced in the incision 11. The abdominal space 20 is maintained and the site to be sutured may be viewed from within by the telescope 22 which have been inserted in the abdomen via another incision (see figure 1). Also, the risk for puncturing or sewing up an internal organ is greatly reduced.

Referring to figure 12, the body 24 is inserted into the incision 11 at a specific height with respect to, for example, the inner surface of the abdominal wall. The marks 36 on the body 24 can be sighted through the telescope 22, providing a visual indication of the extent of insertion of the body 24 into the incision 11. THe extent of insertion of the body 24 varies according to the thickness of abdominal musculature of the patient. In this particular arrangement the first horizontal mark 36a coincides with the inner lining (peritoneum) 80 of the abdominal wall 10. This arrangement is, for example, for an abdominal wall of a patient of average abdominal musculature. If the patient has a thicker than average musculature the body 24 must be positioned within the incision 11 at a different depth, such as that indicated by another one of the marks 36.

Vertical marks 37 (see for example figures 6 and 7), also sighted through the telescope, indicate the location at which the distal end of the needle 52 perforates the tissue surrounding the body 24. Alternatively, the apparatus 1 according to the second embodiment of the invention or a trocar according to the third embodiment of the invention may be used.

Having adjusted the depth of the body 24 inside the incision 11, a first end 82 of a thread 38 is inserted into the abdomen 16 via the passage 28 of the body 24 (see figure 12 and 13). This is accomplished by the following steps: releasably attaching the thread 38 to the distal end 58 of the needle 52; inserting the distal

end 58 of the needle 52 with the thread 38 into the passage 28 of the body 24; and locating the distal end 58 of the needle 52 inside the abdomen 16, as shown in figure 12. In the abdomen, the thread 38 is released from the distal end 58 of the needle 52. This may be accomplished via a forceps (not shown) which have been introduced inside the abdomen via a port 14 (see figure 1). Also, the first end 82 of the thread 38 may be pulled with the forceps out of the passage 28 of the body 24 and located inside the abdomen 16 (see figure 13) .

Referring to figures 14 and 15, once the first end 82 of the thread 38 is located inside the abdomen 16, the distal end 58 of the needle 52 is extracted from the abdomen 16 and the passage 28. As shown in figure 14, the body 24 is raised permitting to extract the second end 84 of the thread 38 out of the passage 28 of the body 24.

As shown in figure 16, the body 24 is rotated through 180°. As previously explained, the vertical marks 37 indicate when the body has undertaken a 180° rotation. If required the depth of the body 24 within the incision 11 may be adjusted using horizontal marks 36 as a guide, as previously explained. The distal end 58 of the needle 52 is inserted into the abdomen 16 via passage 28 of the body 24 and with help of the forceps (not shown) and the telescope 22 (see figure 1) the first end 82 of thread 38 is mounted on the distal end 58 of the needle 52 (see figure 17). The first end 82 of thread 38 is extracted from the abdomen via the passage 28 of the body 24 by extracting the needle 52 from the abdomen and the passage 28 of the body 24 (see figure 18). As shown in figure 20, subsequently the body 24 is raised to extract the first end 82 of thread 38 from the passage 28.

Referring to figures 21 and 22, in order to close the incision 11 a knot 64 is formed, uniting the first and second ends 82, 84 of the thread 38. Once the body 24 is extracted, first and second ends 82, 84 of the thread 38 are immediately pulled thus closing the incision 11. In this way, gas discharge is avoided and the working and viewing space 20 within the abdomen are maintained. This permits an inspection of the suture line below the abdominal wall using the telescope 22

to ensure no organs have been harmed or sutured onto the inner abdominal surface and/or that the incision 11 has been properly sutured.

Subsequently, as shown in figure 23, the first and second ends 82, 84 of the thread 38 are cut and the upper surface 11 of the abdominal wall 10 is sutured using conventional methods.

Alternatively, if the incision 11 is of a considerable magnitude a plurality of sutures (see figure 24) may be required to close the incision 96 (instead of a single suture as previously described). This is accomplished by rotating the body 24 at different angles during each suturing process.

Figure 24 is a top view of an incision 96 having the body 24 inserted in the incision 96. As shown, three threads 104, 106, 108 have been used to close the incision 96. Each thread 104, 106, 108 comprise first ends 98a, 100a, 102a which have been inserted via a first side of the incision 96 into the abdomen and extracted via a second opposite side of the incision 96 out of the abdomen. Second ends 98b, 100b, 102b of the threads 104, 106, 108 have been located opposite to the first ends 98a, 100a, 102a in accordance to the previously described method.

Referring to figure 25, three threads 104, 106, 108 form sutures 110, 112, 114 that are located at spaced intervals along the length of the incision 96. Sutures 110, 112, 114 are formed by rotating the body 24 and thus guiding the needle to the appropriate location on each side of the incision. Suture 110 is formed by guiding the needle to a location 90b close to the first end of the incision in order to insert the first end 98a of the thread 104 inside the abdomen and then rotating the body 24 an angle such that the first end of the thread 98a can be extracted at a location 90a at the opposite side of the incision 96 and counterpart of the location 90b where the first end 98a of the thread 104 was inserted. This procedure can be repeated a plurality of times in order to obtain a plurality of sutures 110, 112, 114 that are located at spaced intervals along the length of the incision 96.

Figures 26 to 51 illustrate the method for suturing of an incision using a continuous suture having a single threat. The method shown in figures 26 to 51 is similar to method previously described and shown in figures 12 to 23 and similar reference numerals are used to identify similar parts.

The steps as shown in figures 26 to 42 are substantially identical to the steps shown in figures 12 to 17 with reference to the single suture process. In both methods (single suture process and continuous suture process), after inserting the thread 38 into the abdominal cavity at the first suture site the body 24 is rotated and the needle 52 reinserted at the second suture site (see figures 41 and 42).

Subsequently, in the continuous suture process, the thread 38 is hooked onto the needle 52 and the needle 52 is not fully withdrawn from the passage 28 but kept within the passage 28 allowing rotation of the body 24 (see figure 43). The body 24 can then be rotated again through the desired amount to the third suture site (see figure 44). The rotation of the body is monitored from within the abdomen with help of the vertical marks 37. The needle 52 is reinserted to carry the thread 38 back into the abdominal cavity (see figure 45). The needle 52 is retrieved to the passage 28 to allow rotation of the body as explained with reference to figure 43. Once the body 24 is rotated, the needle 52 may be reinserted into the forth suture site to retrieve the thread 38 (see figure 46 and 47). The body 24 is then extracted from the incision 11 (see figure 48) and a knot 64 tied as shown in figures 49 and 50. Figure 51 shows the sutured incision 11.

Referring to figure 43, the needle 52 may comprise a mark 53 which indicates that the distal end of the needle 52 has been fully withdrawn from tissue surrounding the incision 11 but is still located within the passage 28 of the body 24. This arrangement allows rotation of the body 24 (see figures 43 and 44).

This procedure can be repeated a plurality of times in order to obtain a plurality of sutures that are located at spaced intervals along the length of the incision 11 and composed of a single thread 38. In this procedure the continuous sutures can

either be arranged to cross from side to side over the incision or pass around the incision back to the starting point thus making a "purse string" type of suture.

Subsequently, as shown in figures 50 and 51, the first and second ends 82, 84 of the thread 38 are cut and the upper surface 11 of the abdominal wall 10 is sutured using conventional methods.

Figures 52 to 54 illustrate a method of using the tool 71 shown in Figures 10 and 11 to guide a body 24 into an incision 11.An example of a procedure in which the tool 71 might be used is in the repair of an established port site hernia. Initially, a laparoscope is inserted at a location (not shown) away from the port side hernia to be closed. At another location (not shown) a port (for example, a 5mm port) is inserted in the abdominal wall. The tool 71 is inserted in the port and pushed into the hernia (see figure 52). The end 75 of the tool 71 can be felt from the exterior side of the abdominal wall 10. At that location, an incision 11 is made in the abdominal wall 10 in which the surgical instrument, for example, body 24 is inserted (see figure 53). The surgical instrument is received by the end 75 of the tool 71. The surgical instrument is then pushed into the abdomen guided by the tool 71. This procedure allows for the hernia sack to be pushed back into the abdomen (see figure 54). At this stage the hernia site may be sutured using body 24 and any of the previously described suture procedures.

It is evident that the present invention provides an efficient and effective procedure for suturing incisions. As explained , the inclusion of passage(s) 28 and mark(s) 36, 37 facilitates accurate suturing of incisions. Also, the invention assists that that muscle layers are sutured instead than fat layers. If thick layers of fat are sutured, the tightening of the threat 38 may divide vessels in the fat layer causing bleeding into the patient's tissues. According to the present invention, for example, it is possible to accurately suture 1.5 cm of muscle at the level of the peritoneal lining with minimal suturing of the fat layer.

Moreover, body 24 or, for example, a trocar comprising passages 28, 29 and 31 and marks 36 and 37 may be used to suture port sites having diameters of

any size. In very large port sites, the air could be maintained within the abdomen by suturing incision 11 snugly up to the trocar. The ability to suture large ports may be useful for extracting large specimens, such as gallstones or pieces of excised colon, through large ports. Currently, it is necessary to make a separate incision in the abdominal wall only to remove such specimens.

Modifications and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

Further, it should be appreciated that the scope of the invention is not limited to the scope of the embodiments disclosed. By way of example, the apparatus and method according to the invention may be suitable to suture any type of incision in human or animal bodies.

Throughout the specification and claims, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

The Claims Defining the Invention are as Follows:

1. A surgical device for guiding a needle during suturing of an incision comprising a body for insertion in the incision having a first passage to conduct an end of the needle below a location surrounding the incision, wherein a distal portion of the body comprises means for indicating the location to which the needle will be conducted.

2. A surgical device according to claim 1 wherein the indicating means may comprise a marking on the distal portion.

3. A surgical device according to any of the preceding claims wherein the location is adjacent to the marking.

4. A surgical device according to any of the preceding claims wherein the first passage traverses obliquely the body.

5. A surgical device according to any of the preceding claims wherein the first passage traverses the body at an angle of about 30^{o} with respect to a side wall of the body.

6. A surgical device according to any of the preceding claims wherein the indicating means may comprise a first mark for providing a visual indication of a specific depth of the body within the incision.

7. A surgical device according to any of the preceding claims wherein the indicating means may comprise a second mark for providing a visual indication of an angular rotation of the body thereby providing an indication of the location to which the end of the needle will be conducted.

8. A surgical device according to any one of claims 6 and 7 wherein there may be a series of first marks in spaced apart relation.

9. A surgical device according to any of claims 7 and 8 wherein may be two opposed second marks.

10. A surgical device according to claim 9 wherein each of the opposed second marks extend from the first passage to a distal end of the body.

11. A surgical device according to any of the preceding claims wherein the distal end is configured for entry into the incision.

12. A surgical device according to claim 11 wherein the distal end is of tapered configuration.

13. A surgical device according to any of the preceding claims wherein the body is adapted to sealingly engage the incision.

14. A surgical device according to any of the preceding claims the body further comprising a second passage.

15. A surgical device according to claim 14 wherein the second passage traverses obliquely the body at a second angle relative to the longitudinal axis of the body,

16. A surgical device according to claim 15 wherein the second angle being different than a first angle at which the first passage traverses obliquely the body.

17. A surgical device according to any of the preceding claims wherein the body comprises three or more passages, each of the three or more passages traversing obliquely the body at angles relatively to the longitudinal axis of the body.

18. A surgical device according to claim 17 wherein the angles being different from each other.

19. A surgical device according to any one of 14 to18 claims wherein the passages are arranged to conduct the end of the needle to a same location relative to the incision.

20. A surgical device according to claim 19 wherein the same location is located 1.5 cm radially outwards from the marking

21. A surgical device according to any of the preceding claims wherein the body comprises transparent material.

22. A surgical device according to any of the preceding claims wherein the body is defined by a trocar.

23. A surgical device for guiding a needle during suturing of an incision comprising a body for insertion in the incision having a plurality of passages to conduct an end of the needle below a location surrounding the incision, wherein a distal portion of the body comprises means for indicating the location to which the needle will be conducted.

24. A surgical device according to claim 23 wherein the plurality of passage traverses obliquely the body at angles relatively to the longitudinal axis of the body.

25. A surgical device according to claim 24 wherein the angles being different with respect to each other.

26. A dilator for determining the diameter of an incision, the dilator comprising at least one mark indicating the diameter of the dilator at the location of the at least one mark.

27. A tool for guiding a surgical instrument with respect a biological cavity, the tool comprising at least one end adapted to receive the surgical instrument.

28. A method for suturing an incision in a biological cavity comprising the steps of:

obturating the incision to avoid gas discharge from the biological cavity; and

suturing the incision.

29. A method for suturing an incision in a biological cavity comprising the steps of:

inserting a body in the incision having at least one first passage to conduct a first end of a thread to a location below the incision; the body being inserted into the incision until at least one first mark on the body reaches a location of the incision;

inserting a first end of a thread inside the biological cavity through the at least one first passage;

extracting a second end of the thread from the at least one passage;

rotating the body around its longitudinal axis until at least one second mark on the body reaches a location around the incision;

extracting the first end of the thread outside of the biological cavity through the at least one first passage;

extracting the body from the incision;

uniting the first end of the thread with a second end of the thread for closing of the incision.

30. A method according to claim 29 wherein the previous steps are repeated a plurality of times for finishing to complete closure of the incision using at least one thread.

31. A method according to any one of claims 29 and 30 the first end of the thread is inserted into the biological cavity attached to a distal end of a needle.

32. A method according to claim 31 wherein the distal end of the needle comprises fastening means to releasably attach a thread.

33. A method according to claim 32 wherein the fastening means to releasably attach a thread comprise at least one indentation having at least one extension extending into the body of the needle onto which the thread is mounted.

34. A method according to any one of claims 31 to 33 wherein, the first end of the thread is removed from the distal end of the needle.

35. A method according to any one of claims 31 to 34 the distal end of the needle is extracted from the at least one first passage.

36. A method according to any one of claims 31 to 35 the distal end of the needle is extracted from incision but kept within the passage of the body so as to allow rotation of the body.

37. A method according to any one of claims 29 to 36 further comprising the steps of raising the body to extract a second end of the thread from the at least one passage.

38. A method according to claim 37 the body is rotated 180 degrees around its longitudinal axis.

39. A method according to any one of claims 29 to 38wherein the first end of the thread is extracted from the biological cavity through the at least one first passage via the distal end of the needle.

40. A method according to any one of claims 29 to 39 further comprising the steps of inserting a telescope into the biological cavity for inspection inside the cavity.

41. A method according to claim 40 wherein the telescope is inserted inside the body for inspection inside the biological cavity.

42. A method according to any one of claims 31 to 41, the method further comprises inserting a forceps into the biological cavity for either removing the thread from the needle or hooking the thread to the needle.

43. A method according to claim 42 the first end of the thread is released from the distal end of the needle via the forceps.

44. A method according to any one of claims 42 and 43 the first end of the thread is mounted on the distal end of the needle via the forceps.

45. A method according to any one of claims 29 to 44 the method further comprises delivering gas into the biological cavity.

46. A method according to any one of claims 29 to 45 wherein the method is performed during laparoscopic surgery.

47. A method according to any one of claims 29 to 46 wherein the method is performed on a port site incision.

48. A method according to any one of claims 29 to 47 wherein the suturing comprises suturing the muscle layer and the peritoneum of the abdomen.

49. A method according to any one of claims 29 to 48 the method further comprises the step of selecting the diameter of the body by use of a dilator.

50. A method according to claim 49 the dilator is a graded dilator.

51. A method according to any one of claims 29 to 50 the body is defined by a trocar.

52. A method for suturing an incision in a biological cavity comprising the steps of

inserting a body in the incision having at least one first passage to conduct a first end of a thread to a location below the incision;

inserting a first end of a thread inside the biological cavity through the at least one first passage;

extracting a second end of the thread from the at least one passage;

rotating the body around its longitudinal axis until at least one second mark on the body reaches a location around the incision;

extracting the first end of the thread outside of the biological cavity through the at least one first passage;

extracting the body from the incision;

uniting the first end of the thread with a second end of the thread for closing of the incision.

53. A method for guiding at least one portion of a surgical instrument into a biological cavity, the method comprising:

inserting a guide having an end adapted to receive at least one end of the surgical instrument;

contacting the end of the guide against a location of a wall of the biological cavity;

making an incision at the location;

inserting the at least one end of the surgical instrument in the incision;

contacting the end of the guide against the at least one end of the surgical instrument; and

inserting the at least one portion of the surgical instrument in the cavity through the incision with assistance of the guide.

54. A surgical device for guiding a needle during suturing of an incision substantially as herein described with reference to the accompanying drawings.

55. A dilator for determining the diameter of an incision substantially as herein described with reference to the accompanying drawings.

56. A tool for guiding a surgical instrument with respect a biological cavity substantially as herein described with reference to the accompanying drawings.

57. A method for suturing an incision in a biological cavity substantially as herein described with reference to the accompanying drawings.

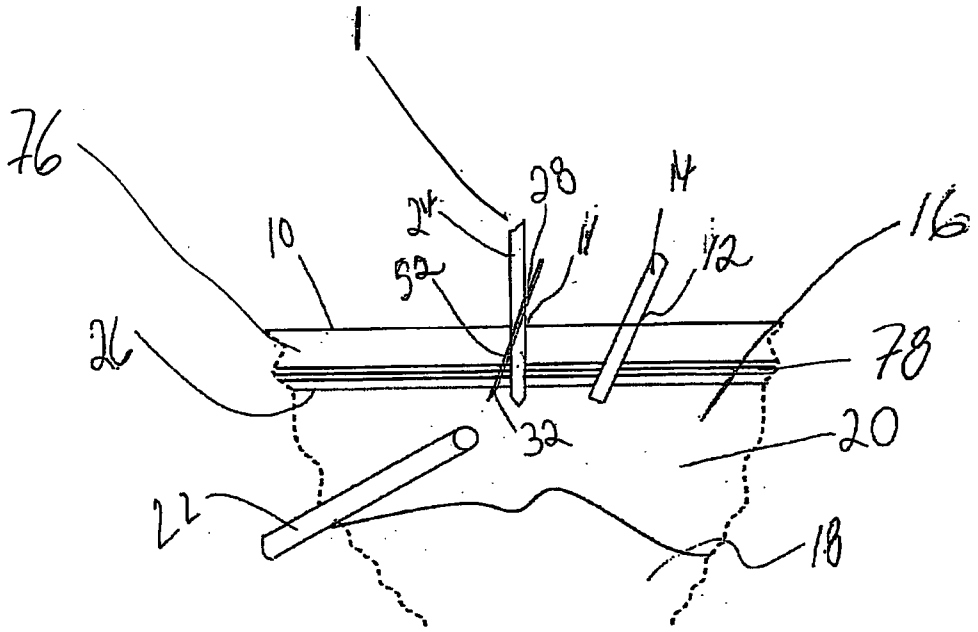

Fig. 1

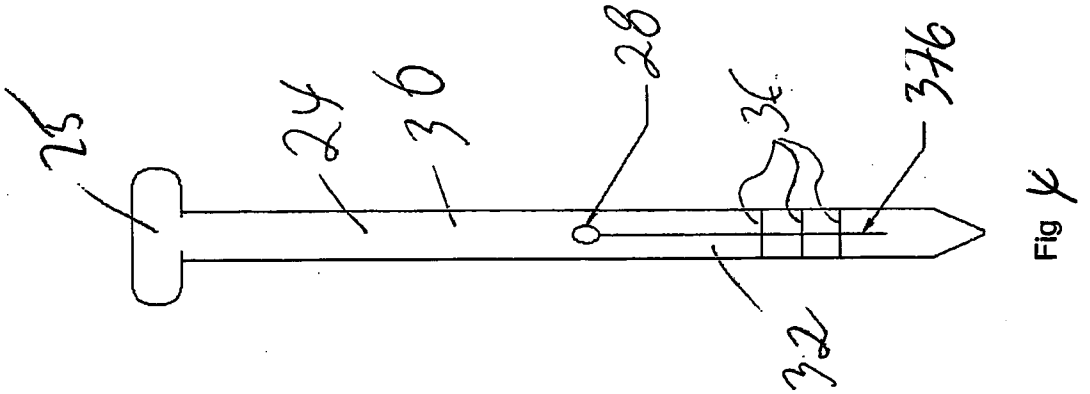

Fig 4

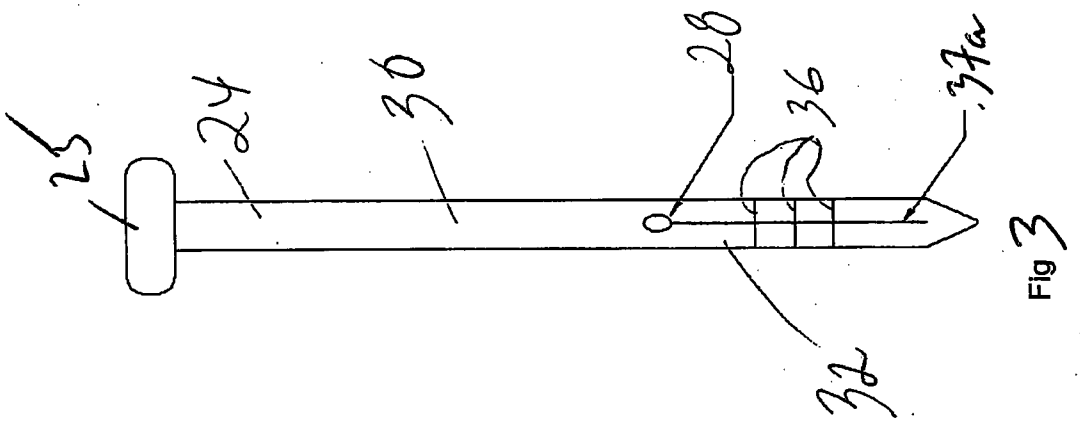

Fig 3

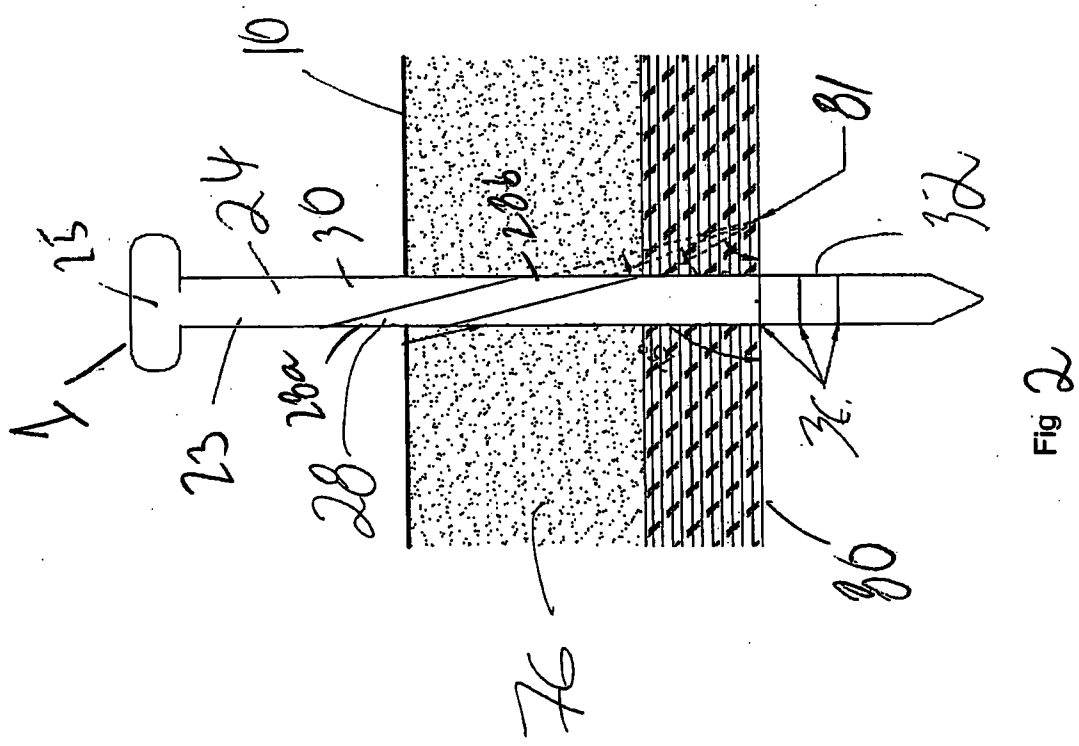

Fig 2

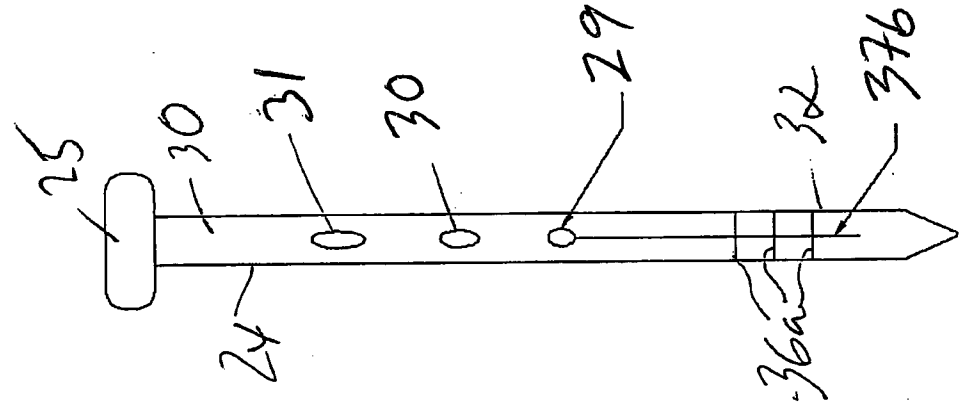

Fig 7

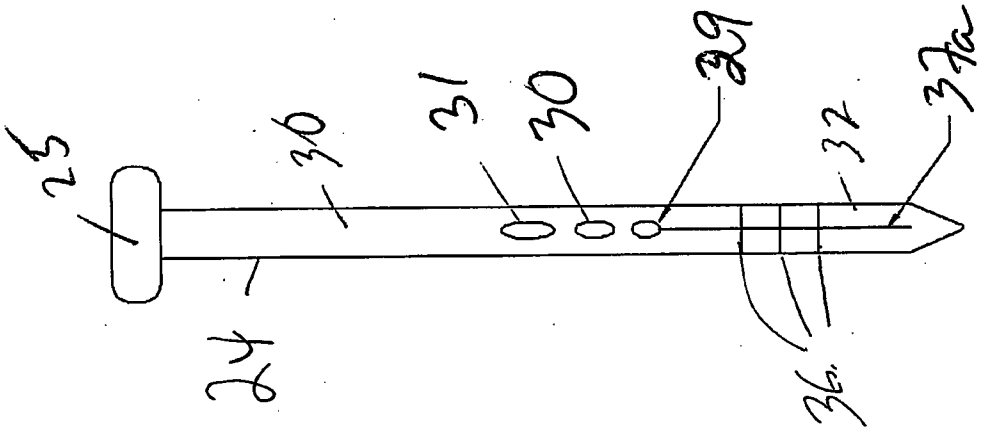

Fig 6

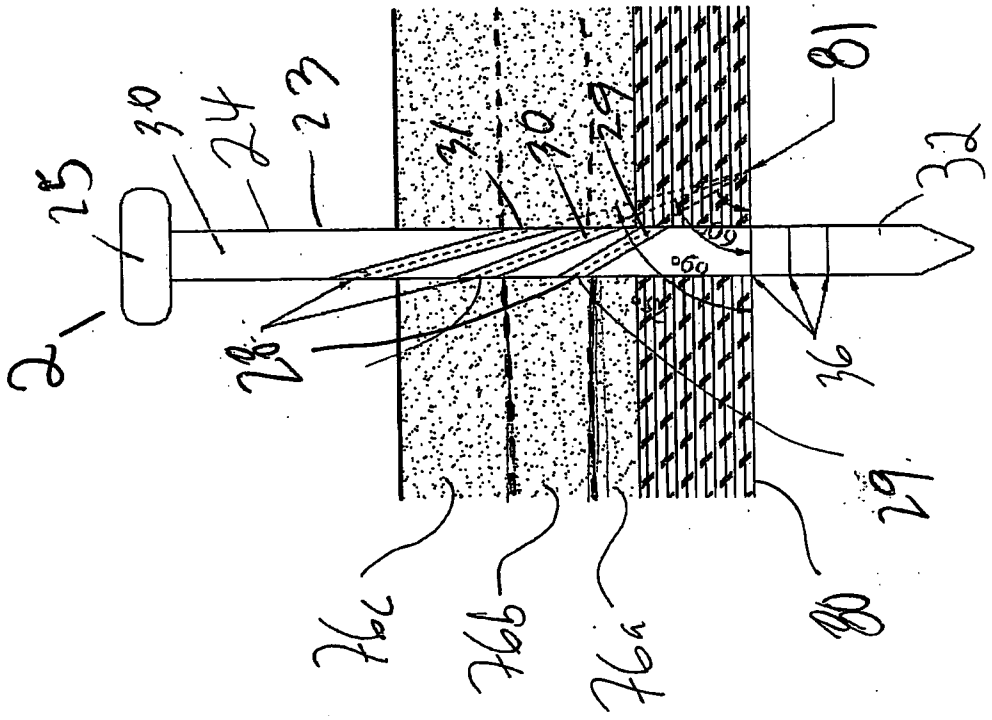

Fig 5

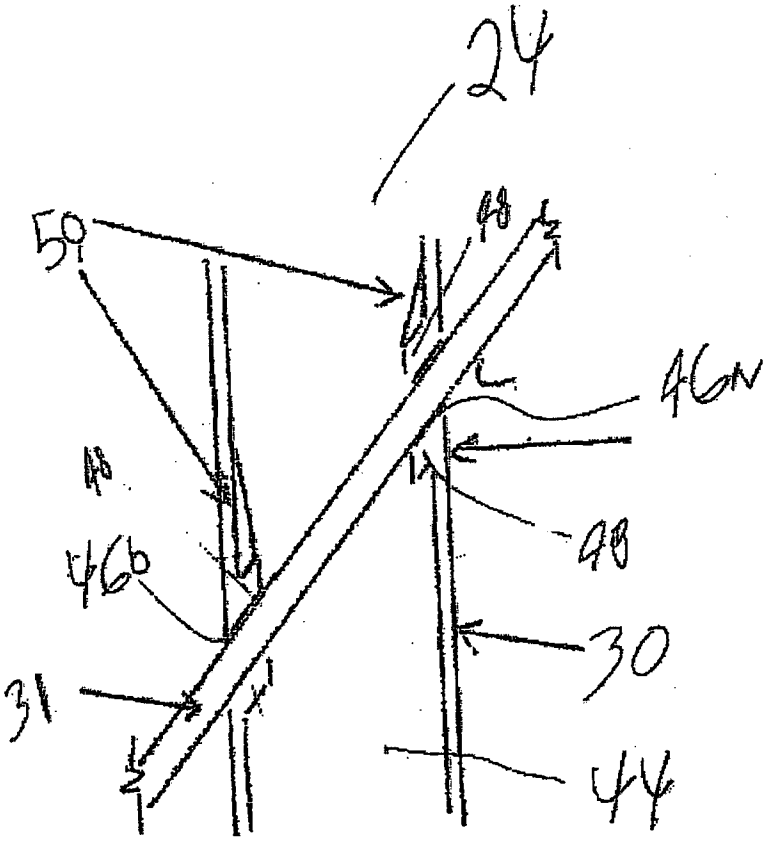

FIG8

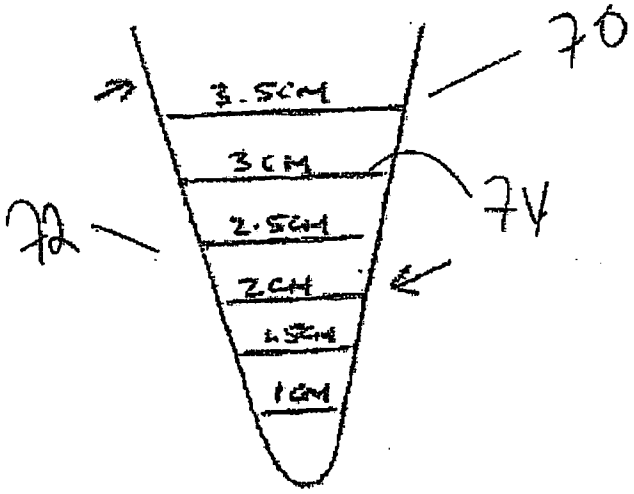

FIG9

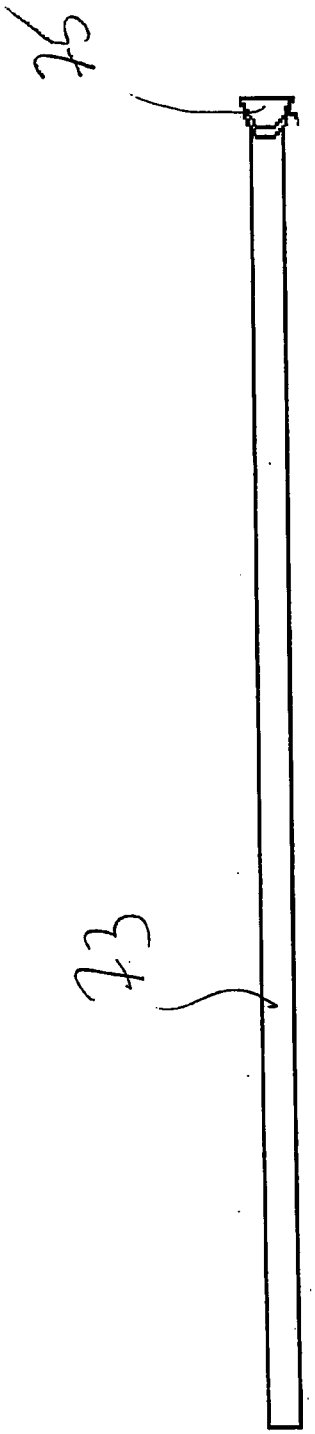

Fig. 10

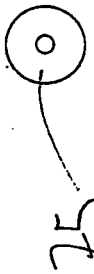

Fig 11

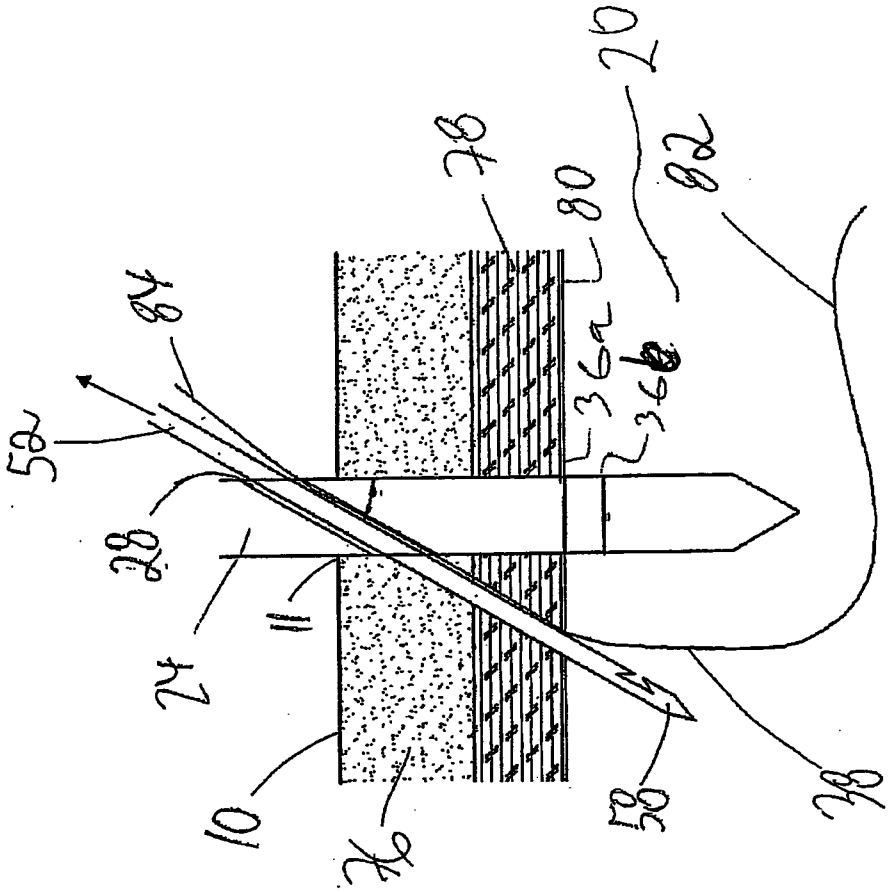
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Fig. 13

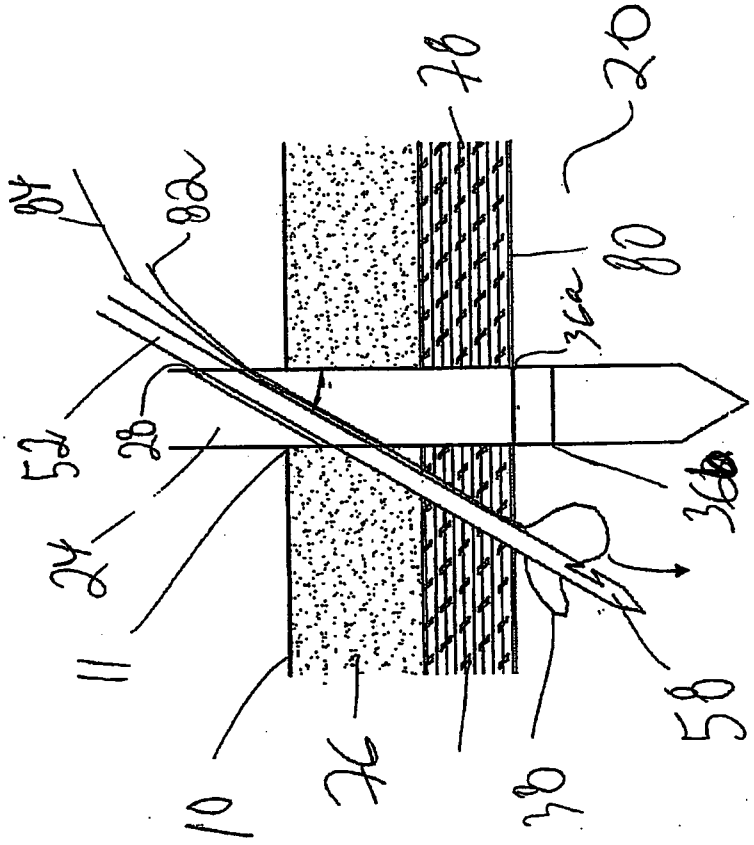
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Fig. 12

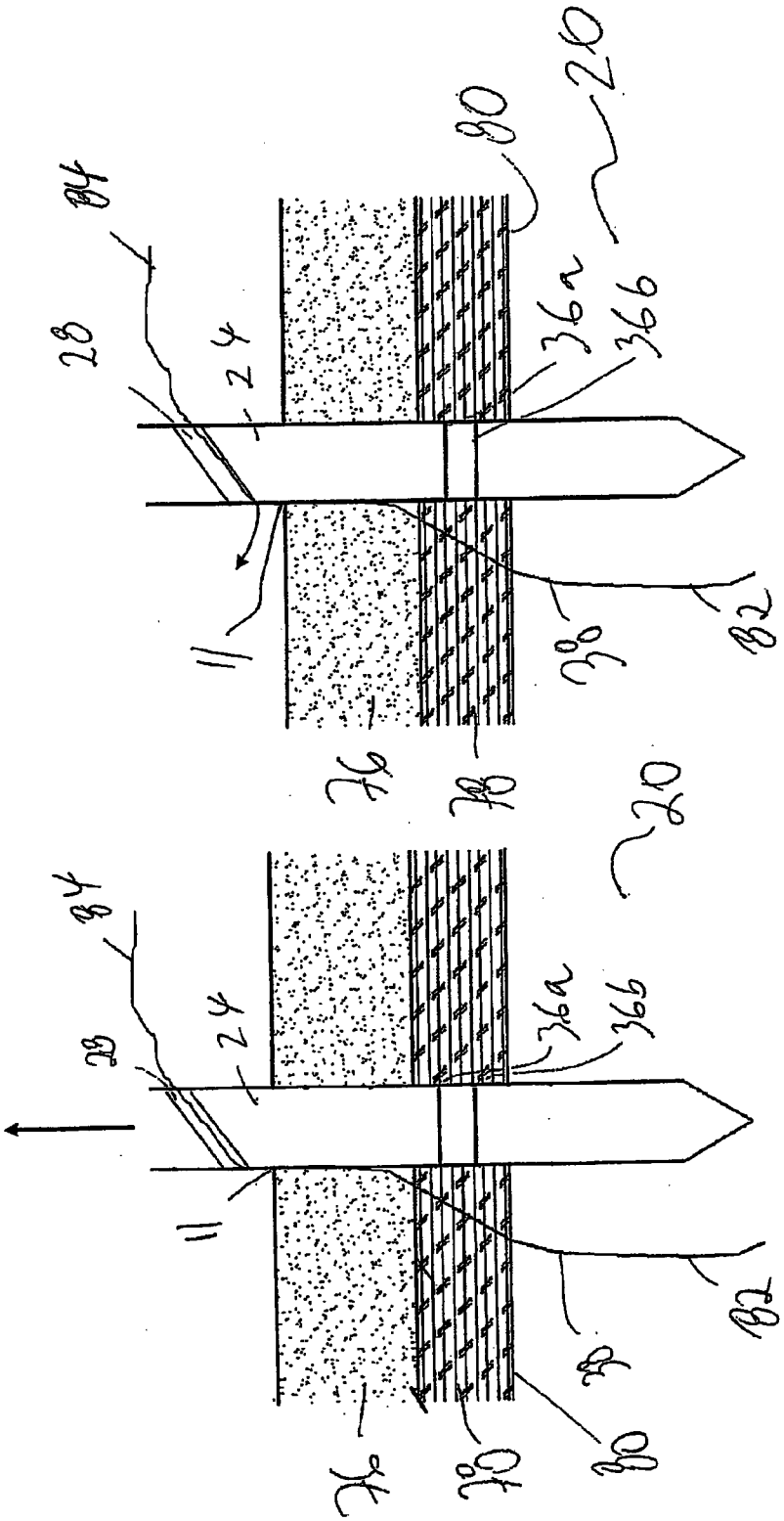
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Fig. 1A

Fig. 1B

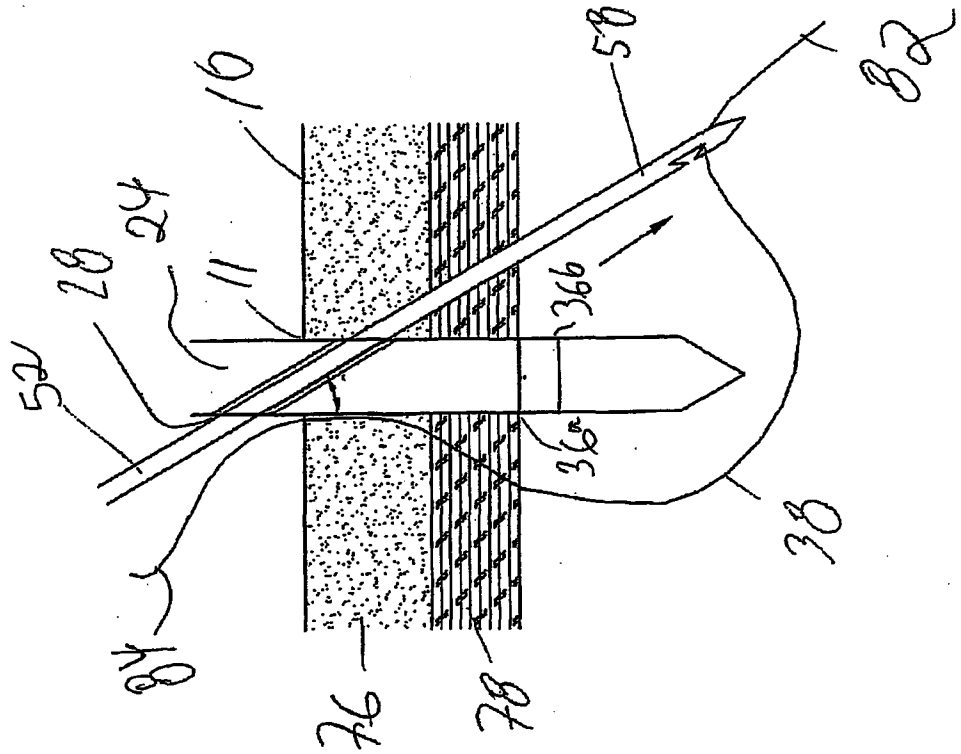
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FIG. 17

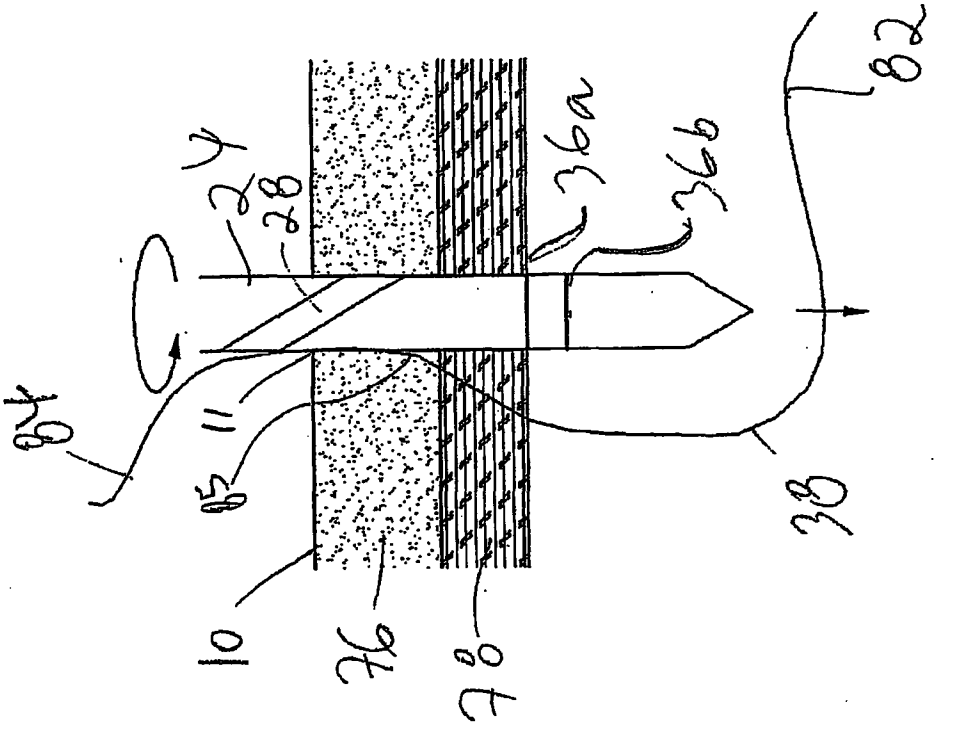
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FIG. 16

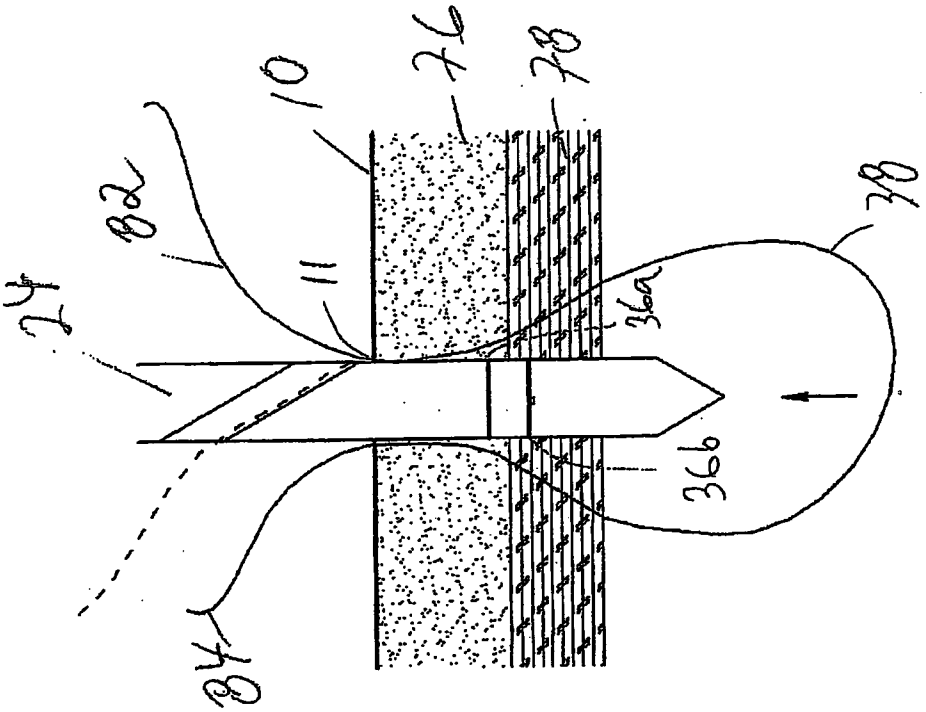

FIG. 17

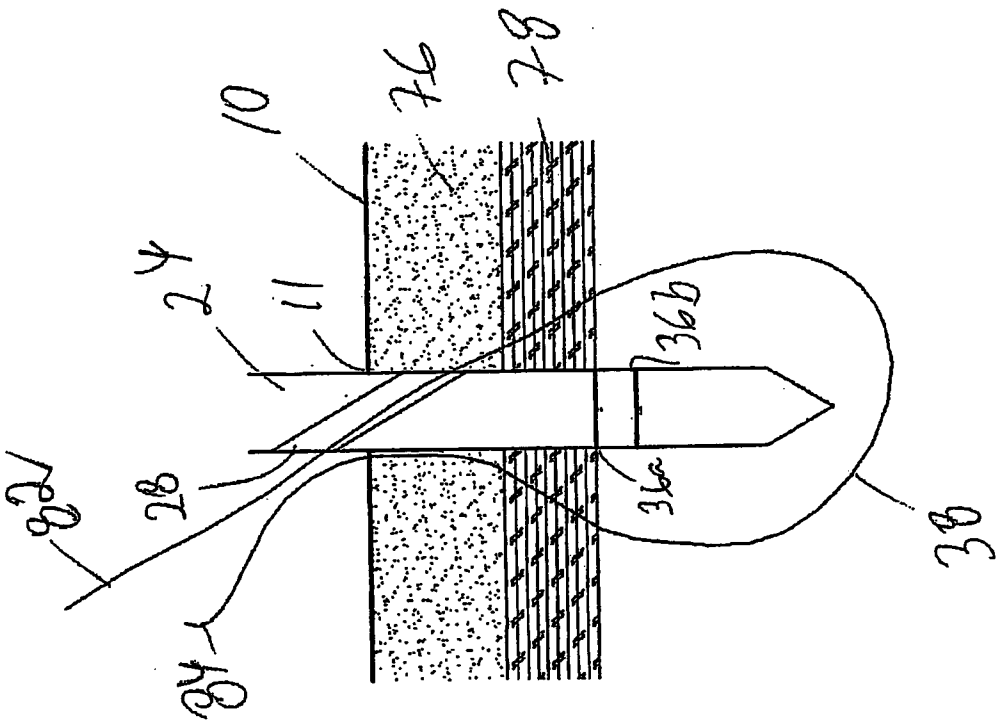

FIG. 18

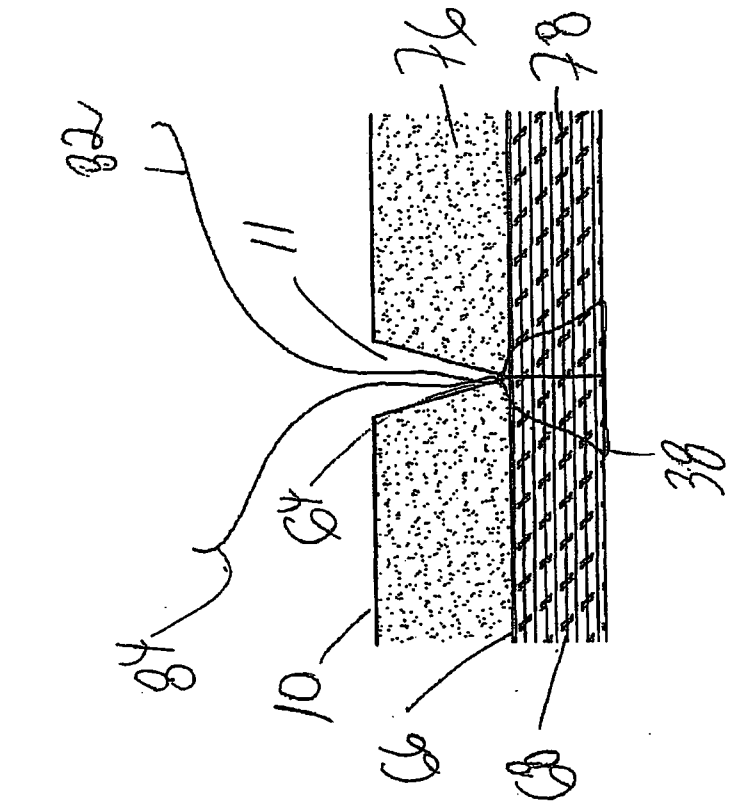

FIG. 21

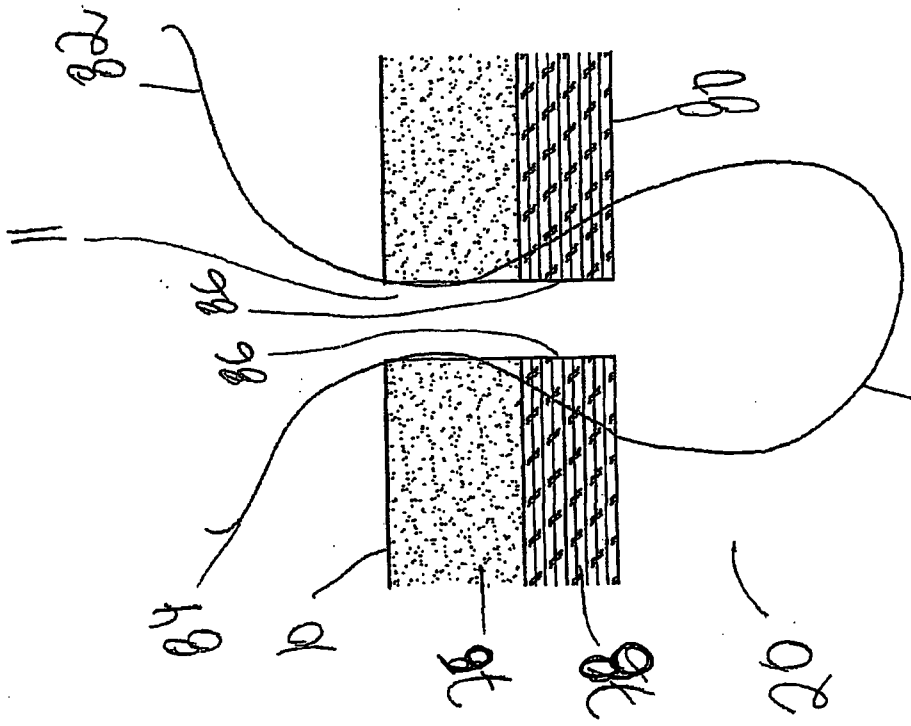

FIG. 20

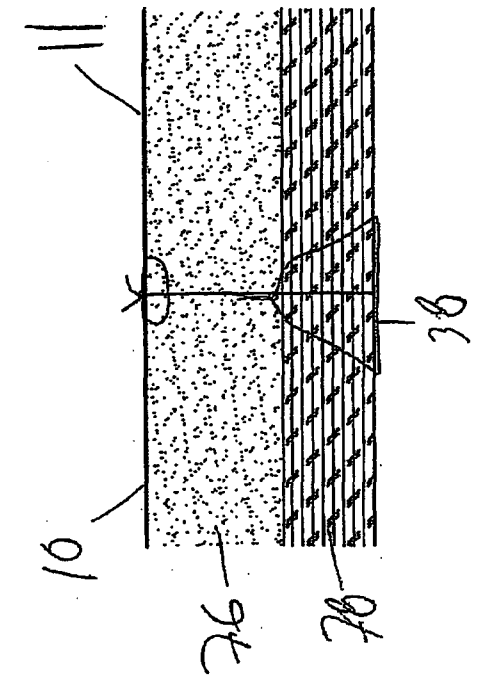

Fig. 23

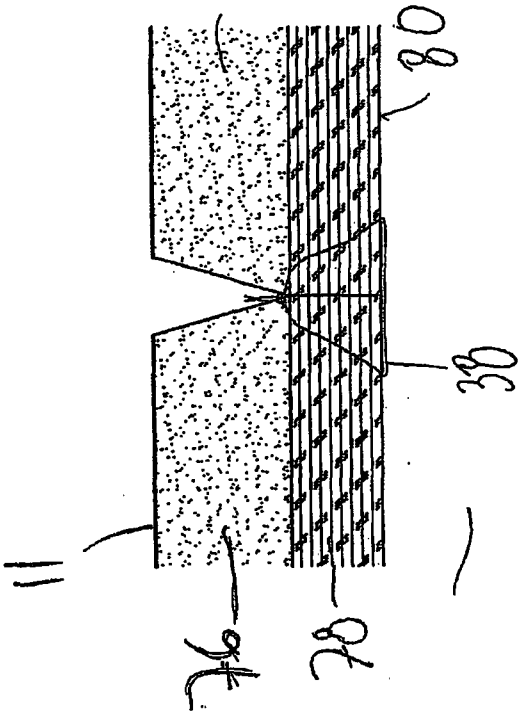

Fig. 22

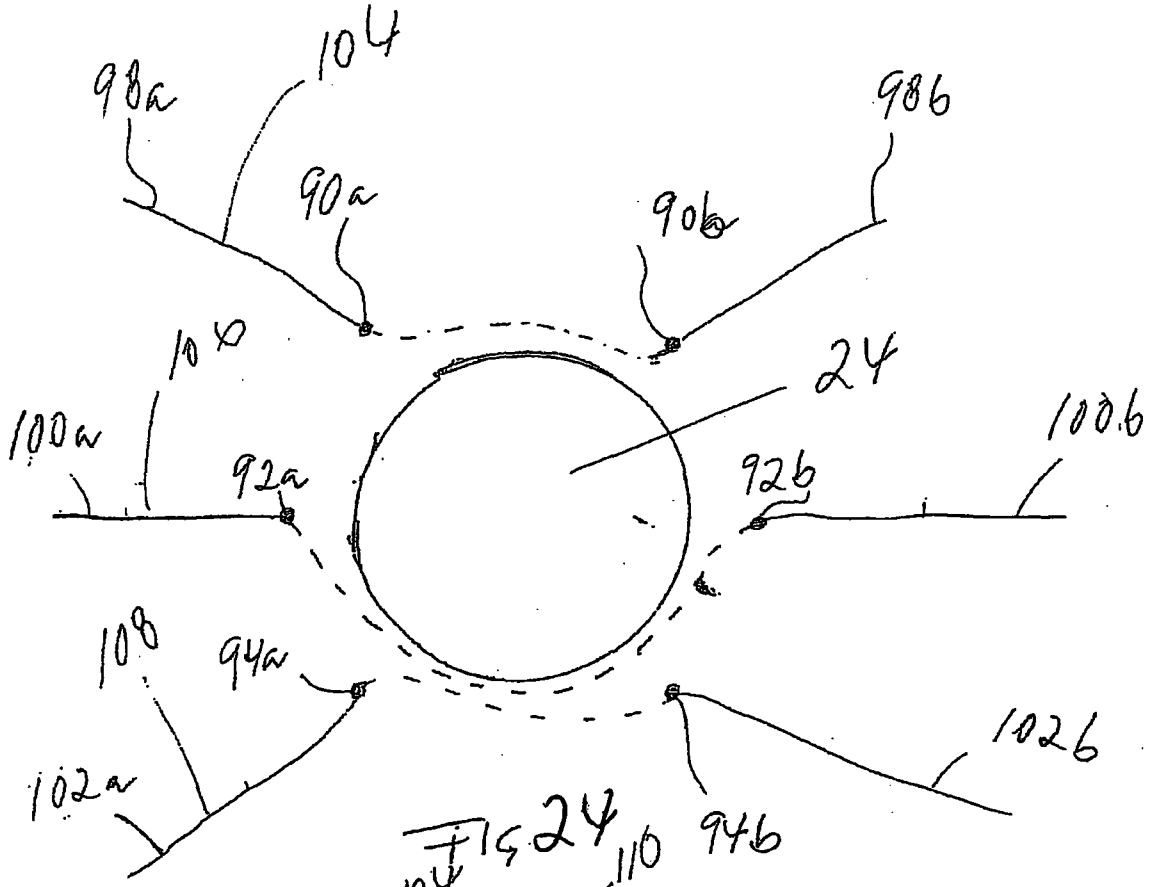
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Fig 24

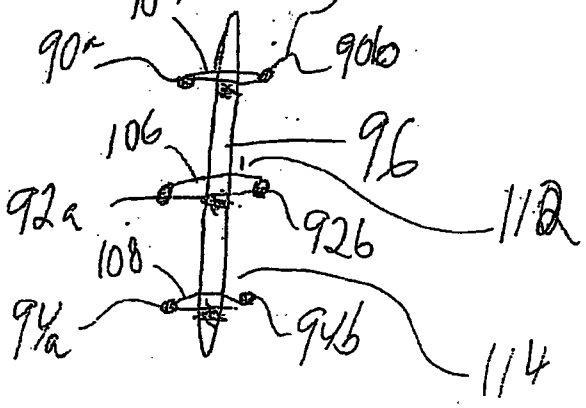
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Fig. 25

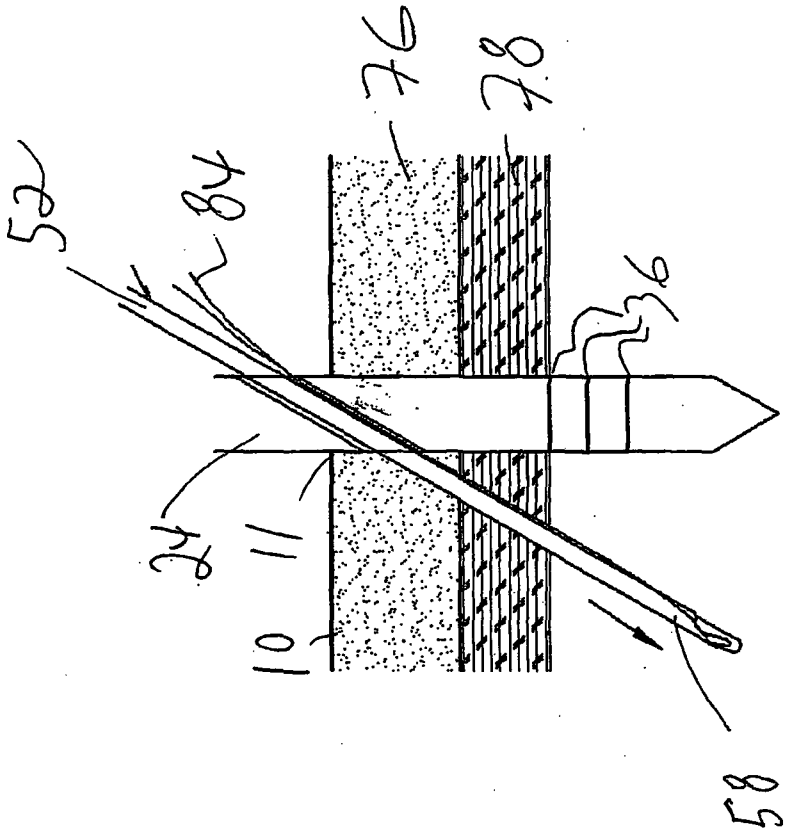

FIG. 27

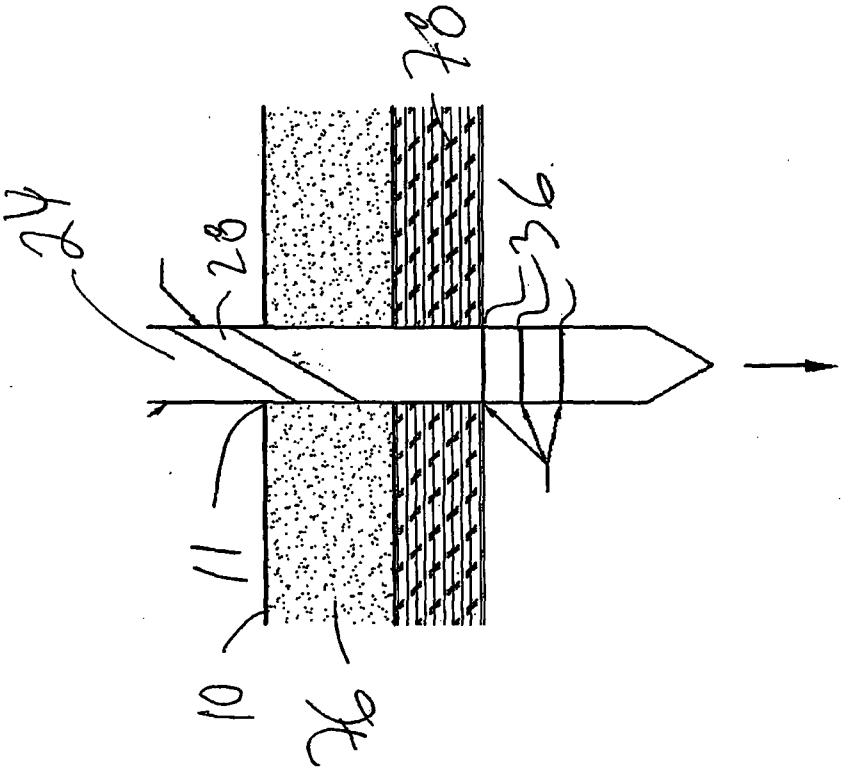

FIG. 26

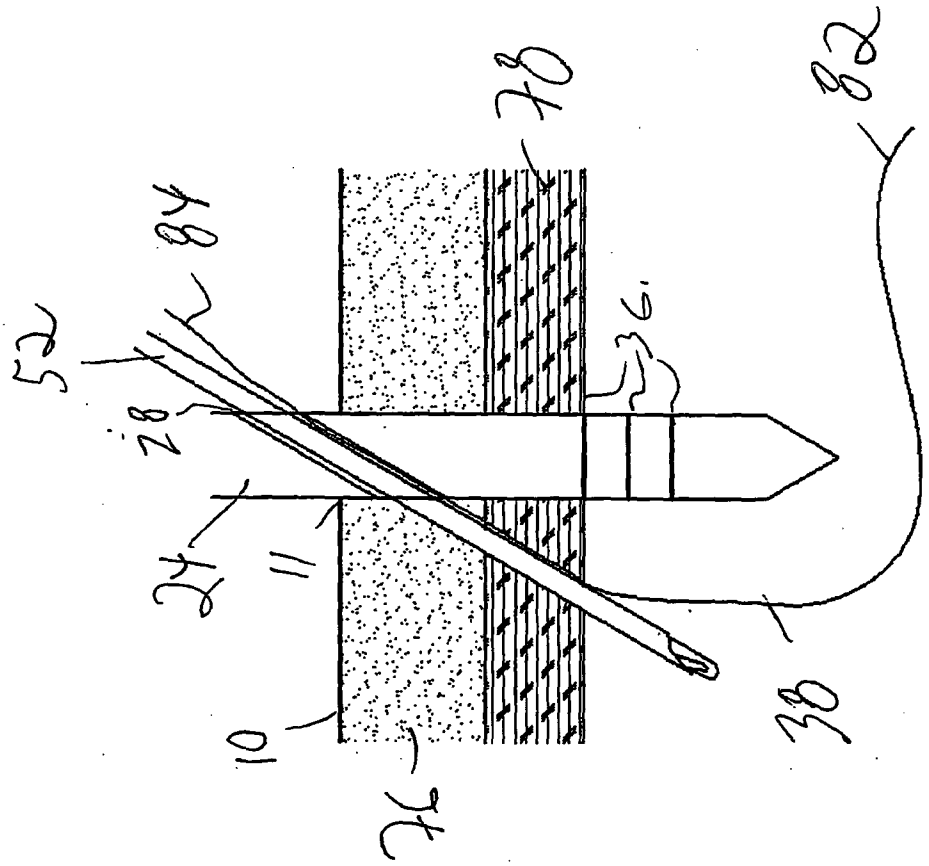

FIG 29

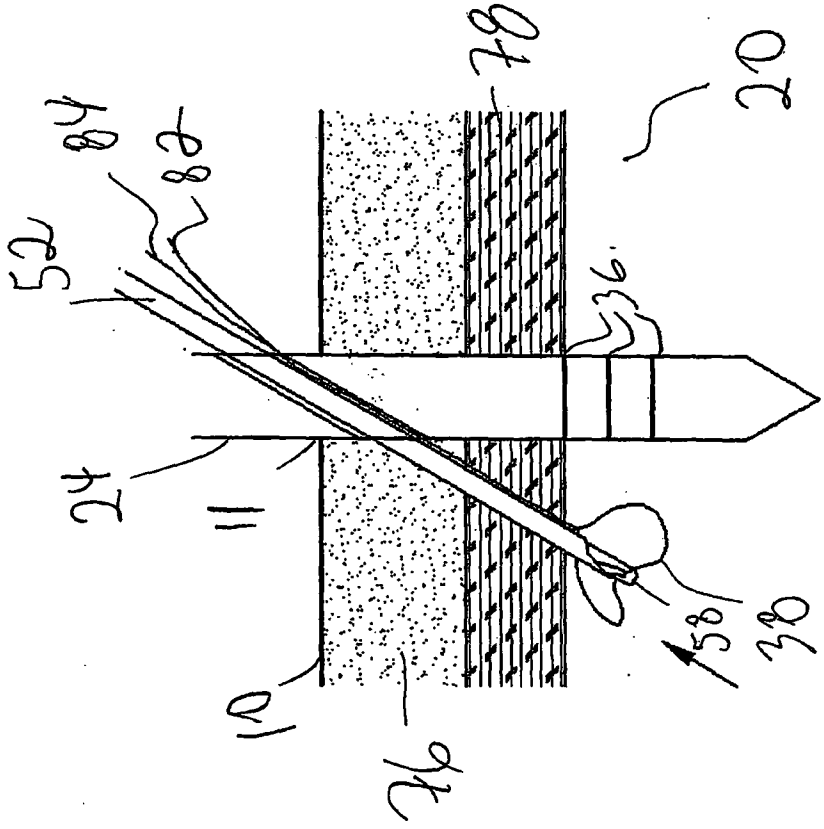

FIG 28

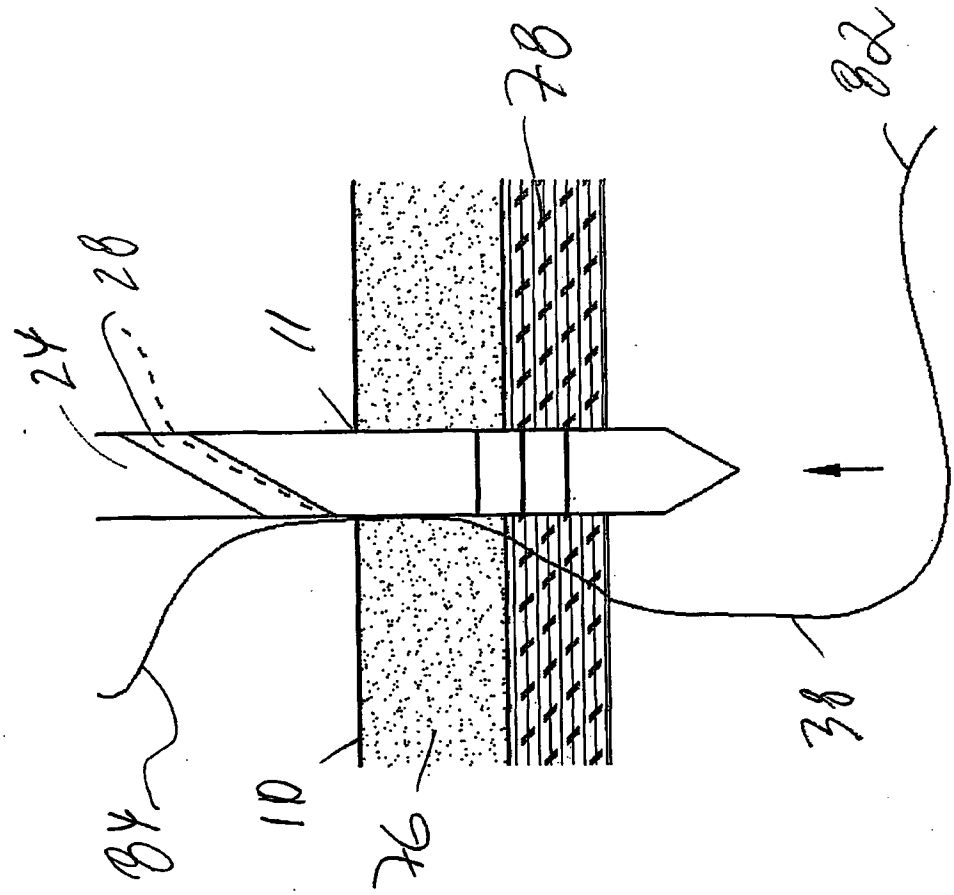

Fig. 4D

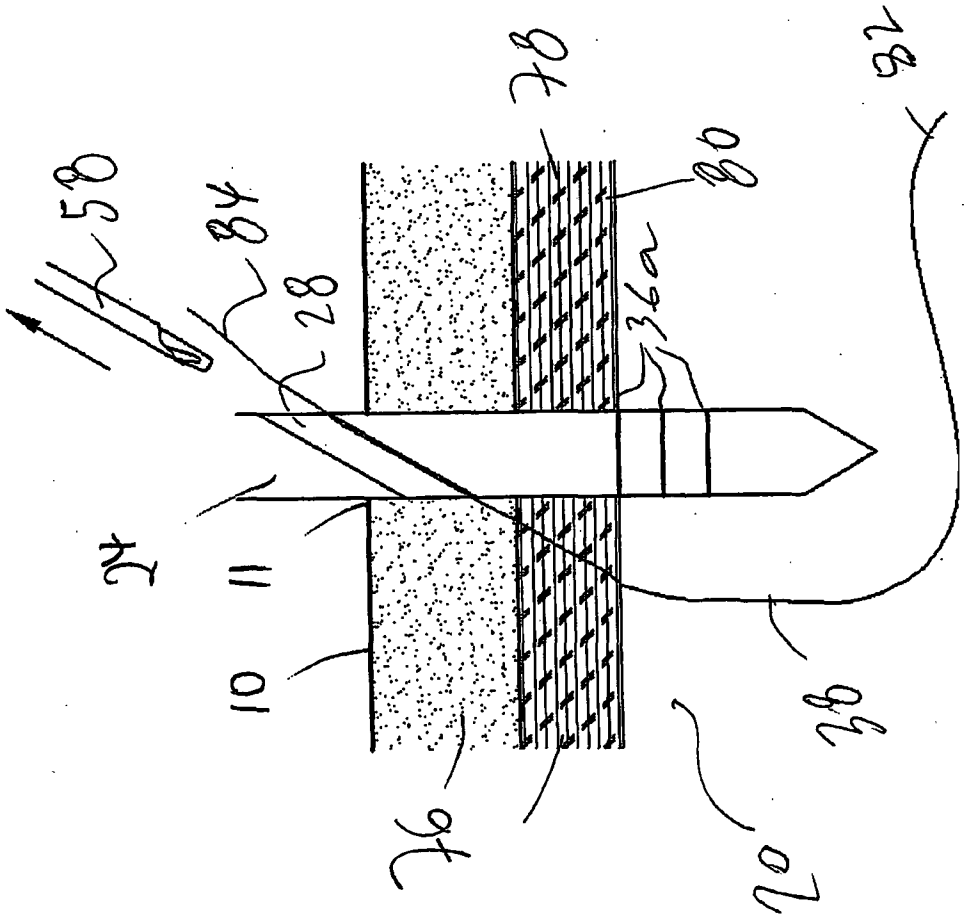

Fig. 4E

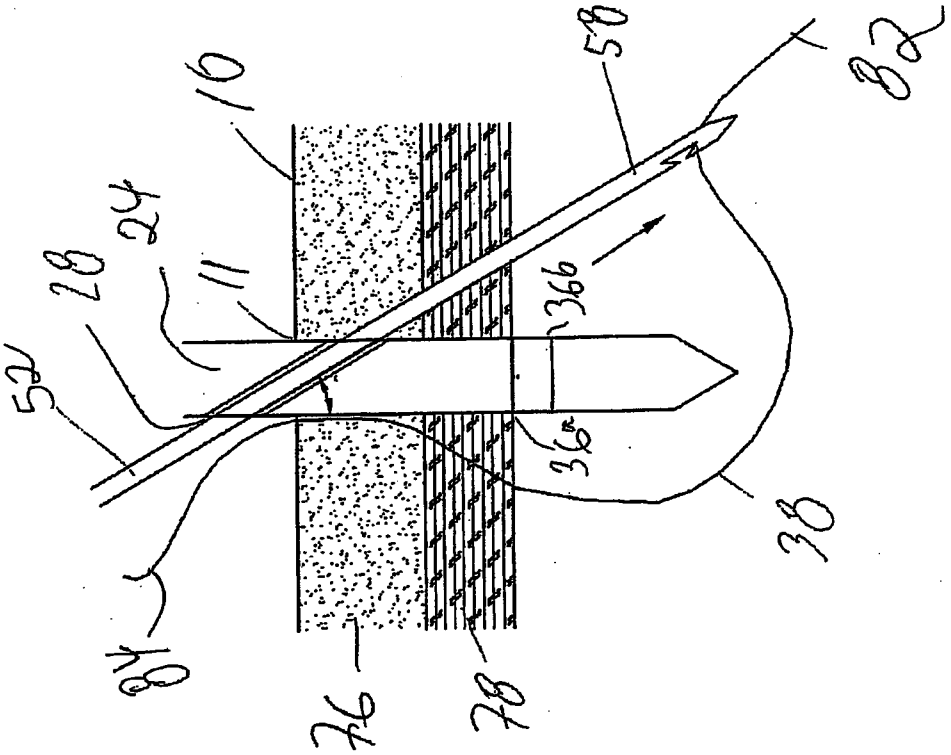
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FIG. 17

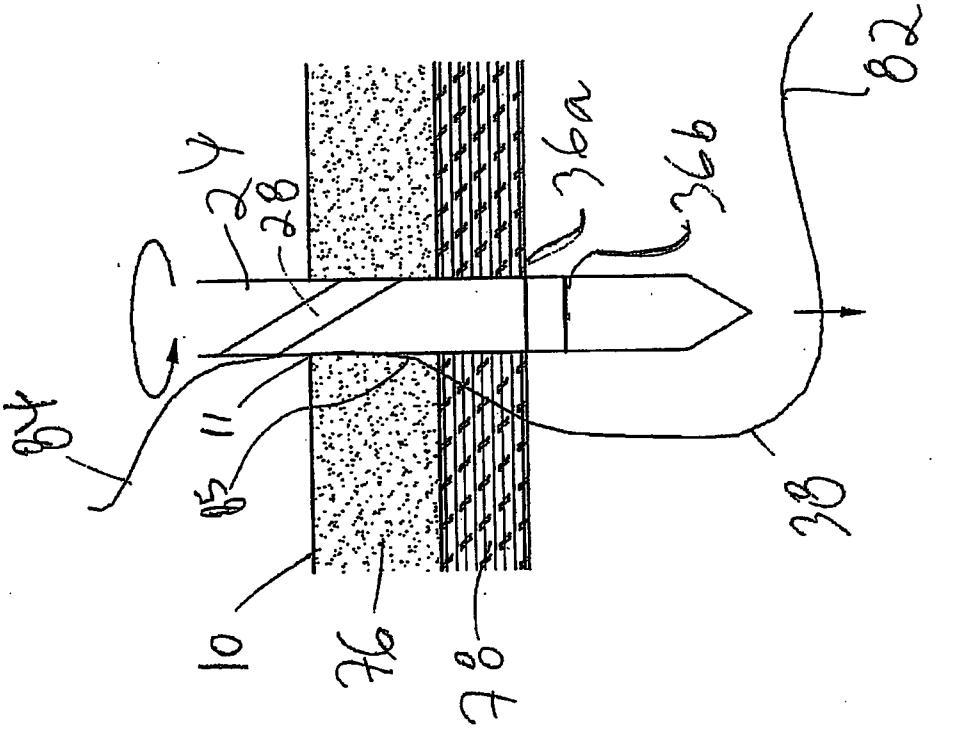
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FIG. 16

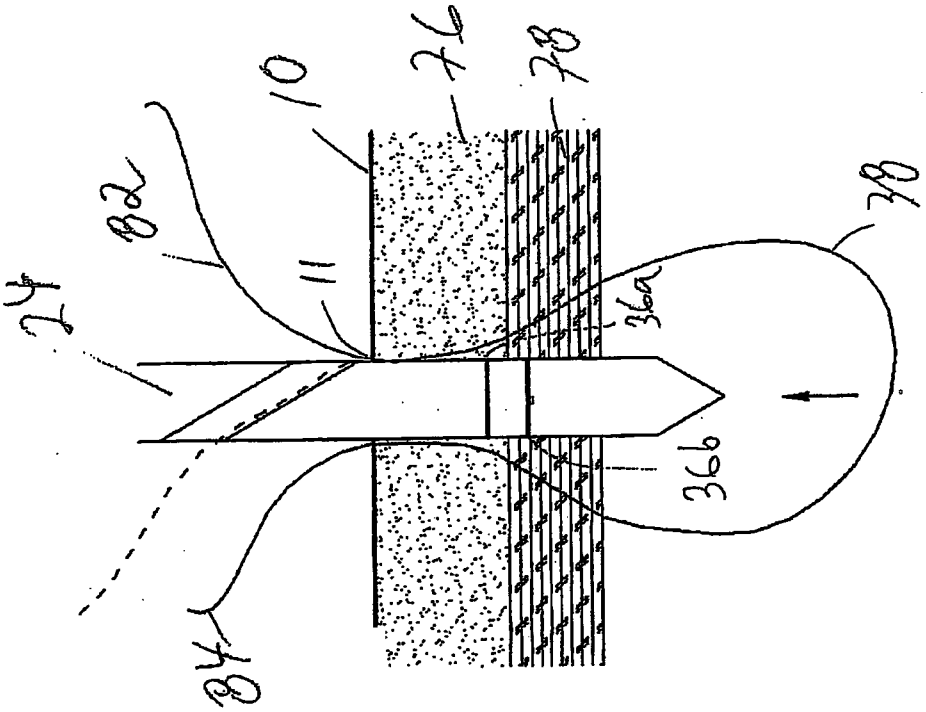

Fig. 19

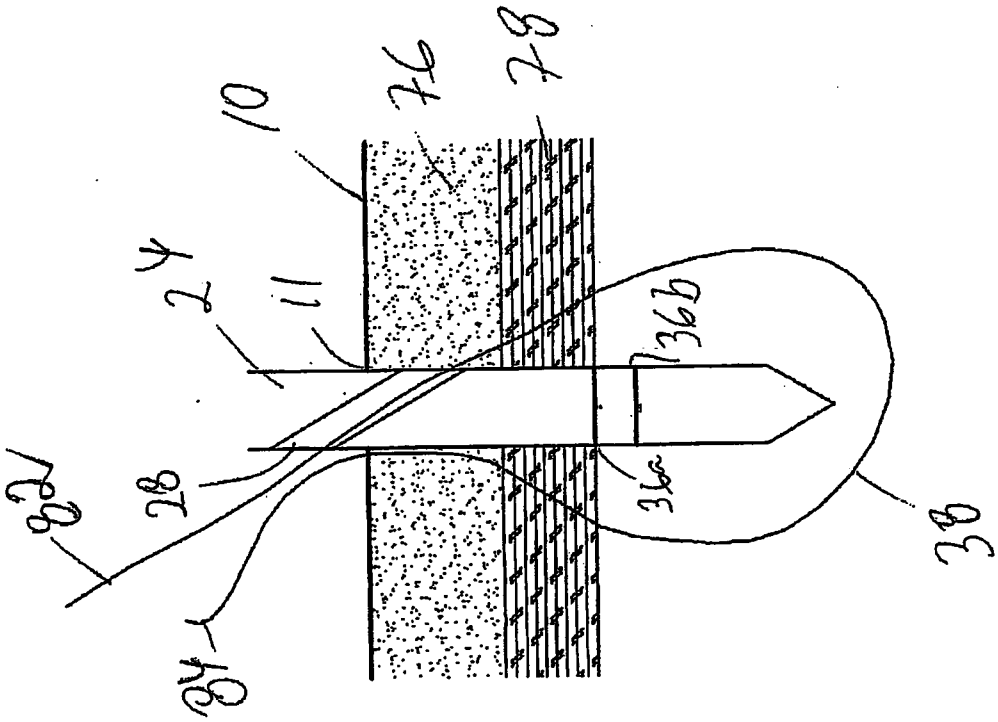

Fig. 18

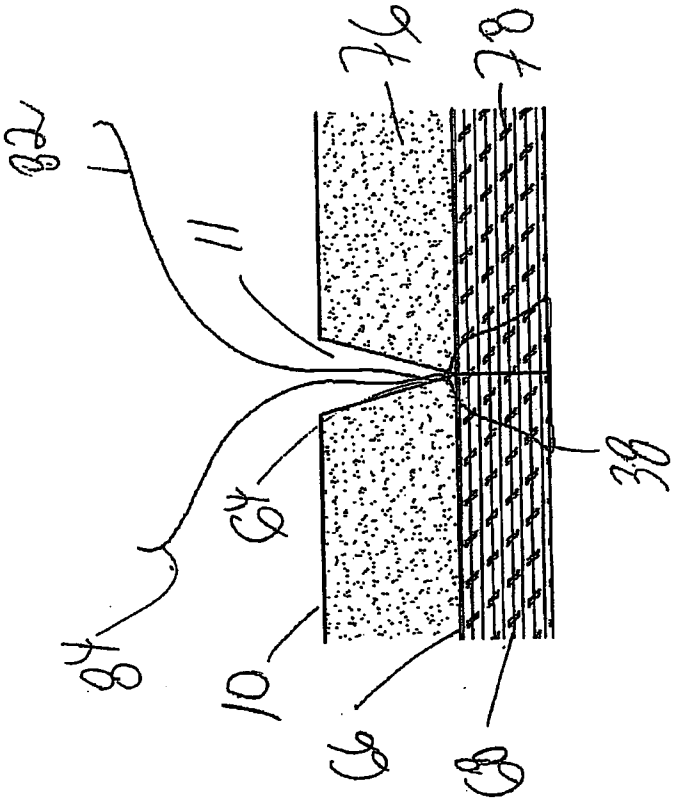

FIG. 21

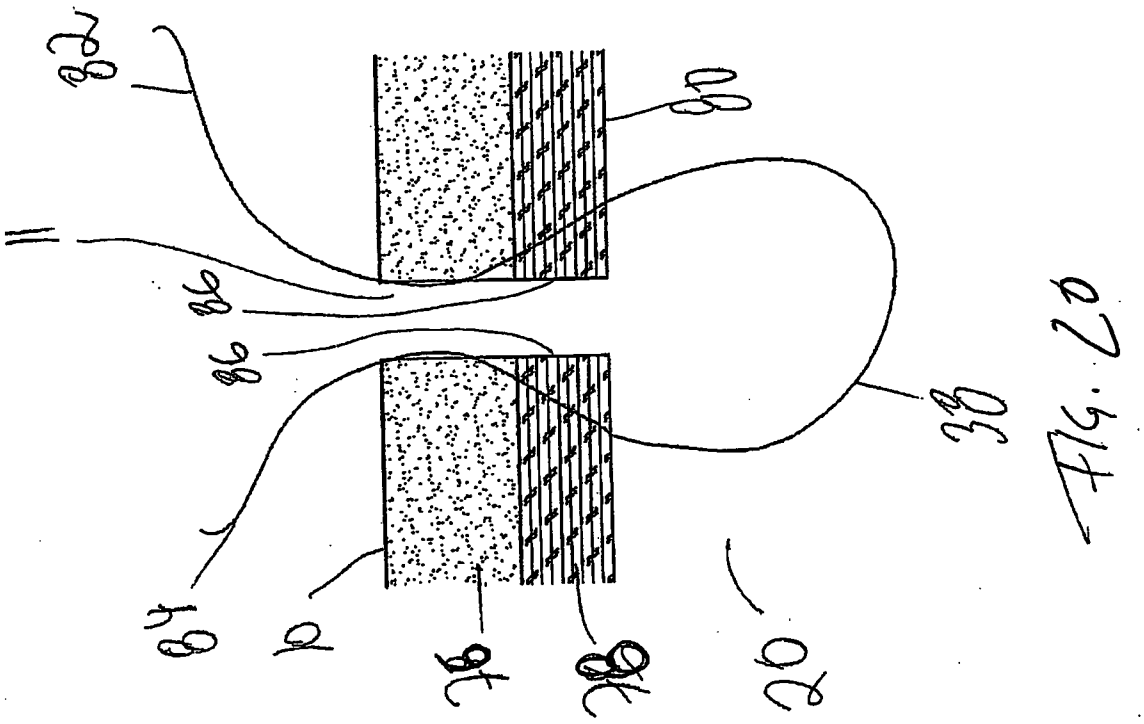

FIG. 20

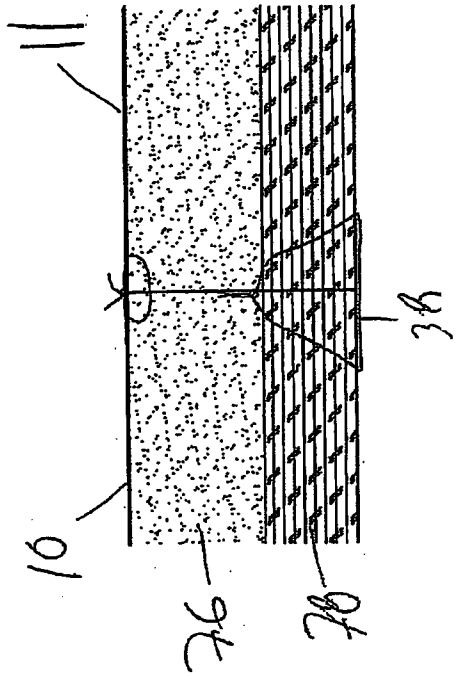

FIG. 23

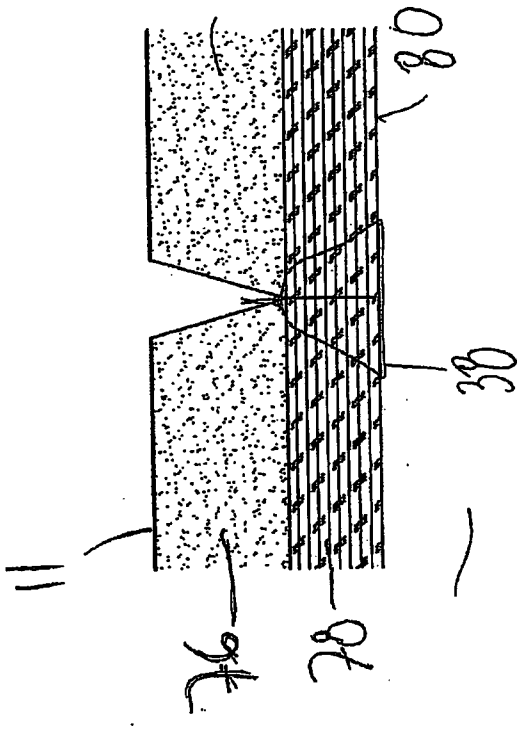

FIG. 22

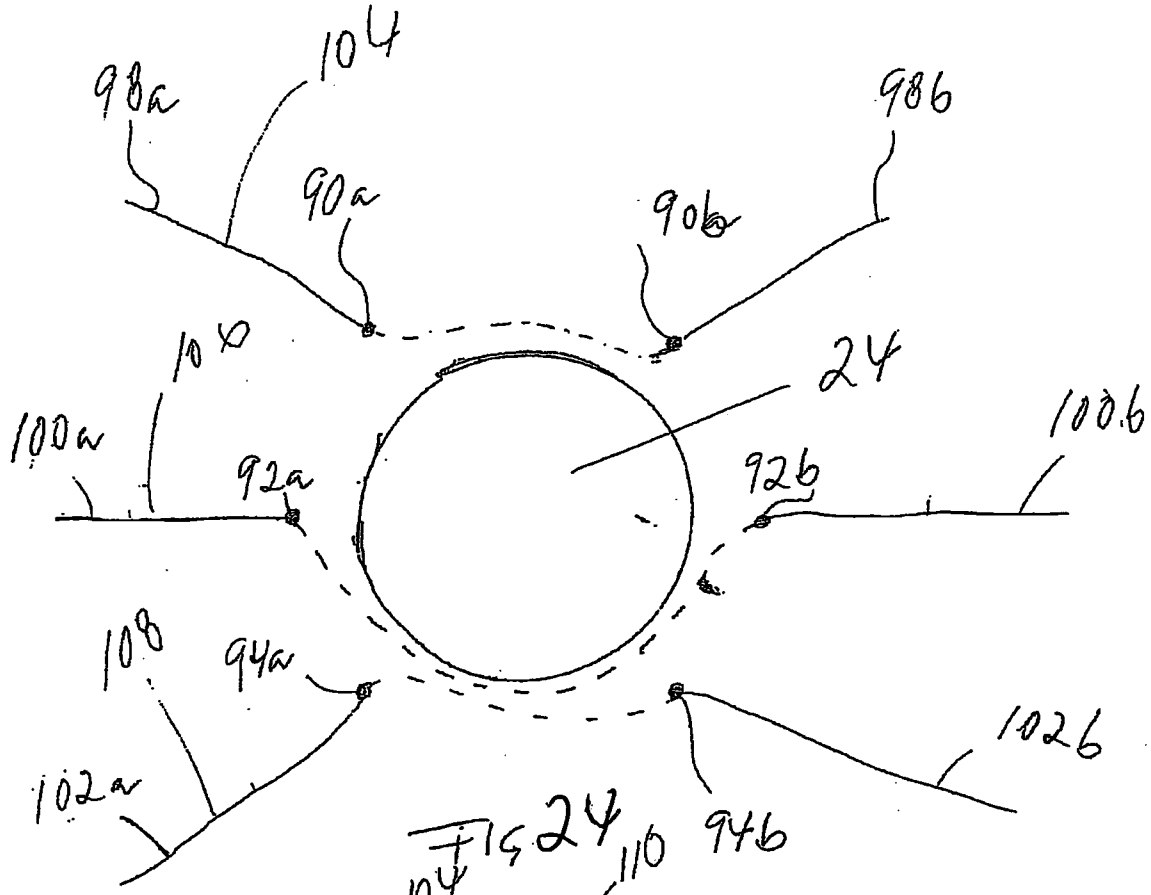
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Fig 24

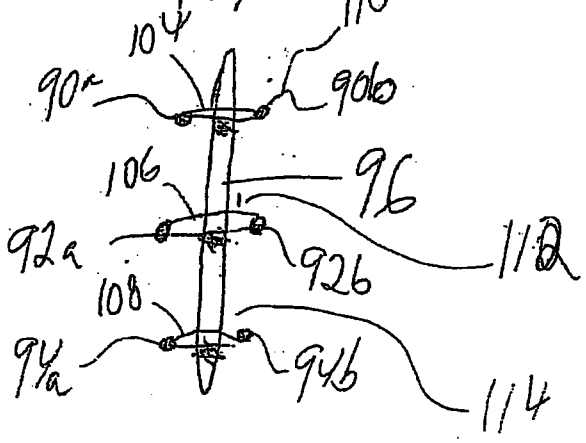
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Fig. 25

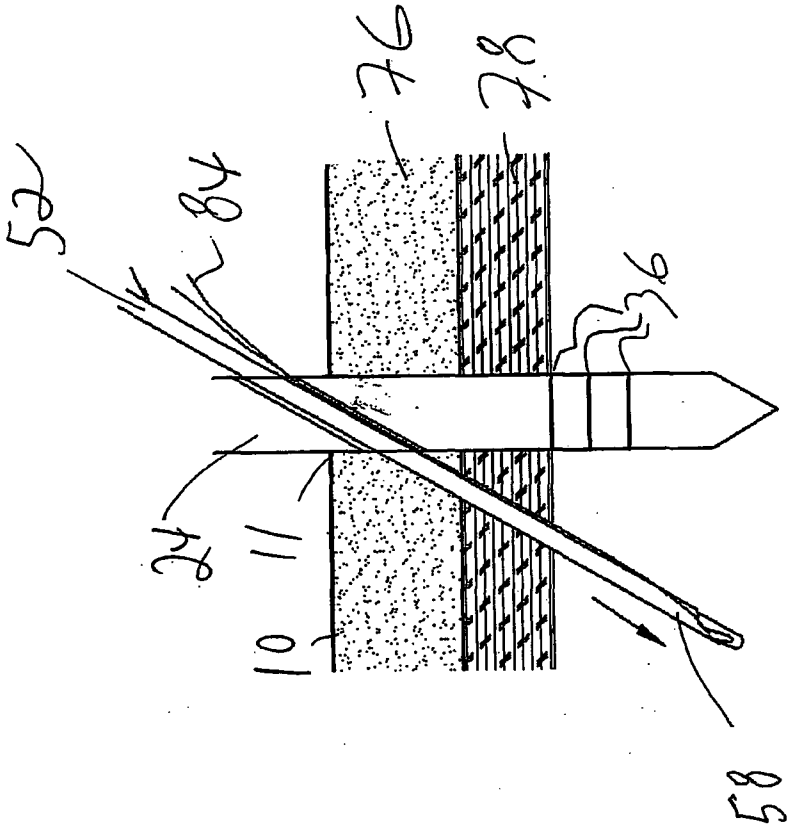

FIG. 27

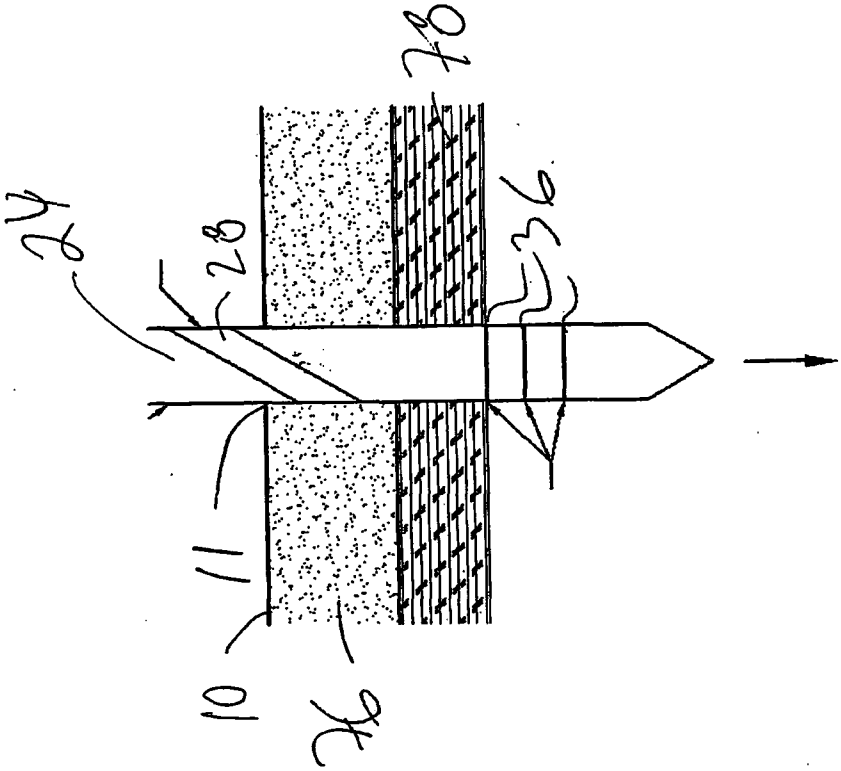

FIG. 26

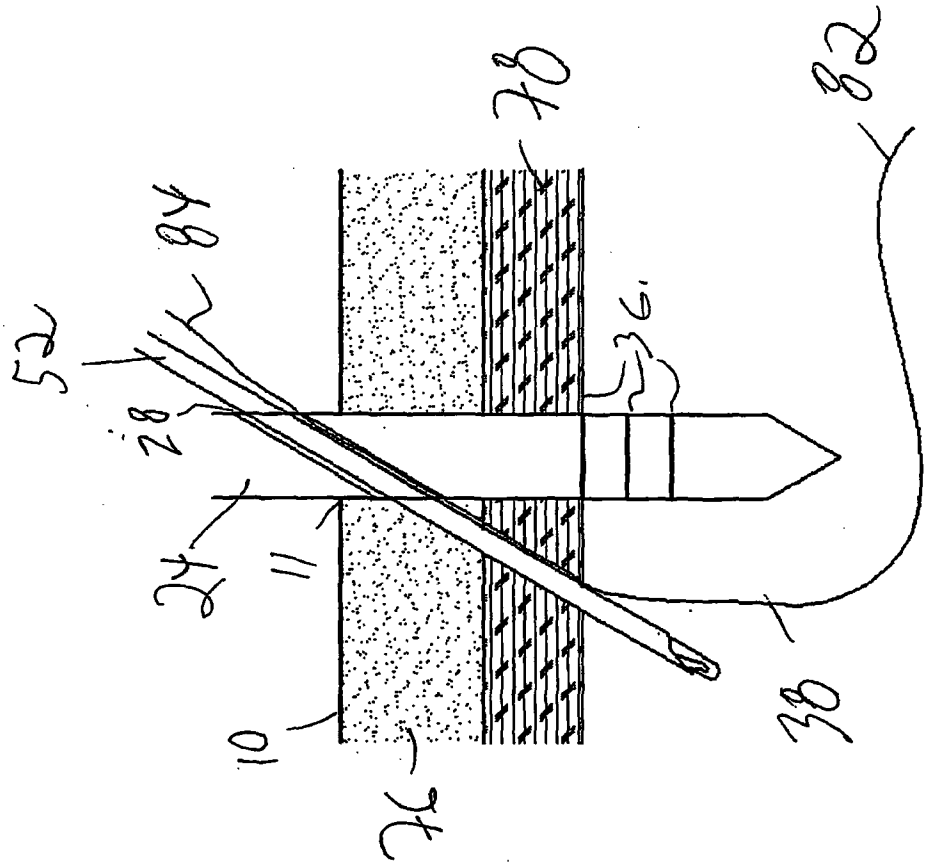

FIG 29

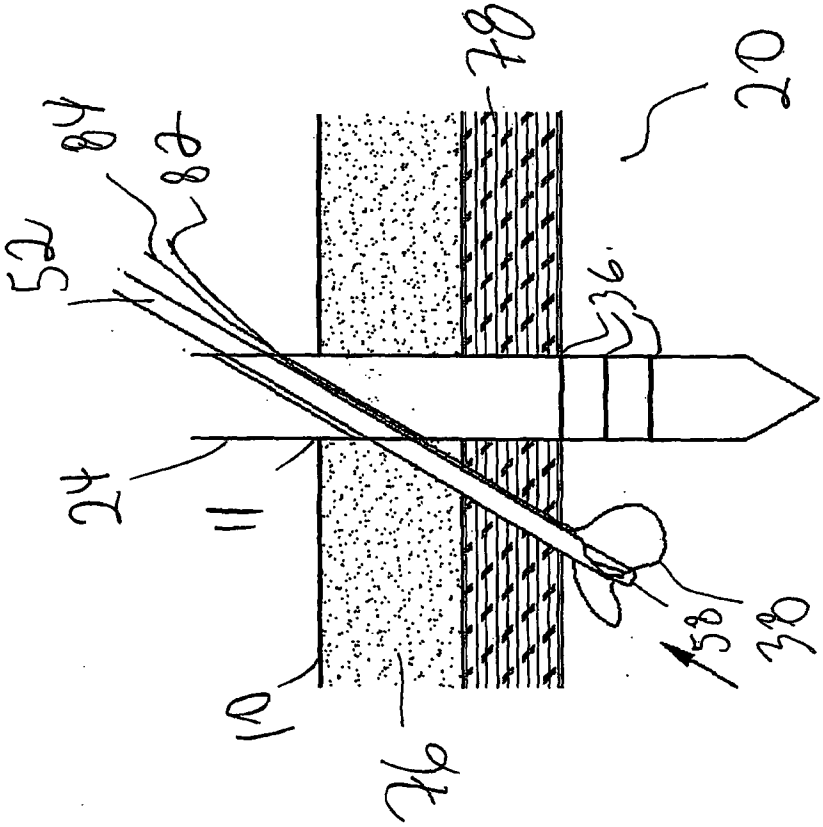

FIG 28

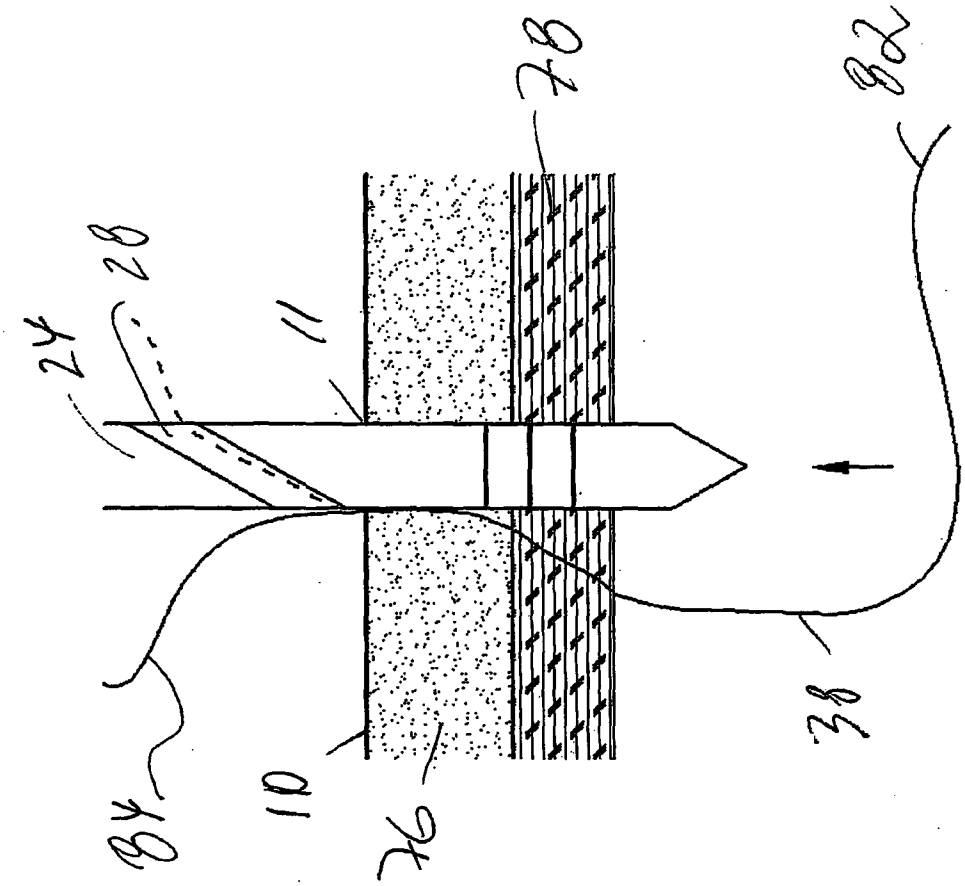

Fig. 4D

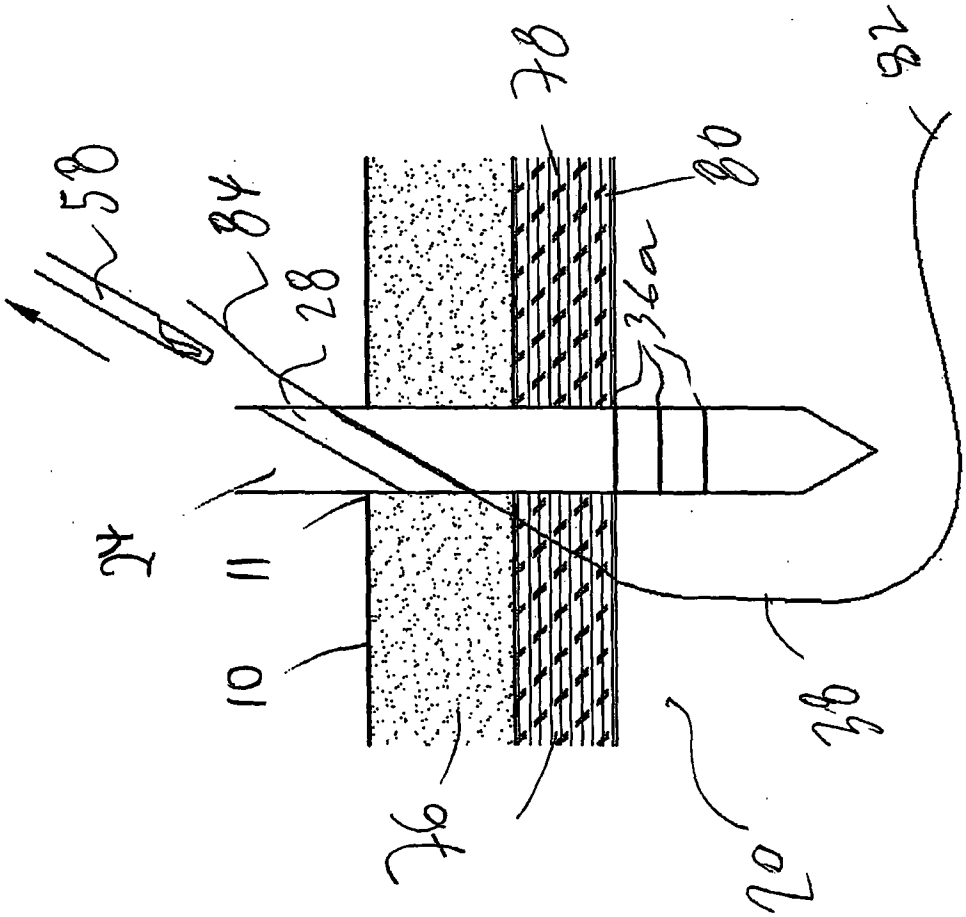

Fig. 4E

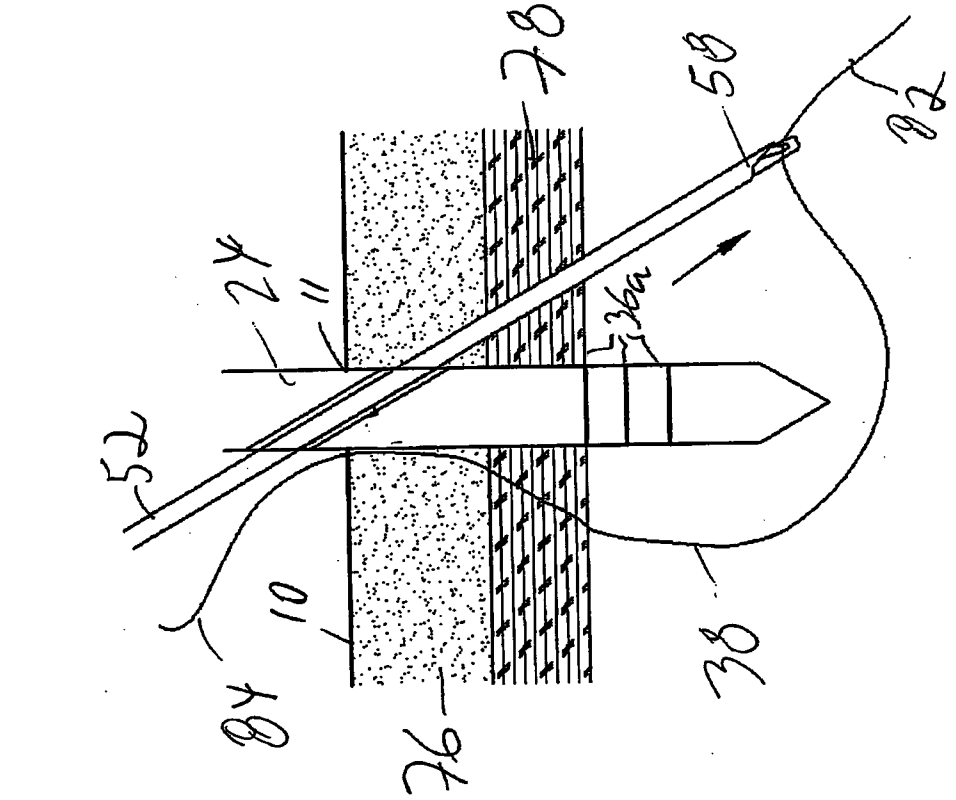

Fig. 4B

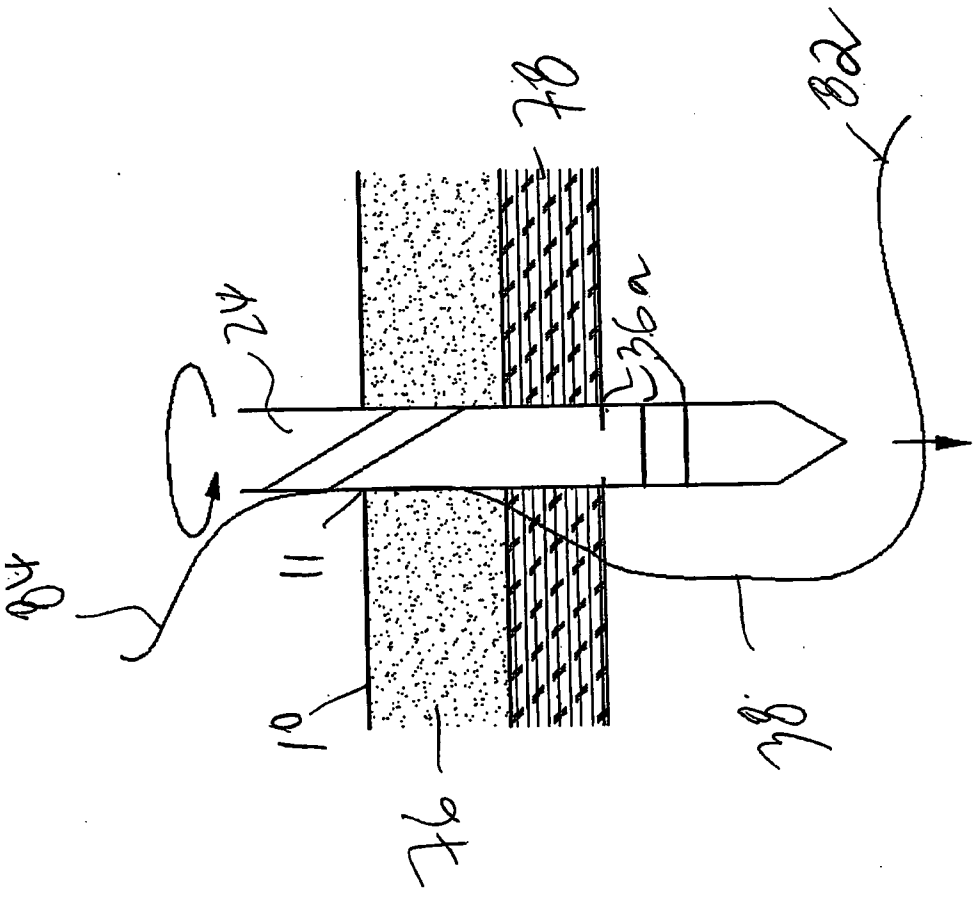

Fig. 4A

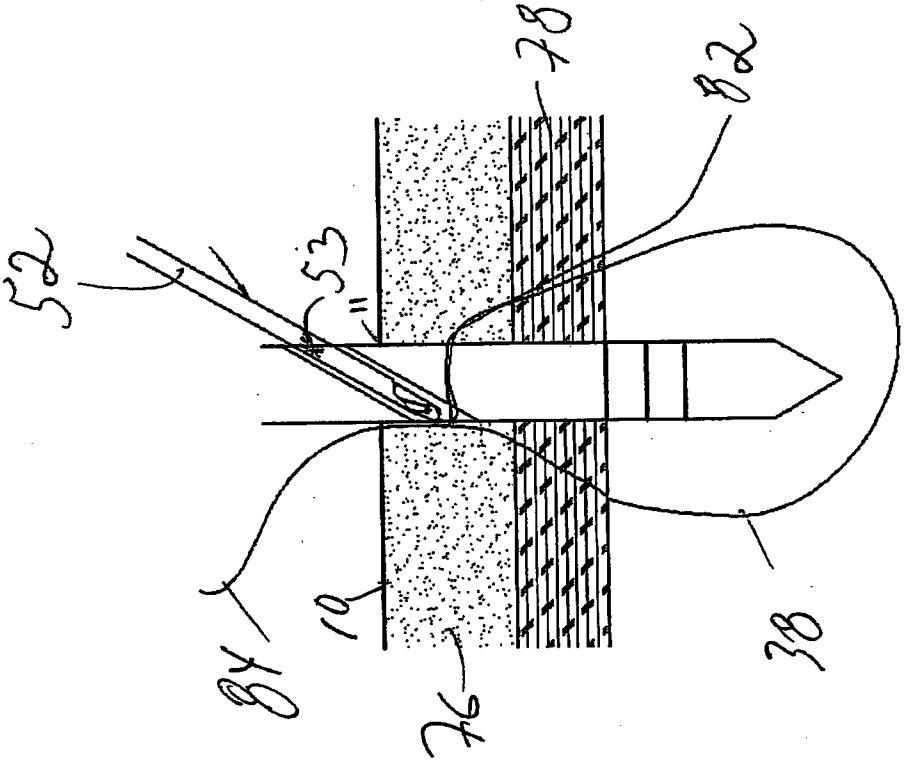

FIG. 44

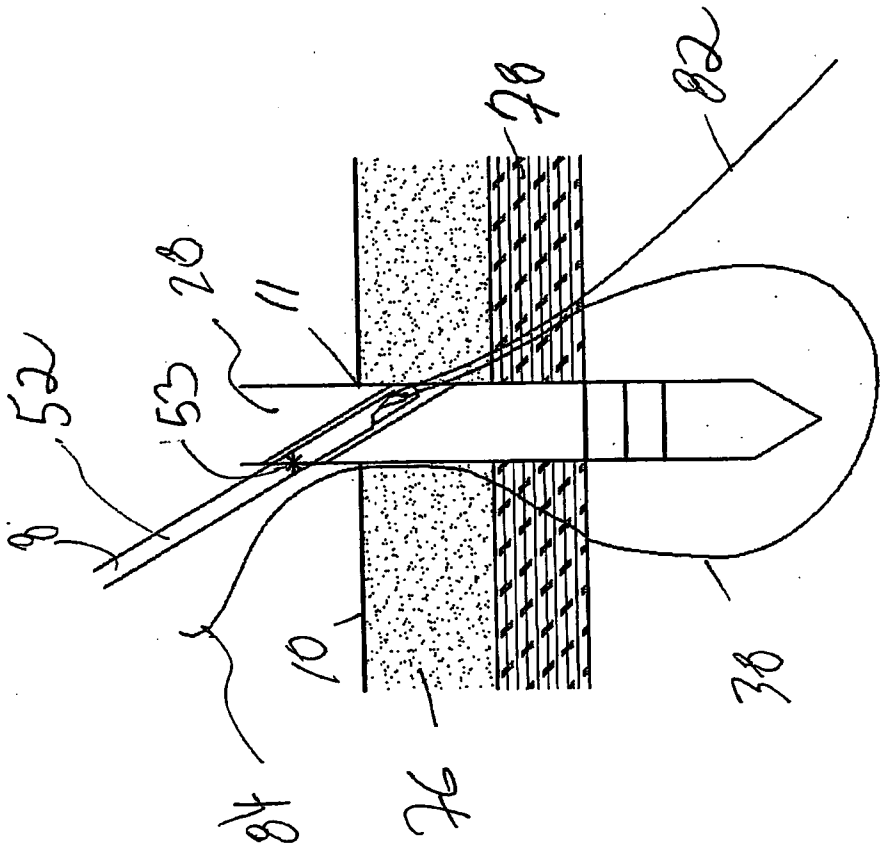

FIG. 43

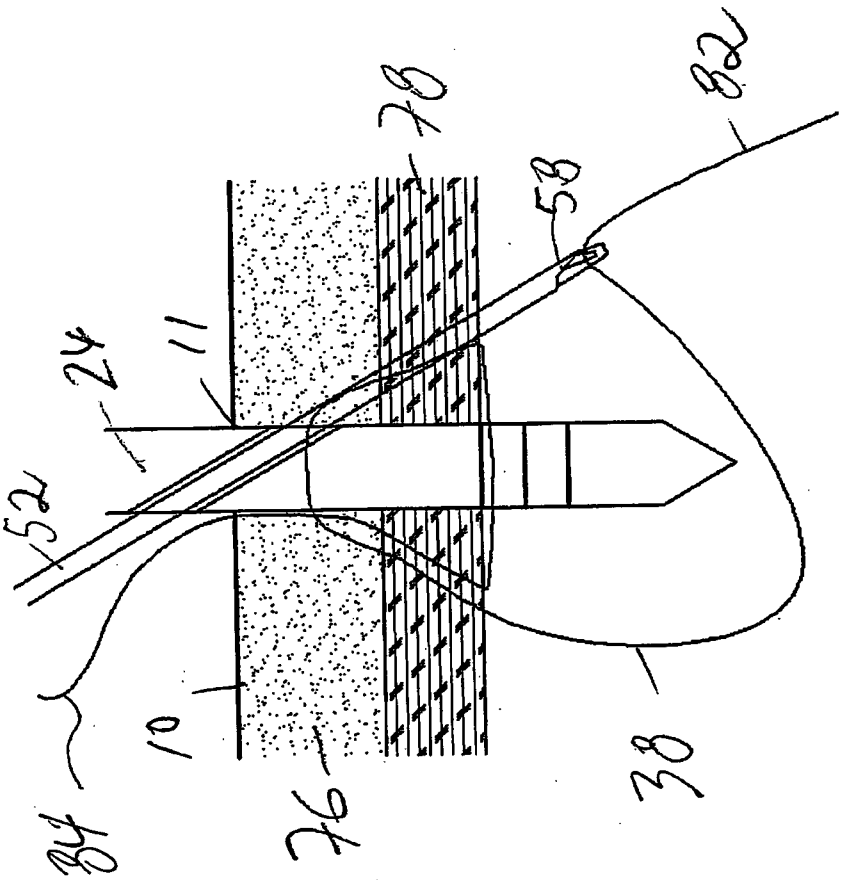

Fig 46

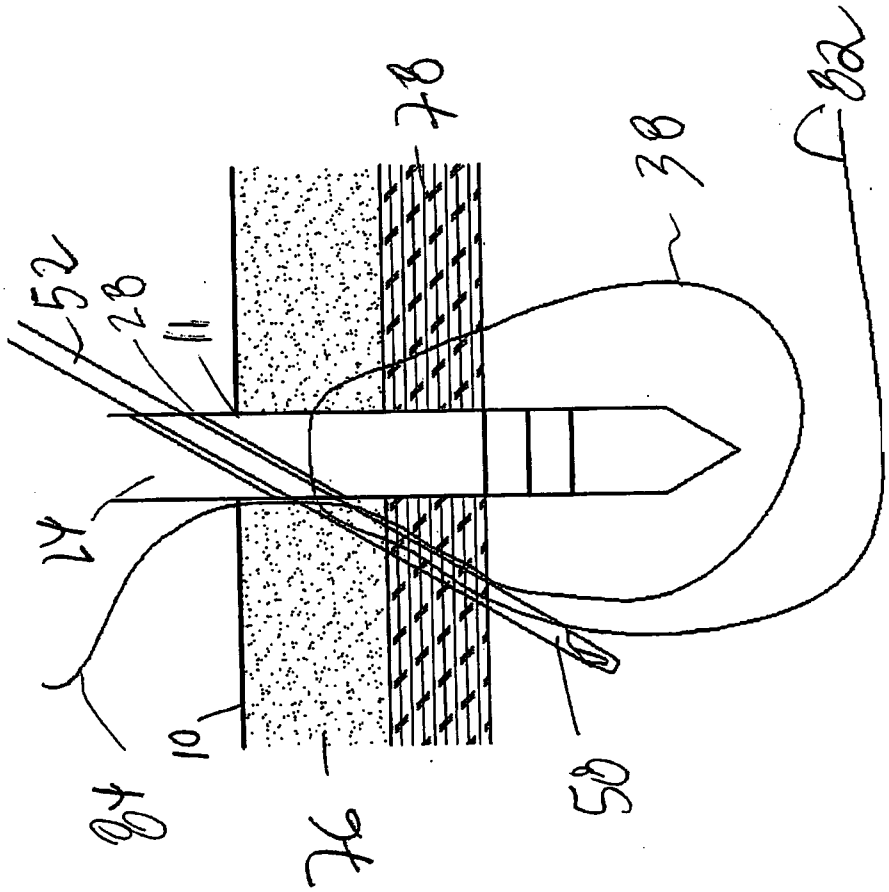

Fig 45

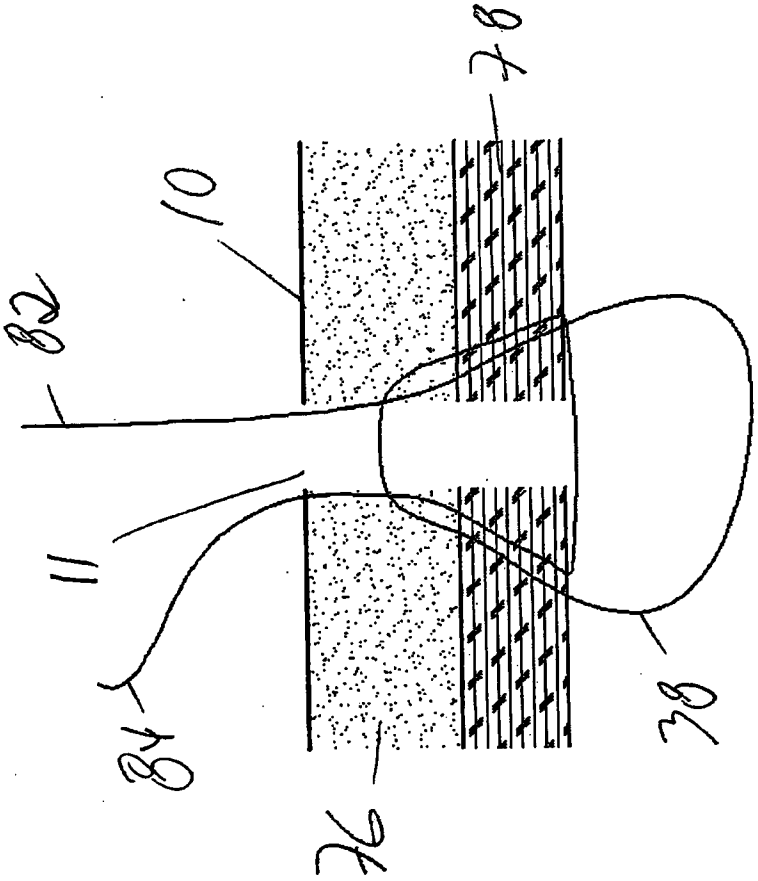

Fig 4B

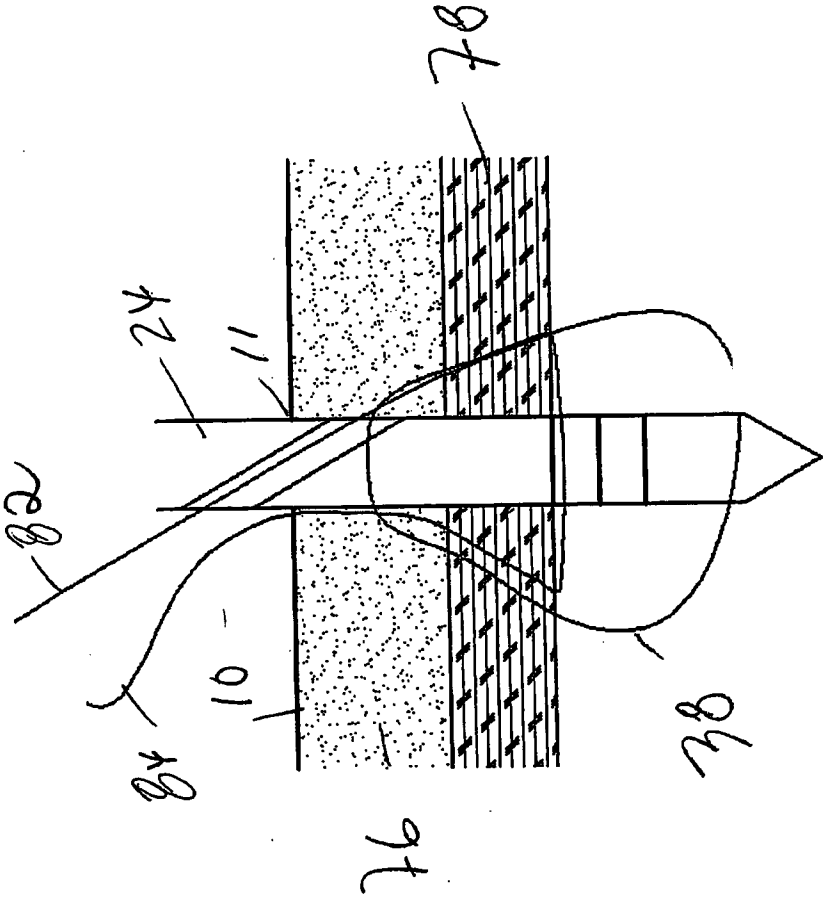

Fig. 4A

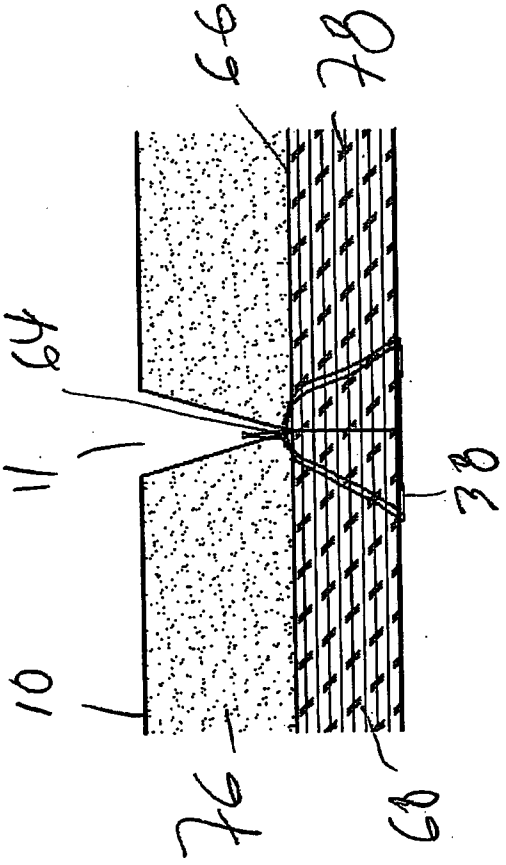

FIG. 5D

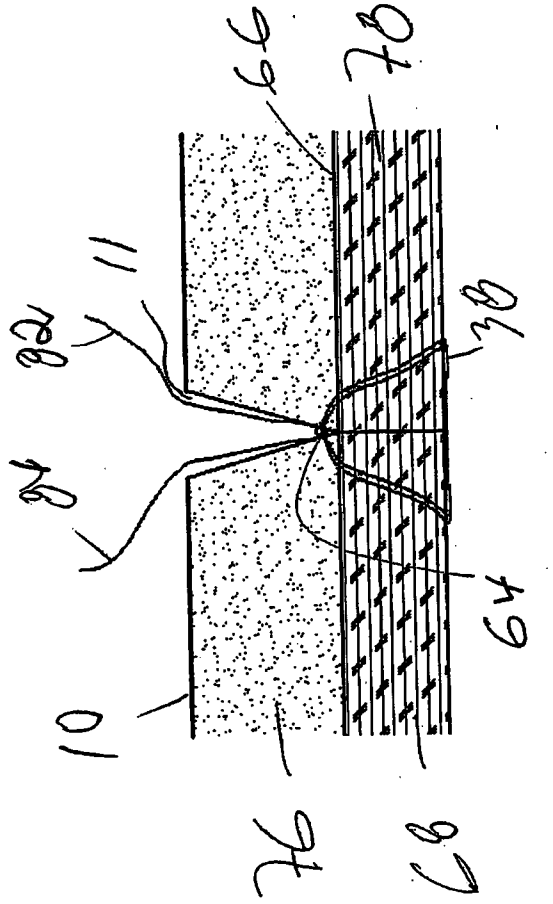

FIG. 6A

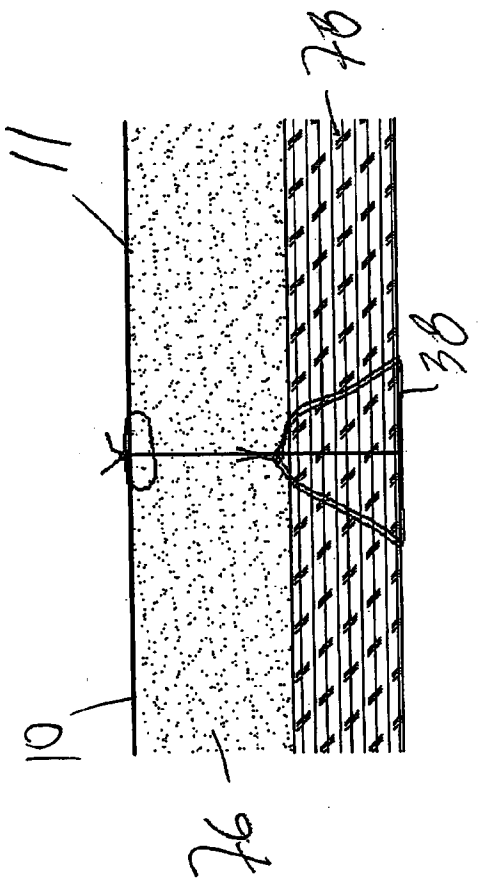

FIG. 5I

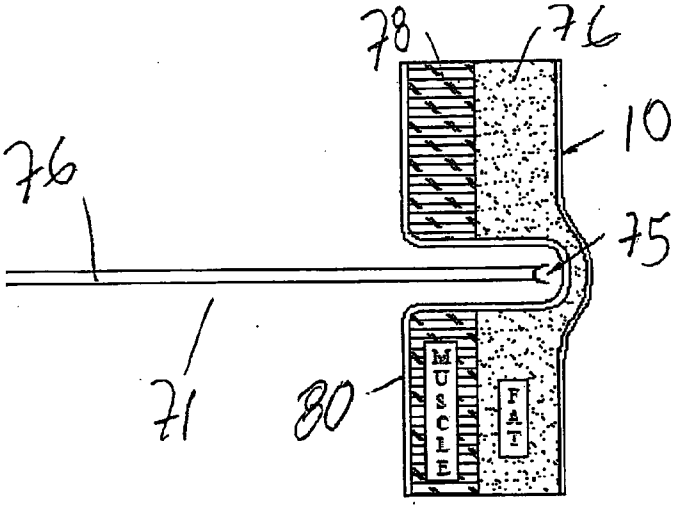

Fig 52

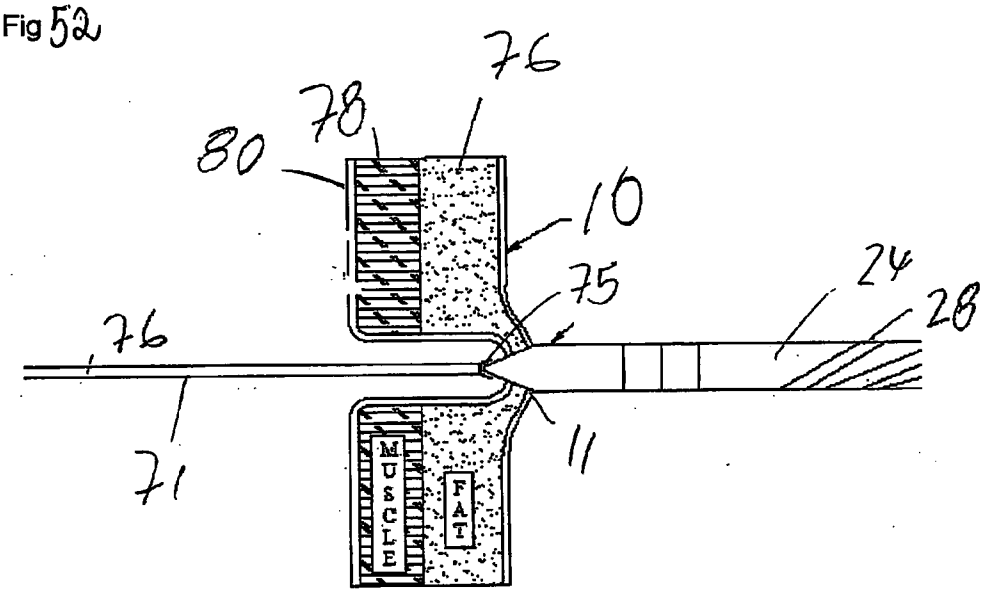

Fig 53

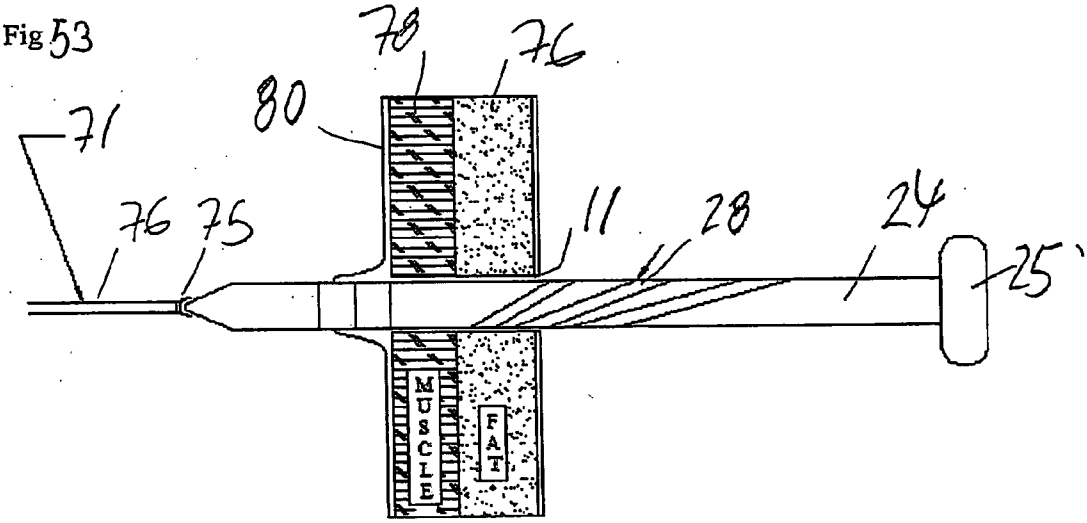

Fig 54

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2009/000859

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.
A61B 17/062 (2006.01) *A61M 29/00* (2006.01)

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)

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)
WPI, EPODOC: IPC, ECLA A61B 17/- , A61M 29/- & keywords (suture, guide, drive, oblique, slant, incision, wound, opening, close, obstruct, bore, opening, channel, indicator, marking, tag, dilator, expander, diameter, radius, perimeter) and like terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0030868 A1 (BENNETT, III) 09 February 2006 FIG. 9b; FIG. 13a – b	1 – 25, 27 and 29 – 53
X	US 6203554 B1 (ROBERTS) 20 March 2001 Figures; col. 4, lines 22 – 32;	1 – 25 and 27 – 53
X	US 5507758 A (THOMASON et al.) 16 April 1996 All figures	1 – 25, 27 and 29 – 53

[X] Further documents are listed in the continuation of Box C [X] 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
06 October 2009	13 OCT 2009
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer VIJAY SINGH AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 2665

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2009/000859

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/0087978 A1 (VELEZ et al.) 06 May 2004 FIG. 10a – 14, 16	1 – 25, 27 and 29 – 53
X	WO 2007/000159 A1 (WILLIAM COOK EUROPE APS et al.) 04 January 2007 All figures	26
X	US 6142931 A (KAJI) 07 November 2000 All figures.	27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2009/000859

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.: **54 – 57**
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:

The claims do not comply with Rule 6.2(a) because they rely on references to the description and/or drawings.

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:

Please see supplemental box I.

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 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.:

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.

Supplemental Box I
(To be used when the space in any of Boxes I to IV is not sufficient)

Continuation of Box No: Box III

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This International Searching Authority has found that there are different inventions as follows:

- Claims 1 – 25 and 29 – 53 are directed towards a surgical device and method for guiding a needle during suturing of an incision. It is considered that a body for insertion in the incision having a first passage to conduct an end of the needle below a location surrounding the incision, wherein a distal portion of the body comprises means for indicating the location to which the needle will be conducted comprises a first distinguishing feature.
- Claim 26 is directed towards a dilator. It is considered that the dilator comprising at least one mark indicating the diameter of the dilator at the location of the at least one mark comprises a second distinguishing feature.
- Claim 27 is directed towards a tool. It is considered that the tool comprising at least one end adapted to receive the surgical instrument comprises the third distinguishing feature.
- Claim 28 is directed towards a method for suturing an incision. It is considered that obturating the incision to avoid gas discharge from the biological cavity; and suturing the incision comprises the fourth distinguishing feature.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

Each of the abovementioned groups of claims has a different distinguishing feature and they do not share any feature which could satisfy the requirement for being a special technical feature. Because there is no common special technical feature it follows that there is no technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention *a priori*.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2009/000859

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	2006030868	NONE					
US	6203554	NONE					
US	5507758	AU	64069/99	US	5496335	US	5827299
		US	5899911	US	5954734	US	6183485
		US	6383199	US	2001056283	WO	0019913
US	2004087978	CA	2569878	CN	101193598	EP	1771115
		US	2005021055	WO	2005122911		
WO	2007000159	EP	1898981	US	2009199849		
US	6142931	JP	11169342				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX

专利名称(译)	腹腔镜端口部位缝合的装置和方法		
公开(公告)号	EP2349021A1	公开(公告)日	2011-08-03
申请号	EP2009771850	申请日	2009-07-02
[标]申请(专利权)人(译)	A.H.比利私人有限公司		
申请(专利权)人(译)	A.H. BEELEY PTY LTD		
当前申请(专利权)人(译)	A.H. BEELEY PTY LTD		
[标]发明人	BEELEY ANTONY HUGH		
发明人	BEELEY, ANTONY HUGH		
IPC分类号	A61B17/062 A61M29/00 A61B17/04		
CPC分类号	A61B17/0057 A61B17/0482 A61B2017/00637 A61B2017/00663 A61B2017/06042 A61B2090/0807 A61B2090/0811 A61M29/00		
代理机构(译)	HARRISON GODDARD FOOTE		
优先权	2008903408 2008-07-02 AU		
其他公开文献	EP2349021A4		
外部链接	Espacenet		

摘要(译)

一种用于在切口缝合期间引导针的外科手术装置，包括用于插入切口的主体，该主体具有第一通道，以将针的一端引导到围绕切口的位置下方，其中主体的远端部分包括用于指示切口的装置。针将被导入的位置。还提供了使用手术装置缝合切口的方法。