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(54) **FOLLICLE PUNCH FOR USE WITH CURLED FOLLICLES**

FOLLIKELSTEMPEL ZUR VERWENDUNG MIT GEKRÄUSELTEN FOLLIKELN

DISPOSITIF D'EXTRACTION DE FOLLICULES À UTILISER AVEC DES FOLLICULES BOUCLÉS

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(56) References cited:
WO-A2-2011/140497
JP-A- H07 100 140
US-A- 6 059 807
US-A1- 2004 116 942
US-A1- 2005 245 952
US-A1- 2007 156 164
US-A1- 2007 156 164
US-A1- 2008 234 699
US-A1- 2008 234 699
US-A1- 2010 114 118
US-A1- 2011 160 746
US-B1- 6 200 326

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Description

Field of the Invention

[0001] This invention relates to surgical instruments and, more particularly, to a punch for extracting hair follicles from the skin.

Background of the Invention

[0002] Hair transplantation is a surgical technique that involves moving skin containing hair follicles from one part of the body (the donor site) to bald or balding parts (the recipient site).

[0003] Hair naturally grows in follicles that contain groupings of 1 to 4 hairs, and transplant techniques typically move the 1-4 hair "follicular units" from the donor site to the recipient site.

[0004] The follicles of hair are typically removed from the donor site using punches of between 0.7mm and 1.25mm in diameter. The punches are tubular bodies having a skin- contacting cutting edge, and are typically mounted in a tool that causes the punch to rotate as the punch is brought into contact with the donor site. Hair follicles are very easily damage during the removal process, and damaged follicles are unlikely to be successfully transplanted.

[0005] Curled follicles are extremely susceptible to damage by follicle punches and are therefore particularly difficult to extract for successful transplantation. Such follicles are curled beneath the skin and are easily cut and/or damaged by the advancing cutting edge of conventional punches as the punch penetrates the donor site's tissue.

[0006] Further information pertaining to the prior art can be found in US 2007/156164; US 2008/234699, JP 07-100140 and US 2004/116942, each of which has been interpreted by the European Patent Office as disclosing a follicle punch comprising a generally tubular body disposed about a generally longitudinal axis and having a distal cutting end region terminating distally in a pair of distally-extending, circumferentially disposed, generally prong-like members carrying distally diverging cutting edges separated by follicle-accommodating slits.

Summary of the Invention

[0007] The invention provides a follicle punch according to claim 1. Further embodiments of the invention are described in the dependent claims.

[0008] A punch that is particularly useful for removing curled hair follicles from a donor site comprises a generally tubular body disposed about a generally longitudinal axis and having a distal cutting end region terminating distally in a plurality of distally-extending circumferentially disposed, generally prong-like members carrying distally diverging cutting edges and separated by follicle-accommodating slits. In practice, the punch is oriented during the extraction process at the donor site so that the curled hair root passes into, and is spared from the advancing cutting edge by, a slit as the punch is inserted into and penetrates the tissue. The punch may then rotated slightly so that the cutting edges cut most of the tissue surrounding the follicle without making damaging contact with the follicle. It may be noted that a rotary motion may not be necessary and, if rotation is desired, it may be in one direction or be in the form of an oscillatory rotary movement, depending on characteristics of the donor site and targeted follicle.

[0009] The foregoing insertion process may be performed manually or under machine or computer control, and with or without the aid of an ultrasonic transducer coupled to punch to impart a vibratory cutting force against the tissue. In addition, a mechanism for automatically rotating the punch may be employed, and may accordingly be coupled to the ultrasonic transducer if one is used.

[0010] These and further details of the invention will be apparent to those of ordinary skill in the art from reading a description of the currently preferred embodiment of the invention described below, of which the drawing forms a part.

Description Of The Drawing

[0011]

Figure 1 is a front elevation view of a punch for removing hair follicles that is constructed in accordance with the invention;

Figure 2 is a side elevation view of a punch of Figure 1;

Figure 3 is a longitudinal section view of the punch of Figure 1, taken along line 3-3 in Figure 1;

Figure 4 is a longitudinal section view of the punch of Figure 1, taken along line 4-4 in Figure 2;

Figure 5 is an enlarged fragmentary view of the portion of the punch illustrated within the line 5 of Figure 4;

Figure 6 is a bottom plan view of the punch of Figure 2;

Figure 7 is a fragmentary view in perspective of the cutting end region of the punch oriented per line 7-7 in Figure 6 illustrated in Figure 1;

Figure 8 is an oblique fragmentary elevation view of the cutting end region of the punch of Figure 1;

Figure 9 is an oblique bottom view of the cutting end region of the punch of Figure 1; Figure 10 is a schematic illustration of the example methodology for ex-

tracting a curled follicle in accordance with the invention;

Figure 11A is a right front oblique view, in schematic, of an alternative embodiment of a punch for removing hair follicles that is constructed in accordance with the invention;

Figure 11B is a longitudinal sectional view of the punch of Figure 11A, taken along line 11B-11B in Figure 11C;

Figure 11C is a front elevation view, in schematic, of the punch of Figure 11A,

Figures 12A is a right front oblique view, in schematic, of a second alternative embodiment of a punch for removing hair follicles that is constructed in accordance with the invention;

Figure 12B is a longitudinal sectional view of the punch of Figure 12A, taken along line 12B-12B in Figure 12C; and

Figure 12C is a front elevation view, in schematic, of the punch of Figure 12A.

Detailed Description Of The Preferred Embodiment

[0012] Referring to Figures 1-9, a preferred punch for extracting curled follicles is illustrated as comprising a generally tubular body 12 extending from a proximal end 14 to a skin-contacting distal end 16 about a generally central longitudinal axis 11. The currently preferred dimensions of the punch are indicated in the Figures. Fig. 3 shows currently preferred dimensions L1 = 35.1 mm (1.382 inches), L2 = 1.347 mm (0.053 inches), L3 = 0.727 mm (0.029 inches), L4 = 0.926 mm (0.036 inches), d1 = 0.762 mm (0.030 inches) and d2 = 1.270 mm (0.0500 inches). Fig. 5 shows currently preferred dimensions L5 = 1.449 mm (0.057 inches), L6 = 1.551 mm (0.0611 inches), d1 = 0.452 mm (0.0182 inches), d2 = 1.270 mm (0.050 inches) and R1 = 9.004 mm (0.354 inches). Fig. 7 shows currently preferred dimension R2 = 9.499 mm (0.3346 inches).

[0013] The punch's generally tubular body 12 has a distal cutting end region terminating distally in a plurality of distally-extending circumferentially disposed, generally prong-like members 13 carrying distally diverging cutting edges 15 and separated follicle-accommodating slits 22. The currently preferred number of members 13 is two because a pair of such members currently appears to provide the appropriate amount of cutting around the follicle together with sufficient slit width to safely accommodate entry and protection of the follicle during the extraction process.

[0014] As illustrated in the Figures, each of the preferred prong-like members 13 has a generally convex outer surface 18 and a generally concave inner surface 20 substantially the same as that of the tubular body. As also illustrated in the Figures, each of the prong-like members also has a beveled cutting surface 24, 26 terminating at a cutting edges, 15, with the bevel preferably being on the inside of the punch so that it terminates at a cutting edge on the punch's outer diameter. However, the formation of bevels on the outer surface of the punch is also possible, although not preferred, and is within the scope of the invention. It may be noted that it is.currently believed that the cutting edge portion illustrated in Figure 3 as 1.653 mm in length may be as long as approximately 4 mm or so, and that the follicle-accommodating slit 22 should preferably be approximately 2 mm - 4 mm longer than the cutting edge portion.

[0015] The bevels 24, 26 are preferably created by grinding cutting edges outwardly from the interiors of the members 13 to produce sharp cutting edges. However, the bevels can also be formed by laser cutting, waterjet or abrasivejet cutting, chemical molding, and/or other manufacturing processes without departing from the scope of the invention.

[0016] The bevels 24, 26 preferably interface at an apex 25 of the prong-like member to provide a sharp, point-like, leading tip which makes the initial penetration into the tissue that surrounds the targeted follicle, while the widening, generally semi-elliptical profiles of the prong-like members 13 cut more of the surrounding tissue as the punch is urged distally into the site. The leading tip can alternatively be a sharp rounded tip without departing from the scope of the invention.

[0017] The distal end region of the punch may be further provided with generally circumferentially-extending notch having a generally concave shape that generally circumscribes the punch's outer surface. The notch preferably extends 1-2 mm proximally from a location closely adjacent the tip of the punch. The generally concave shape serves two purposes. First, its preferred size and shape results in a wound with everted edges; as the punch enters the tissue surrounding the targeted follicle, the tissue outward of the cut expands against the concavity as it is passed by the cutting edge. When the punch is subsequently withdrawn, the tissue resumes its consequently everted shape. Second, the generally concave shape and preferred sharpening from the inside of the punch results in a cutting force that is outwardly directed away from the follicle and tissue to be extracted, decreasing the risk of damage to the follicle.

[0018] Alternatively, the punch can be provided with a flared distal end having a diameter that has a diverging inner diameter and diverging outer diameter along the last 1 mm or so, with the flared end region resulting in a preferred gap of approximately 1.25 mm between opposing tips. Gaps of great or lesser spacing may be utilized as well, depending on the subject's hair and follicle dimensions without departing from the scope of the invention.

[0019] In one preferred configuration, the shape and

dimensions of the slit 22 are, as best illustrated in Figures 4 and 5, a general inverted "V" profile having a relatively distal segment and a relatively proximal segment 22a that is more steeply tapered than the distal segment 22b. The more steeply tapered interior of the relatively proximal segment provides a slit length and width that accommodates the follicle as the punch penetrates the surrounding tissue, in order to spare the follicle from being cut; the less tapered distal segment of the slit results in adequate spacing of the cutting edges of adjacent prong-like members 13 from the follicle's root structure so that the cutting yields a viable implant. Although the same taper could be used for both segments, it is preferable not to do so since a generally uniformly steep taper (such as that of the preferred distal segment) would add unnecessary length to the punch to achieve the needed spacing between the prongs, while a generally uniformly shallow taper (such as that of the preferred distal segment) would fail to provide the slit length needed.

[0020] The cutting edge of the punch, which preferably extends from its leading tip to the beginning of the steeply tapered portion of the slit (i.e., the interface of the proximal and distal slit segments), may be smooth or include one or more serrations. If serrations are included, it is currently preferable that there be one or two serrations, with rounded edges, although the use of sharply angled edges would not depart from the scope of the invention.

[0021] Figure 10 schematically illustrates (at "A") a subject's head 100 having a plurality of hairs 102 protruding from the skin 104. A hair 102 and its curled, subcutaneously-located follicle 106 is schematically illustrated in magnified form at "B".

[0022] As next schematically illustrated with greater magnification at "C", the preferred punch is inserted into the skin at the donor site in such a way that the hair enters the punch's interior while the follicle 106 passes uncut through the slit 22. As further illustrated at "D", the punch is advanced past the follicle, which remains undamaged by the cutting edges of the punch by passing through the slit. Once the punch has penetrated sufficiently, it can be partially rotated back and forth if desired, as schematically illustrated by the arrows, resulting in an arcuate cut in the tissue substantially circumscribing the curled follicle, while the follicle itself is spared by its clearance within the slit and isolation from the cutting edges. The intact hair follicle is then removed from the donor site for subsequent transfer to the recipient site.

[0023] To penetrate the skin, the punch could be manually pressed proximally by hand. Currently, it is believed that the use of an ultrasonic transducer to apply rapid, incremental, proximally-directed cutting force pulses to the tissue via the punch offers a more precisely controllable methodology for penetrating the tissue while the punch is positioned at the donor site and oriented so as to accommodate the follicle within the slit.

[0024] Turning to Figures 11A-C, a second currently preferred configuration of a follicle punch is illustrated. It should be noted that the interior surfaces of the punch are smooth; the apparent facets illustrated in Figures 11A and 11B are computer-generated "tangent" lines connoting a change in surface direction only.

[0025] The punch illustrated in Figures 11A-C comprises a pair of distally-extending circumferentially disposed, generally prong-like members 113 carrying distally diverging cutting edges 114, 116 and separated by a generally U-shaped follicle-accommodating slit 122. The cutting edge of each prong-like member is again preferably formed from the inside of the punch by grinding cutting edges outwardly from the interior region of the members. However, as noted earlier, the cutting edges can also be formed by laser cutting, waterjet or abrasivejet cutting, chemical molding, and/or other manufacturing processed without departing from the scope of the invention. The leading tips 125 of the punch illustrated in Figures 11A-C are sharp rounded tips that make the initial penetration into the skin and tissue surrounding the targeted follicle.

[0026] To minimize the risk of the follicle being cut during the extraction process, the formation of the cutting edges may be limited to the first 1.52 mm (0.060 inches) or so from the distal tip 125 of the punch, so that the cutting edges pass the follicle during insertion of the punch at the donor site and any subsequent contact between the punch and follicle is not with a cutting edge. The cutting edge may however extend the entire length, or a different length, of the slits.

[0027] The gap between the prong-like members of the punch illustrated in Figures 11A-C is preferably 0.51-0.76 mm (0.02-0.03 inches) wide. It preferably extends proximally from the distal tip of the punch for about 3.05 - 4.06 mm (0.12 to 0.16 inches).

[0028] Turning to Figure 12A-C, another preferred variation of the punch is illustrated, wherein the punch comprises a pair of distally-extending circumferentially disposed generally prong-like members 213 that carry distally-diverging cutting edges 214, 216 separated by a generally U-shaped follicle-accommodating slit. The leading tips 225 of the members 213 are sharp pointed tips. Each cutting edge 214, 216 is preferably formed from the inside of the punch by grinding cutting edges outwardly from the interior region of the prong-like members. However, as noted earlier, the cutting edges can also be formed by laser cutting, waterjet or abrasivejet cutting, chemical molding, and/or other manufacturing processed without departing from the scope of the invention. To minimize the risk of the follicle being cut during the extraction process, the formation of the cutting edges may be limited to the first 1.52 mm (0.060 inches) or so from the distal tip of the punch, so that the cutting edges pass the follicle during insertion of the punch at the donor site and any subsequent contact between the punch and follicle is not with a cutting edge. The cutting edge may however extend the entire length, or a different length, of the gap.

[0029] The gap between the prong-like members of the punch illustrated in Figures 12A-C is preferably 0.076

mm (0.03 inches) wide, and preferably extends proximally from the distal tip of the punch for about 4.06 mm (0.16 inches).

[0030] As with Figures 11A-B, it should be noted that the interior surfaces of the punch illustrated in Figures 12A-B are smooth, and that the apparent facets are computer-generated "tangent" lines connoting a change in surface direction only.

[0031] Regardless of the specific version of follicle punch utilized, the inclusion of an ultrasonic transducer coupled to the punch and selectively operable to enhance the cutting operation is desirable. The transducer is mounted within a handpiece to which the punch is attached in a manner analogous to the transducer, handpiece and scaler tip of an ultrasonic dental scaler. The punch may be further mounted for reciprocating pivoting movement within the handpiece so as to move in such manner with or without ultrasonic vibratory movement. Likewise, the configuration may be such that ultrasonic vibratory movement can be generated with or without the pivoting movement.

[0032] In practice, it has been found that an adjustable degree of longitudinally reciprocating ultrasonic movement is desirable in that the appropriate degree of movement is a function of the subject's skin thickness and tissue, with higher settings being suitable when cutting through thicker skin or scar tissue for example. The use of the ultrasonic movement permits the surgeon or other operator of the equipment to better use his/her "fine motor" muscle movement to more precisely make the required incisions with greater sensitivity and finesse.

[0033] Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein without departing from the scope of the invention as will be defined by appended claims.

Claims

1. A follicle punch comprising
a generally tubular body (12) disposed about a generally longitudinal axis (11) and having a distal cutting end region terminating distally in a pair of distally-extending, circumferentially disposed, generally prong-like members (13, 113, 213) carrying distally diverging cutting edges (15, 114, 116, 214, 216) and separated by follicle-accommodating slits (22, 122, 222) wherein
the prong-like members (13, 113, 123) respectively terminate distally in a leading tip (25, 125, 225) which makes the initial penetration into tissue (104) surrounding a follicle (106), and the cutting edges (15, 114, 116, 214, 216) extend proximally from the tips and next to the slits (22, 122, 222), the slits (22, 122, 222) being longer than the cutting edges (15, 114, 116, 214, 216) by a distance sufficient to enable the cutting edges to pass the follicle during insertion of the punch at a donor site so that any subsequent contact between the punch and follicle caused by a rotational movement of the punch about said axis is not with a cutting edge.

2. The punch of Claim 1 wherein each of the prong-like members (113) includes a beveled cutting surface (24, 26) terminating at a cutting edge IIIv.

3. The punch of Claim 2 wherein the bevel is formed on the inside surface (20) of the tubular punch body.

4. The punch of Claim 3 wherein the cutting edge formed by the beveled cutting surface (24, 26) isat the punch's outer diameter.

5. The punch of Claim 1 wherein the prong-like member (13) terminate in respective cutting edges (15) having a longitudinal length in the range of substantially 1.65 mm to and including substantially 4 mm.

6. The punch of Claim 5 wherein the follicle-accommodating slits (22) are substantially 2 mm to 4 mm longer than the cutting edges (115).

7. The punch of Claim 1 wherein the follicle-accommodating slits (22) are substantially 2 mm to 4 mm longer than the cutting edges (115).

8. The punch of Claim 1 wherein the prong-like members (13, 213) respectively terminate distally in a sharp, point-like, leading tip (25, 225) which makes the initial penetration into tissue surrounding the follicle

9. The punch of Claim 1 wherein the prong-like members (113) respectively terminate distally in a sharp rounded leading tip (125) which makes the initial penetration into tissue surrounding the follicle.

10. The punch of Claim 1 wherein the prong-like members (13, 113, 213) terminate distally in respective leading tips (25, 125, 225) that make the initial penetration into tissue surrounding the follicle, and the distal end region of the punch includes a generally circumferentially-extending notch having a generally concave shape that generally circumscribes the punch's outer surface.

11. The punch of Claim 10 wherein the notch preferably extends proximally 1-2 mm from the tips (25, 125, 225) of the prong-like members (13, 113, 213).

12. The punch of Claim 1 wherein the slits (22) each have a generally inverted "V" profile.

13. The punch of Claim 11 wherein the generally inverted "V" profile consists of a relatively distal segment

(22b) and a relatively proximal segment (22a) that is more steeply tapered than the distal segment (22b).

14. The punch of Claim 13 wherein the cutting edge (15) of each prong-like member (13) extends from its leading tip (25) to the proximal end of the distal slit segment.

15. The punch of Claim 1 wherein the cutting edges (15, 114, 116, 214, 216) have one or.more serrations.

16. The punch of Claim 1 wherein the slits (122, 222) each have a generally inverted "U" shape.

17. The punch of Claim 1 including
a handpiece coupled to the punch for enabling the punch to be controllably manipulated by a user in the removal of a hair follicle from a targeted donor site,
and
an ultrasonic transducer within the handpiece and coupled to the punch and selectively operable by the user to induce ultrasonic movement in the punch to enhance the cutting to controllably cut the skin and tissue around a targeted donor site.

18. The punch of Claim 1 wherein the ultrasonic movement is generally axial.

19. The punch of Claim 1 wherein the prong-like members (13, 113, 213) terminate distally in respective leading tips (25, 125, 225) that make the initial penetration into tissue surrounding the follicle, and the distal end region of the punch comprising the prong-like members (13, 113, 213) is flared.

Patentansprüche

1. Follikelstanze, die umfasst:

einen allgemein rohrförmigen Körper (12), der um eine allgemein in Längsrichtung verlaufende Achse (11) angeordnet ist und ein distales Schneid-Endgebiet aufweist, das distal in einem Paar distal verlaufender in Umfangsrichtung angeordneter allgemein zinkenförmiger Elemente (13, 113, 213) endet, die distal auseinanderlaufende Schneidkanten (15, 114, 116, 214, 216) tragen und die durch Follikelaufnahmeschlitze (22, 122, 222) getrennt sind, wobei
die zinkenförmigen Elemente (13, 113, 123) jeweils distal in einer Vorderspitze (25, 125, 225) enden, die das Anfangseindringen in das einen Follikel (106) umgebende Gewebe (104) ermöglicht, und wobei die Schneidkanten (15, 114, 116, 214, 216) proximal von den Spitzen und neben den Schlitzen (22, 122, 222) verlaufen, wobei die Schlitze (22, 122, 222) um eine Strecke, die ausreicht, um zu ermöglichen, dass die Schneidkanten den Follikel während des Einführens der Stanze an einer Spenderstelle durchlassen, länger als die Schneidkante (15, 114, 116, 214, 216) sind, so dass irgendein durch eine Drehbewegung der Stanze um die Achse veranlasster nachfolgender Kontakt zwischen der Stanze und dem Follikel nicht mit einer Schneidkante erfolgt.

2. Stanze nach Anspruch 1, wobei jedes der zinkenförmigen Elemente (13) eine abgeschrägte Schneidfläche (24, 26) enthält, die in einer Schneidkante endet.

3. Stanze nach Anspruch 2, wobei die Abschrägung an der Innenfläche (20) des rohrförmigen Stanzenkörpers gebildet ist.

4. Stanze nach Anspruch 3, wobei sich die durch die abgeschrägte Schneidfläche (24, 26) gebildete Schneidkante bei dem Außendurchmesser der Stanze befindet.

5. Stanze nach Anspruch 1, wobei die zinkenförmigen Elemente (13) in jeweiligen Schneidkanten (15) enden, die eine Länge in Längsrichtung in dem Bereich von im Wesentlichen 1,65 mm bis zu und einschließlich im Wesentlichen 4 mm aufweisen.

6. Stanze nach Anspruch 5, wobei die Follikelaufnahmeschlitze (22) im Wesentlichen 2 mm bis 4 mm länger als die Schneidkanten (15) sind.

7. Stanze nach Anspruch 1, wobei die Follikelaufnahmeschlitze (22) im Wesentlichen 2 mm bis 4 mm länger als die Schneidkanten (15) sind.

8. Stanze nach Anspruch 1, wobei die zinkenförmigen Elemente (13, 213) jeweils distal in einer scharfen punktförmigen Vorderspitze (25, 225) enden, die das Anfangseindringen in das den Follikel umgebende Gewebe veranlasst.

9. Stanze nach Anspruch 1, wobei die zinkenförmigen Elemente (113) jeweils distal in einer scharfen abgerundeten Vorderspitze (125) enden, die das Anfangseindringen in das den Follikel umgebende Gewebe veranlasst.

10. Stanze nach Anspruch 1, wobei die zinkenförmigen Elemente (13, 113, 213) distal in jeweiligen Vorderspitzen (25, 125, 225) enden, die das Anfangseindringen in das den Follikel umgebende Gewebe veranlassen, und wobei das distale Endgebiet der Stanze eine allgemein in Umfangsrichtung verlaufende Kerbe enthält, die eine allgemein konkave Form auf-

weist, die die Außenoberfläche der Stanze allgemein umschreibt.

11. Stanze nach Anspruch 10, wobei die Kerbe vorzugsweise proximal 1-2 mm von den Spitzen (25, 125, 225) der zinkenförmigen Elemente (13, 113, 213) verläuft.

12. Stanze nach Anspruch 1, wobei die Schlitze (22) jeweils ein allgemein umgekehrtes "V"-Profil aufweisen.

13. Stanze nach Anspruch 11, wobei das allgemein umgekehrte "V"-Profil aus einem relativ distalen Segment (22b) und aus einem relativ proximalen Segment (22a), das steiler als das distale Segment (22b) geneigt ist, besteht.

14. Stanze nach Anspruch 13, wobei die Schneidkante (15) jedes zinkenförmigen Elements (13) von seiner Vorderspitze (25) zu dem proximalen Ende des distalen Sehlitzelements verläuft.

15. Stanze nach Anspruch 1, wobei die Schneidkanten (15, 114, 116, 214, 216) einen oder mehrere gezackte Ränder aufweisen.

16. Stanze nach Anspruch 1, wobei die Schlitze (122, 222) jeweils eine allgemein umgekehrte "U"-Form aufweisen.

17. Stanze nach Anspruch 1, die enthält:

ein Handstück, das mit der Stanze gekoppelt ist, um zu ermöglichen, dass die Stanze bei der Beseitigung eines Haarfollikels von einer angestrebten Spenderstelle durch einen Nutzer steuerbar manipuliert wird, und
einen Ultraschallwandler innerhalb des Handstücks und der mit der Stanze gekoppelt ist und durch den Nutzer wahlweise dafür betreibbar ist, in der Stanze eine Ultraschallbewegung zu erzeugen, um das Schneiden zum steuerbaren Schneiden der Haut und des Gewebes um eine angestrebte Spenderstelle zu verbessern.

18. Stanze nach Anspruch 1, wobei die Ultraschallbewegung allgemein axial ist.

19. Stanze nach Anspruch 1, wobei die zinkenförmigen Elemente (13, 113, 213) distal in jeweiligen Vorderspitzen (25, 125, 225) enden, die das Anfangseindringen in das den Follikel umgebende Gewebe veranlassen, und wobei das distale Endgebiet der Stanze, das die zinkenförmigen Elemente (13, 113, 213) umfasst, ausgestellt ist.

Revendications

1. Poinçon d'extraction folliculaire comportant une structure généralement tubulaire (12) disposée autour d'un axe généralement longitudinal (11) et dont l'extrémité tranchante distale se termine en une paire de membres généralement en forme de fourche disposés de façon circonférentielle et qui s'étendent vers l'extrémité distale (13, 113, 213), arborant des bords tranchants qui s'écartent sur un axe distal (15, 114, 116, 214, 216) et sont séparés par des fentes de récupération des follicules (22, 122, 222), où
les membres en forme de fourche (13, 113, 123) se terminent respectivement à l'extrémité distale en une pointe directrice (25,125, 225) qui opère la pénétration initiale dans les tissus (104) qui enserrent un follicule (106), et les bords tranchants (15, 114, 116, 214, 216) s'étendent sur un axe proximal à partir des pointes et le long des fentes (22, 122, 222); ces fentes (22, 122, 222) étant plus longues que le bord tranchant (15, 114, 116, 214, 216) d'une distance suffisante pour permettre aux bords tranchants de contourner le follicule pendant l'insertion du poinçon sur le site d'un donneur de sorte qu'un éventuel contact ultérieur entre le poinçon et le follicule provoqué par un mouvement rotatif du poinçon autour de l'axe en question ne se fasse pas avec un bord tranchant.

2. Poinçon selon la Revendication 1, où chacun des membres en forme de fourche (13) inclut une surface coupante biseautée (24, 26) qui se termine par un bord tranchant.

3. Poinçon selon la Revendication 2, où le biseau est formé sur la surface interne (20) du corps du poinçon tubulaire.

4. Poinçon selon la Revendication 3, où le bord tranchant formé par la surface coupante biseautée (24, 26) se trouve au diamètre extérieur du poinçon.

5. Poinçon selon la Revendication 1, où les membres en forme de fourche (13) se terminent respectivement en bords tranchants (15) d'une longueur longitudinale comprise entre 1,65 mm et 4 mm.

6. Poinçon selon la Revendication 5, où les fentes de récupération des follicules (22) sont 2 à 4 mm plus longues que les bords tranchants (15).

7. Poinçon selon la Revendication 1, où les fentes de récupération des follicules (22) sont 2 à 4 mm plus longues que les bords tranchants (15).

8. Poinçon selon la Revendication 1, où les membres en forme de fourche (13, 213) se terminent respectivement à l'extrémité distale en une pointe directrice

pointue et tranchante (25, 225) qui opère la pénétration initiale dans les tissus qui enserrent le follicule.

9. Poinçon selon la Revendication 1, où les membres en forme de fourche (13, 113) se terminent respectivement à l'extrémité distale en une pointe directrice arrondie et tranchante (25, 125) qui opère la pénétration initiale dans les tissus qui enserrent le follicule.

10. Poinçon selon la Revendication 1, où les membres en forme de fourche (13, 113, 213) se terminent respectivement à l'extrémité distale en pointes directrices (25, 125, 225) qui opèrent la pénétration initiale dans les tissus qui enserrent le follicule, et où l'extrémité distale du poinçon inclut une encoche qui s'étend généralement de façon circonférentielle et de forme généralement concave qui encercle généralement la surface externe du poinçon.

11. Poinçon selon la Revendication 10, où l'encoche s'étend de préférence vers l'extrémité proximale sur 1 à 2 mm à partir des pointes (25, 125, 225) des membres en forme de fourche (13, 113, 213).

12. Poinçon selon la Revendication 1, où les fentes (22) affichent chacune un profil en « V » généralement inversé.

13. Poinçon selon la Revendication 11, où le profil en « V » généralement inversé consiste en un segment relativement distal (22b) et un segment relativement proximal (22a) fuselé de façon plus abrupte que le segment digital (22b).

14. Poinçon selon la Revendication 13, où le bord tranchant (15) de chaque membre en forme de fourche (13) s'étend à partir de sa pointe directrice (25) vers l'extrémité proximale du segment de fente distale.

15. Poinçon selon la Revendication 1, où les bords tranchants (15, 114, 116, 214, 216) arborent une ou plusieurs dentelures.

16. Poinçon selon la Revendication 1, où les fentes (122, 222) affichent chacune une forme en « U » généralement inversée.

17. Poinçon selon la Revendication 1, qui inclut
une pièce à main raccordée au poinçon pour permettre la manipulation contrôlée du poinçon par un utilisateur lors de l'extraction d'un follicule pileux hors du site ciblé d'un donneur et
un transducteur ultrasonique intégré à la pièce à main et raccordé au poinçon, qui peut être actionné par l'utilisateur, à sa guise, pour induire un mouvement ultrasonique dans le poinçon et ainsi améliorer l'incision de façon à inciser la peau et les tissus de manière contrôlée autour du site ciblé d'un donneur.

18. Poinçon selon la Revendication 1, où le mouvement ultrasonique est généralement axial.

19. Poinçon selon la Revendication 1, où les membres en forme de fourche (13, 113, 213) se terminent respectivement à l'extrémité distale en pointes directrices (25, 125, 225) qui opèrent la pénétration initiale dans les tissus qui enserrent le follicule, et où l'extrémité distale du poinçon composée des membres en forme de fourche (13, 113, 213) est évasée.

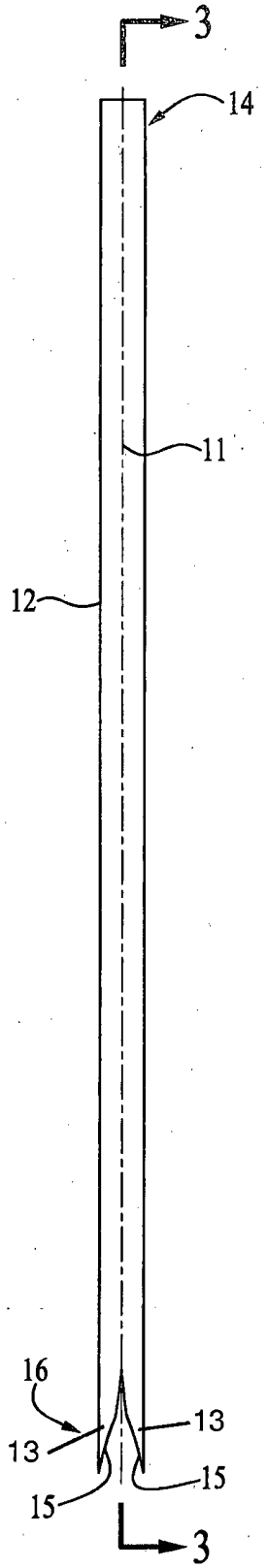

FIG. 1

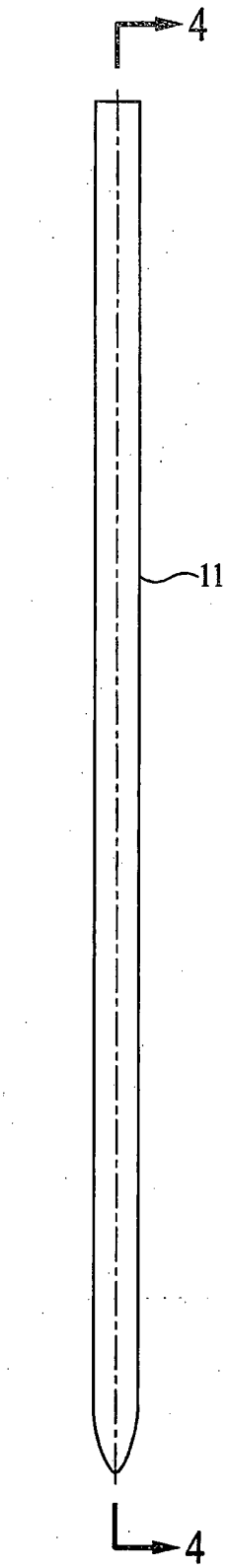

FIG. 2

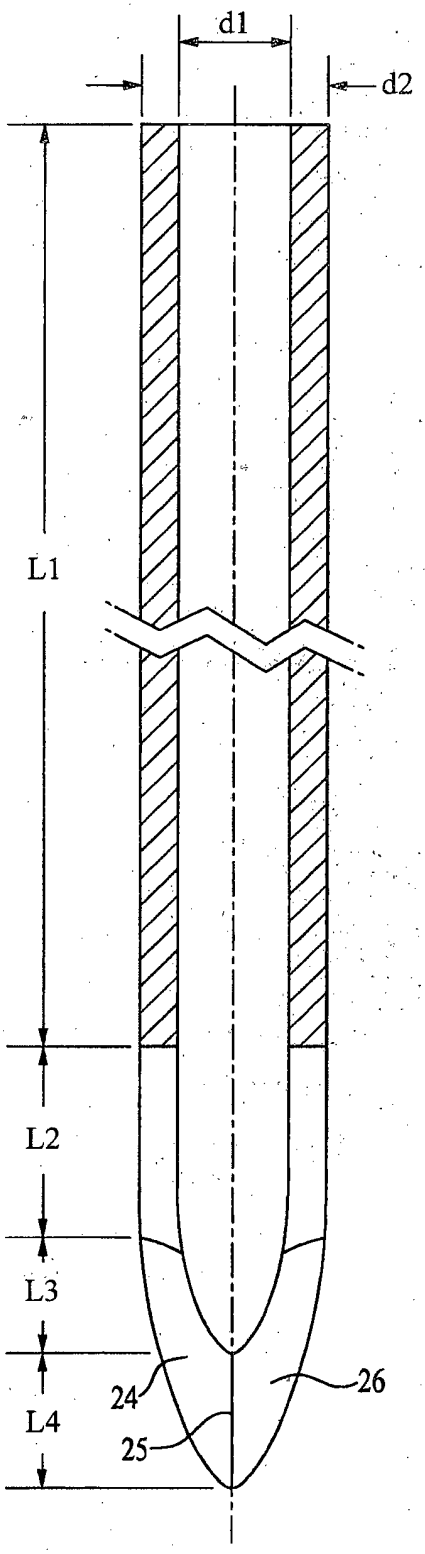

FIG. 3

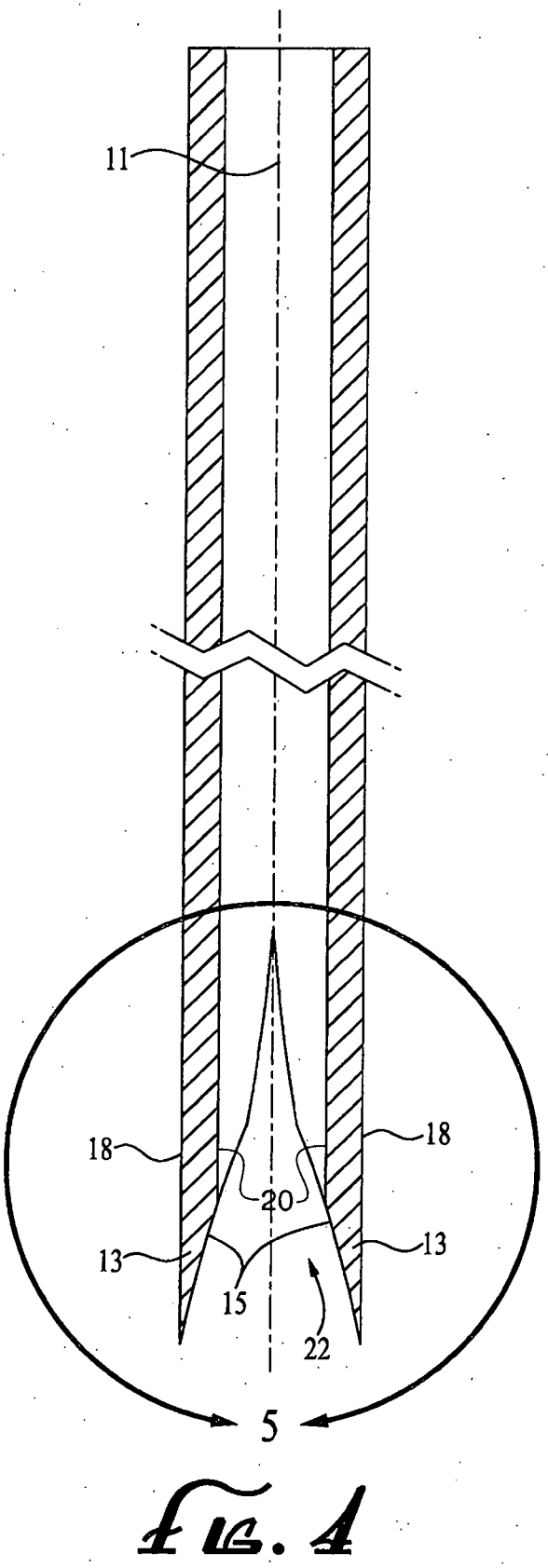

FIG. 4

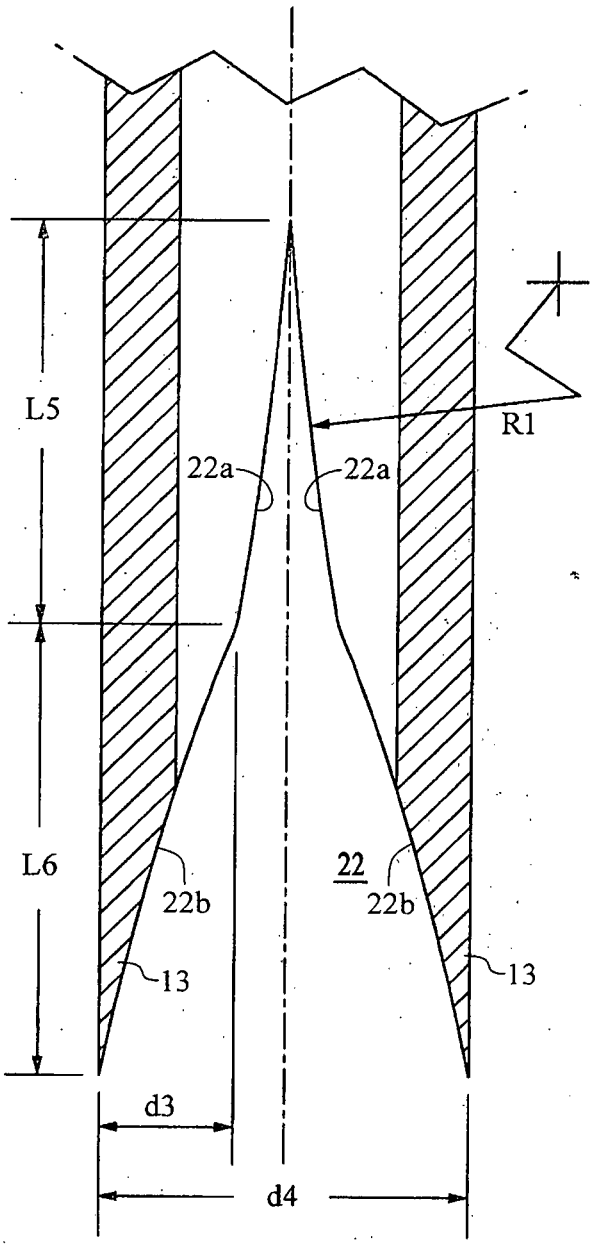

FIG. 5

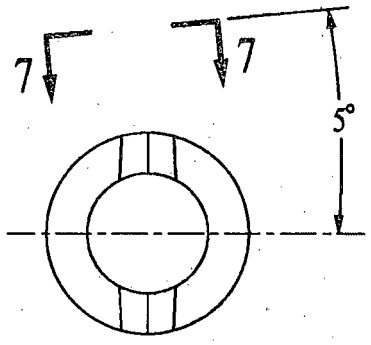

FIG. 6

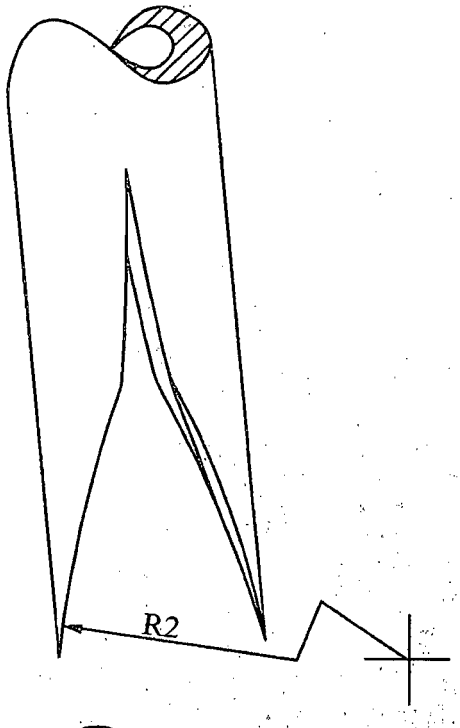

FIG. 7

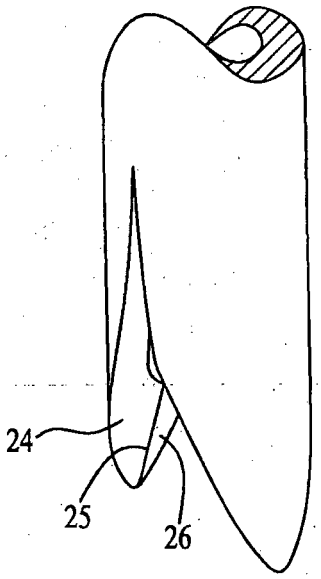

FIG. 8

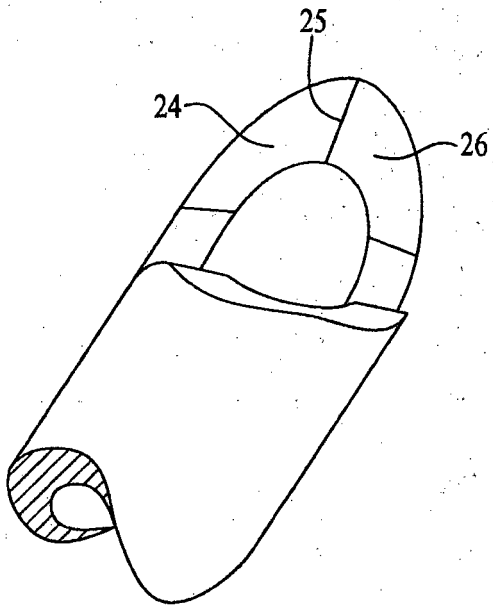

FIG. 9

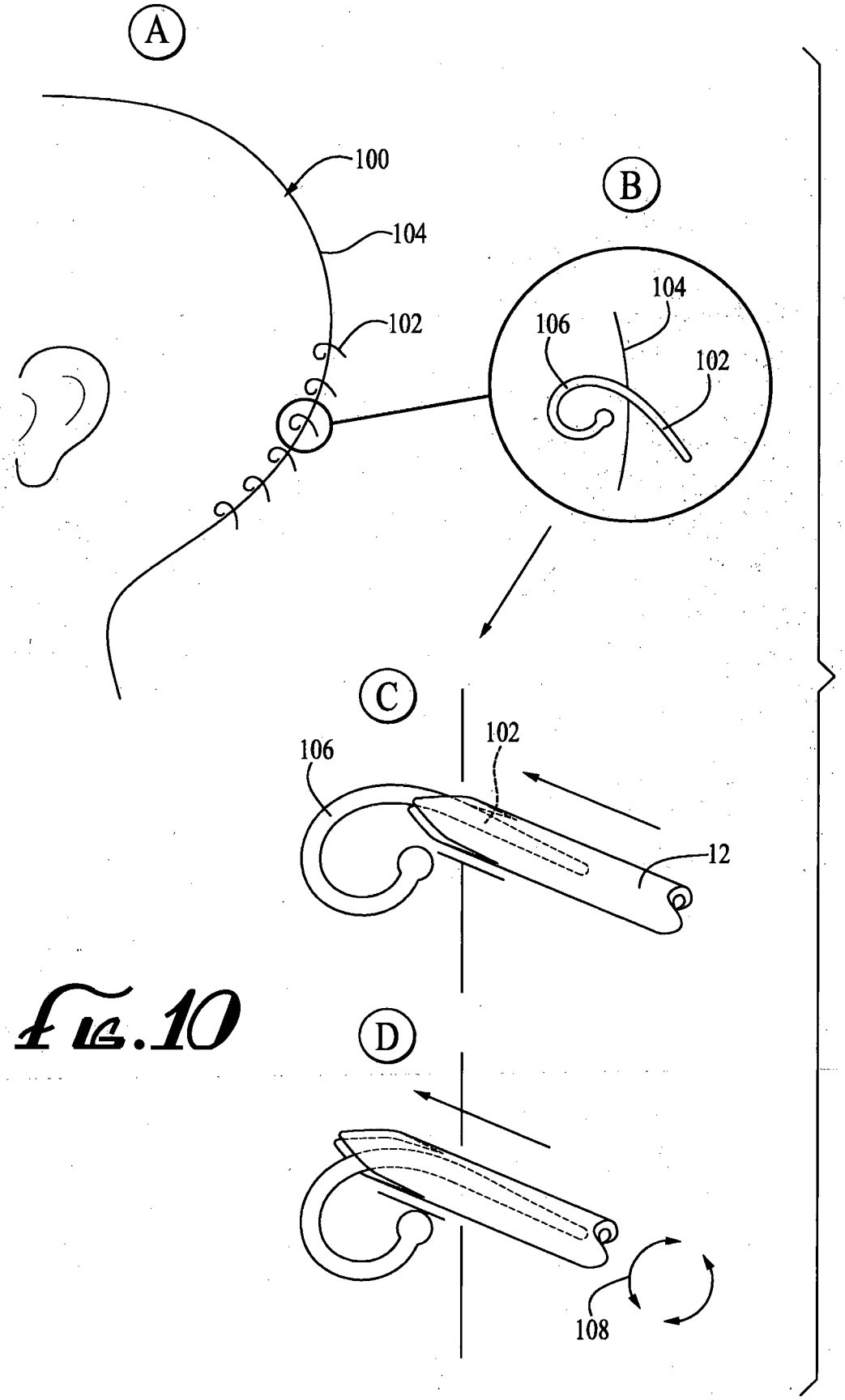

Fig.10

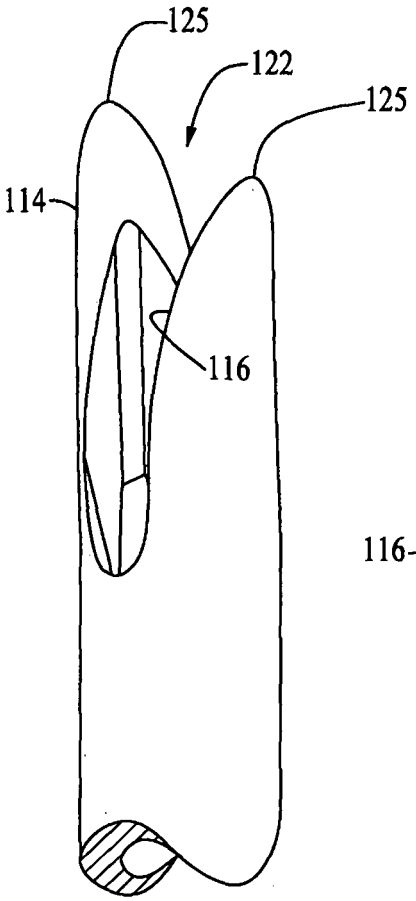

FIG. 11A

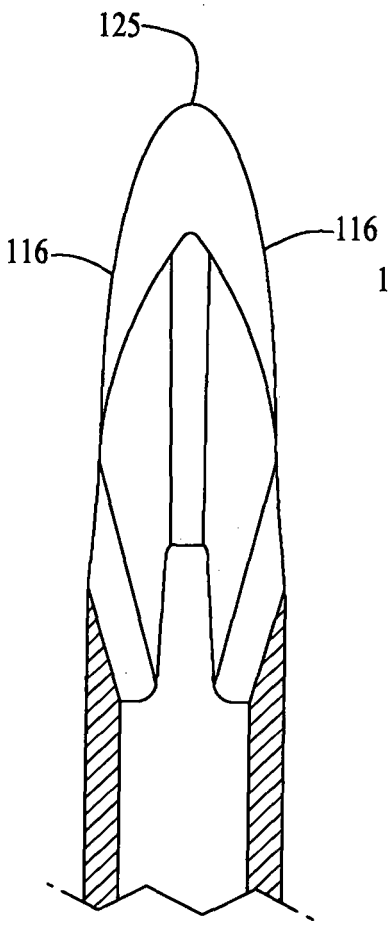

FIG. 11B

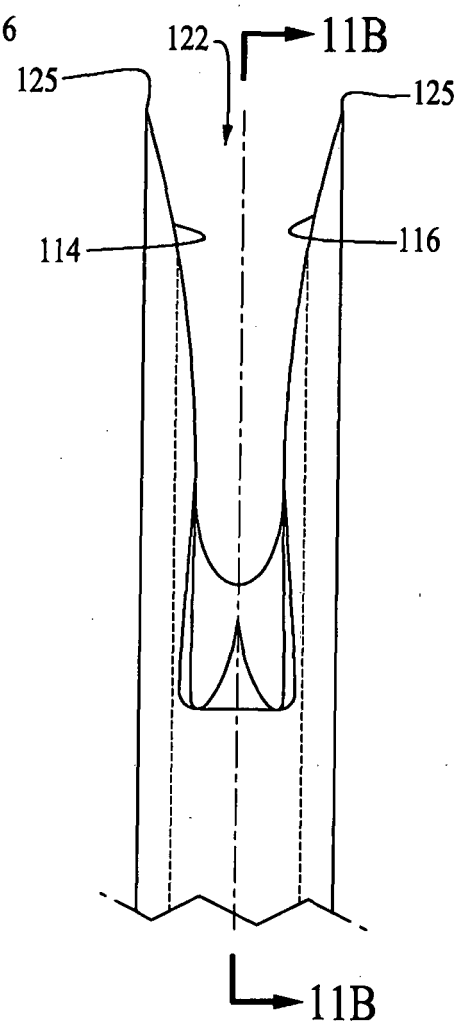

FIG. 11C

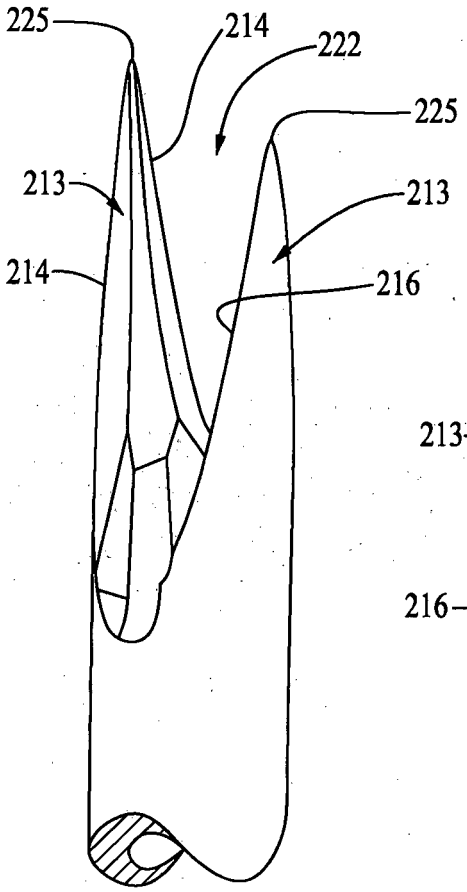

FIG. 12A

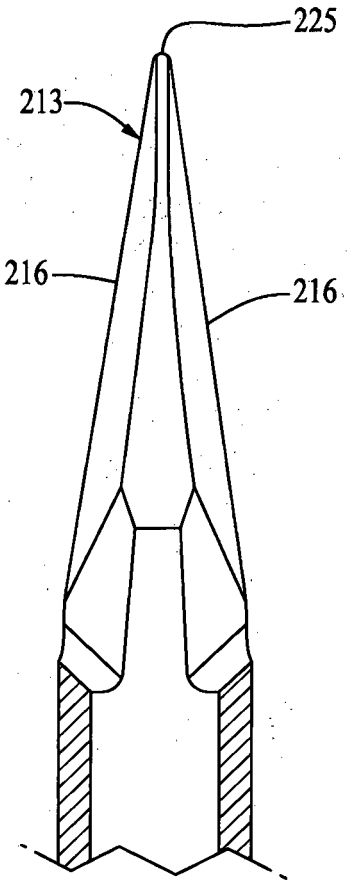

FIG. 12B

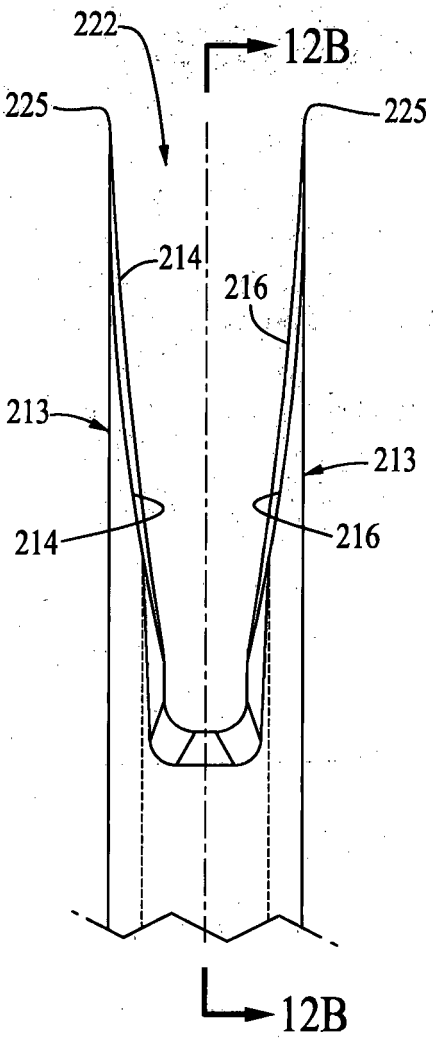

FIG. 12C

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2007156164 A **[0006]**
- US 2008234699 A **[0006]**
- JP 7100140 A **[0006]**
- US 2004116942 A **[0006]**

专利名称(译)	Follicle打孔器用于卷曲的毛囊		
公开(公告)号	EP2838448B1	公开(公告)日	2016-10-26
申请号	EP2013857615	申请日	2013-11-26
[标]申请(专利权)人(译)	UMAR SANUSI		
申请(专利权)人(译)	奥马尔SANUSI		
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发明人	UMAR, SANUSI		
IPC分类号	A61B17/3205 A61F2/10 A61B17/34		
CPC分类号	A61B17/32053 A61B17/3468 A61B2017/00752 A61B2017/320098 A61F2/10 F04C2270/0421		
代理机构(译)	迪克森DAVID		
优先权	61/874664 2013-09-06 US 61/729733 2012-11-26 US		
其他公开文献	EP2838448A1 EP2838448A4		
外部链接	Espacenet		

摘要(译)

一种特别有用的冲头，其用于从供体部位去除卷曲的毛囊，该冲头包括围绕大体纵轴设置的大体管状主体，并具有远侧切割末端区域，所述远侧切割末端区域在多个向远侧延伸的，周向设置的大体叉状构件中向远侧终止 带有向远端散开的切削刃，并由卵泡容纳缝隙隔开。 实际上，在拔出过程中，将打孔器对准供体部位，以便在打孔器插入组织中并穿透组织时，卷曲的发根通过狭缝进入行进的切割边缘，并从行进的切削刃中幸免。 然后可以使冲头略微旋转，以使切割边缘切割卵泡周围的大部分组织，而不会与卵泡发生破坏性接触。 可以注意到，旋转运动可能不是必需的，并且如果需要旋转，则旋转运动可以是一个方向，也可以是振荡旋转运动的形式，这取决于供体部位和目标卵泡的特性。

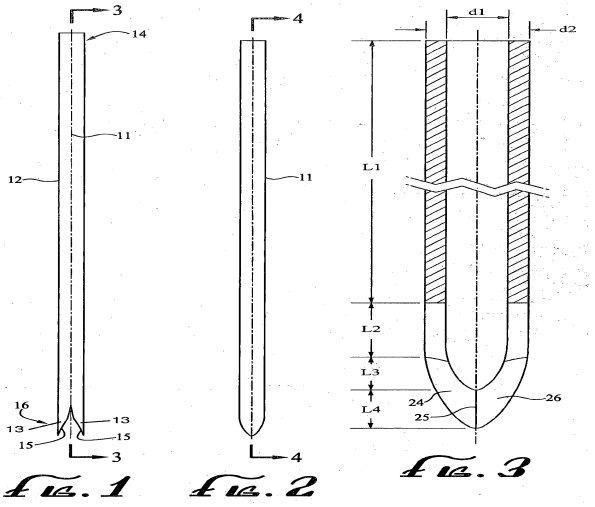

Fig. 1 Fig. 2 Fig. 3