(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 December 2007 (13.12.2007)

PCT

(10) International Publication Number
WO 2007/140543 A1

(51) International Patent Classification:
A41G 3/00 (2006.01) *A45D 1/00* (2006.01)
A41G 5/00 (2006.01)

(21) International Application Number:
PCT/AU2007/000808

(22) International Filing Date: 11 June 2007 (11.06.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2006903168 10 June 2006 (10.06.2006) AU

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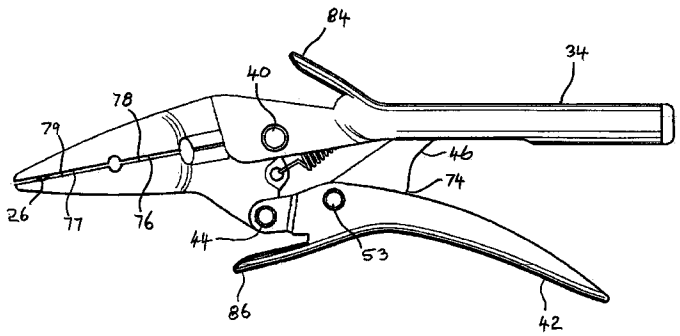
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PROCESS AND APPARATUS FOR ATTACHING SUPPLEMENTAL HAIR TO NATURAL HAIR



(57) Abstract: A method of attaching supplemental hair to human natural hair, by using a hand tool comprising a pair of jaws with attached handles, a stop means, and a spring urging the jaws apart. A plurality of strands of said human hair are threaded through a plastically deformable tube and a lock of supplemental hair inserted. The handles are squeezed to flatten the tube between the jaws to thereby clamp the lock and strands together. The handles are then squeezed closer together, to cause the handles and/or the jaws to flex without significantly further deforming the tube, until the stop means is engaged preventing the handles being squeezed more closely together. The spring opens the jaws, so releasing the deformed tube.

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PROCESS AND APPARATUS FOR ATTACHING SUPPLEMENTAL HAIR TO NATURAL HAIR

Field of the Invention

This invention concerns the attachment of extensions to the hair of persons.

Background to the Invention

The attachment of hair extensions has traditionally been primarily for the purpose of concealing partial baldness or thinning of hair growth. While this need continues, there has recently been an increased desire of particularly younger people for attachment of long locks of hair for fashion purposes, sometimes for only brief periods, and with a desire to easily apply, remove and reuse the locks and their attachment means without the need for highly skilled professional assistance

An aim of the present invention is to provide an attachment method and equipment to address such a need.

Summary of the Invention

In one aspect the invention provides a method of attaching supplemental hair to human natural hair, by using a hand tool comprising a pair of jaws with attached handles, a stop means, and a spring means urging the jaws apart, said method comprising:

(a) threading a plurality of strands of said human hair through a plastically deformable tube,

(b) inserting into the tube an end of a lock of said supplemental hair,

(c) squeezing the handles to squeeze the tube between the jaws to thereby flatten the tube by plastic deformation to clamp the lock and strands together,

(d) continuing to squeeze the handles closer together, to cause the handles and/or the jaws to flex without significantly further deforming the tube, until the stop means is engaged preventing the handles being squeezed closer together,

(e) reducing the squeezing action on the handles until the spring means opens the jaws, so releasing the deformed tube.

The hand tool preferably has a pliers-like construction including a first handle, a second handle, a first jaw and a second jaw.

The first handle may have a tubular portion within which is an adjustment screw which adjusts longitudinally to said first handle to set the extent of said flex before said stop means is engaged. Preferably a handle-linking member is slidably engaged at a first of its ends with said first handle and pivotally engaged at the second of its ends with said second handle and a portion of said handle-linking member spaced from said handle-linking member's ends bears against said stop means thus preventing the handles being squeezed closer together. The stop means is preferably a protrusion located within said second handle.

Preferably the first jaw and the first handle are fastened together in a fixed relationship, the second jaw pivots from the first handle on a first pin, the second handle pivots from the second jaw on a second pin , and a handle-linking member is slidably engaged at a first of its ends with said first handle and pivots on a third pin through said second handle, said first end of the handle-linking member bears against said adjustment screw at a contact, and wherein the axis of said third pin is prevented by the stop means from passing through a straight line drawn between the axis of the second pin and said contact between the handle-linking member and the adjustment screw.

Preferably said flattening of the tube occurs by squeezing the tube between smooth flat opposed faces on the jaws without causing significant damage to a coloured coating on the outer surface of the tube.

In another aspect the invention provides a pliers-like hand tool for attaching supplemental hair to human natural hair, said hand tool comprising a pair of opposed jaws with attached handles for squeezing the jaws towards each other, a spring means urging the jaws apart, each said jaw having a smooth face opposing another smooth face on the other jaw and a smooth surfaced straight groove upon each of said opposed smooth faces, wherein when said jaws are closed said grooves in conjunction form a smooth-surfaced hole between the jaws. Preferably said grooves have a semi-circular cross-section such that when said jaws are closed said smooth-surfaced hole between the jaws is cylindrical.

In another aspect the invention provides a method of attaching a lock of supplemental hair to human natural hair, and later detaching the lock of supplemental hair, comprising the steps of:

(a) threading a plurality of strands of said human hair through a plastically deformable tube which has a coloured coating on its outer surface,

(b) inserting into the tube an end of a lock of said supplemental hair,

(c) squeezing the tube between a pair of jaws of a hand tool to thereby flatten the tube to clamp the lock and strands together, each said jaw having a smooth face opposing another smooth face on the other jaw, and said flattening of the tube occurring by squeezing the tube between said smooth faces without causing significant damage to said coating,

(d) inserting the flattened tube between the jaws and within a smooth surfaced straight groove having a semi-circular cross-section let into each said smooth face, and squeezing the tube within said grooves to thereby unflatten the tube and reform it to a cylindrical shape without causing significant damage to said coating, and

(e) sliding said end of the lock of supplemental hair out of the tube.

The lock of said supplemental hair preferably comprises a plurality of individual hairs bonded together at one end by a short cylindrical plug of hardened adhesive, said plug being a loose sliding fit in said tube.

In another aspect the invention provides a method of attaching a lock of supplemental hair to human natural hair comprising the steps of:

(a) threading a plurality of strands of said human hair through a plastically deformable tube,

(b) inserting into the tube an end of a lock of said supplemental hair, and

(c) squeezing the tube between a pair of jaws of a hand tool to thereby flatten the tube to clamp the lock and strands together,

said hand tool actuating as described in this specification with reference to Figures 5 to 7.

In a further aspect the invention provides a method of detaching a lock of supplemental hair previously attached to a plurality of strands of human hair by clamping said lock and said strands of human hair together in a flattened plastically deformable tube which has a coloured coating on its outer surface, said method of detaching comprising the steps of:

(a) inserting the flattened tube between a pair of jaws of a hand tool and squeezing the flattened tube to thereby unflatten the tube, and

(b) sliding said end of the lock of supplemental hair out of the tube,

wherein each said jaw has formed therein a smooth surfaced straight groove having a semi-circular cross-section sized to be a snug fit on the tube before said flattening, and said flattened tube is positioned within said smooth grooves when squeezed to unflatten the tube, said tube thereby being reformed to a cylindrical shape without causing significant damage to said coating.

Brief Description of the Drawings

In order that the invention may be more fully understood there will now be described, by way of example only, preferred embodiments and other elements of the invention with reference to the accompanying drawings where:

Figures 1 to 3 show successive steps in the process of attaching a lock of supplemental hair to some strands of human hair according to one embodiment of the invention;

Figure 4 is a cross section view of a short tube shown in Figures 1 to 3;

Figure 5 is a side view of a hand tool used in the process;

Figure 6 is a side view of the tool in Figure 5 shown with a tube squeezed between its jaws to the point where the human hair and supplemental hair are firmly held by the deformed tube;

Figure 7 is a view similar to Figure 6 but with the handles squeezed tighter together until a stop means is engaged;

Figure 8 is a partially cut-away view of the tool, shown with its adjusting screw adjusted excessively in one direction; and

Figure 9 is a partially cut away view of the tool, shown with its adjusting screw adjusted excessively in the other direction.

Description of the Preferred Embodiment and Other Examples of the Invention

Referring to Figure 1, a lock 10 of supplemental hair has been earlier prepared by bundling together an appropriate plurality of individual hairs 12 in a generally parallel configuration and bonding them together at one end by a short cylindrical plug 14 of appropriate glue. A thermoplastic glue is suitable but other glues may be used. Typically the hair in the lock 10 may be around 50cm long, but any desired length may be used. The hairs in the lock may be of synthetic material, but natural hairs are preferred. Such locks are commercially available.

About twenty strands 16 of a person's natural hair are separated and threaded through a short tube 18. This may be conveniently achieved (but not shown in the Figures) by first passing a loop of thread through the tube, passing the hair strands through the loop and then pulling the loop back through the tube, so pulling the hair strands 16 also through the tube.

As shown in Figure 2, the plug 14 is then inserted into the tube 18 so the lock 10 extends outwards in the same direction as the natural hairs 16. The tube is then squeezed tight with a hand tool, which is described later in this specification, to flatten the tube so that the plug 14 and the hairs 16 are clamped within the tube. The flattened tube 26 is shown in Figure 3.

As seen in Figure 4, one end 20 of the tube 18 is slightly flared out at its rim in order to make insertion of the plug 14 easier from that end. The rim at the other end 22 of the tube 18 is rolled inwards a little, which assists in preventing the plug being pushed too far through the tube.

The tube 18 is preferably made of copper or brass, or perhaps aluminium, but could be another appropriately malleable metal alloy. The outer surface 24 of the tube has paint or some other coating applied to it to give it a colour close to that of the hairs 12 in order to make the tube as inconspicuous as possible. For this reason, the manner in which the tube is squeezed is important so as to not damage the coating.

The tube is squeezed by means of the hand tool 30 shown in Figure 5. The tool has the general form of a self locking pair of long nose pliers. However, while the present tool 30 uses a jaw movement and leverage principles similar to many locking pliers, it is specifically designed to have no self locking function.

As seen from Figures 5 and 8, the pliers 30 have an elongated handle member 32 which includes an elongated upper handle 34 and an upper jaw 36. The upper handle is fixed in relationship to the upper jaw. A lower jaw 38 pivots, on a pin 40, from the upper handle 34 and an elongated lower handle 42 pivots, on a pin 44, from the lower jaw 38.

The lower handle 42 has a forward end 62 adjacent the jaws 36 and 38 and a distal end 50 away from the jaws. Similarly the upper handle 34 has a forward end 64 adjacent the jaws and a distal end 48 away from the jaws. The lower handle 42 has a channel-shaped cross section, and its forward end 62 is bifurcated and a corner 43 of the lower jaw 38 is pivoted, between the bifurcation arms, on the pivot pin 44. The forward end 64 of the upper handle is channel shaped and another corner 39 of the lower jaw is secured within the channel by the pivot pin 40.

The distal end 48 of the upper handle is cylindrically tubular and contains an adjustment screw 58 which is threadably engaged with a nut 60 which is rigidly

attached to and within the upper handle 34. The screw 58 has, at its distal end, a slotted head 59 which may be rotated for adjustment by a screwdriver inserted into the tubular end of the handle 34. At the screw's other end 56 it has a flat end face 57 transverse to its axis. A removable plastic cap 61 plugs the end 48 of the upper handle and restricts access to the head 59 of the adjustment screw once the screw is set as desired. The operation and adjustment of the screw is described later in this specification.

A handle-linking member 46 links the handles 34 and 42 in the region between the pivot pin 40 and the distal ends 48 and 50. The handle-linking member is pivotally engaged at one of its ends (the lower end) 52 about a pivot pin 53 through the lower handle 42. As shown in cutaway in Figures 8 and 9, the other end (upper end) 54 is engaged with the upper handle, and in particular with the end face 57 of the adjustment screw 58.

An extension coil spring 66 extends between respective anchoring holes 68 and 70 in the upper handle and the lower jaw. The spring urges the jaws 36 and 38 apart and, by doing so, urges the pivot pins 44 and 53 rearwards and thus urges the upper end 54 of the linking member 46 into contact with the abutment end 56 of the screw.

A stop 72 is formed within the channel-shaped lower handle 42. A bulge 74 on the linking member 46 hits the stop 72 when the desired maximum force is applied to the handles. Unlike locking pliers, the pivot pin 53 cannot move over centre (ie the centre of pin 53 cannot cross a straight line drawn between the centre of pin 44 and the linking member's contact with the abutment 56).

The jaws 36 and 38 have respective opposed faces 76 and 78. Each of faces 76 and 78 has a smoothly polished flat surface except for a smoothly-walled straight groove, 80 and 82 respectively, of semi-circular cross-section which runs across the width of each face 76 and 78 about half way along the face. The flat portions 77 and 79 of faces 76 and 78 respectively are each bisected by their respective grooves 80 and 82.

Closing the pliers 30 by moving the handle 42 towards the handle 34 causes the pin 44 to move forwards and the flat surface portions 77 and 79 to shut flat against each other (as seen in Figure 9) when there is nothing between the jaws. The grooves 80 and 82 are aligned relative to each other so that when the jaw faces 76 and 78 are in contact, the grooves in conjunction form a smooth-walled cylindrical hole 83 through the closed pliers 30.

When a tube 18 is to be flattened, it is placed between the jaws and squeezed with the flat portions 77 and 79 of the faces 76 and 78. Unlike conventional pliers, there are no serrations across the faces 76 and 78 which would cause damage to the painted exterior of the tube. The handles are squeezed until the position shown in Figure 6 is reached. At this stage, the flattened tube 26 containing the plug 14 and hair strands 16 is flattened to the maximum extent it will be in the attachment process. It reaches a point where any greater flattening requires a substantial increase in the applied force. At this stage the bulge 74 has not yet made contact with the stop 72.

The operator then squeezes the handles a little tighter until the stage shown in Figure 7 is reached. It can be seen that although the faces of the jaws have not discernibly moved closer to each other, the bulge 74 on the handle linking member 46 has entered further into the channel section of the lower handle 42. The bulge has now contacted the stop 72, but this contact is hidden from view in Figure 7. The movement of the handle linking member 46 despite no discernable movement between the faces 76 and 78 is due to elastic flex of the handles and, to a lesser degree, the jaws. When the bulge 74 hits the stop 72 there is a distinct tactile sensation felt by the operator as the resistance to further squeezing rises abruptly. At this stage the operator releases the hand squeezing, the spring 66 causes the handles and jaws to open, and the operator can repeat the process with other tubes and locks of supplemental hair.

The provision of a hard stop with tactile feedback means the operator knows that sufficient force has been applied to the tube, and also prevents possible cutting of the natural hair 16 from over compression of the tube. It also means that, even though an operator may be applying over 100 locks of hair over a short period, any tiredness does not result in a variation of the holding force applied by the tubes to the hair.

Also, different operators will produce the same holding force within the tubes despite individual differences in the strength of the operators.

Proper adjustment of the screw 59 is required for correct operation of the process. By way of explanation, Figure 8 is included to show the effect of having the screw 58 adjusted out much too far. In this situation the bulge 74 has contacted the stop 72, so preventing further closure, before the jaws 36 and 38 have closed sufficiently. Although the situation as illustrated is extreme, it can be seen that closer to (but still short of) the desired setting, the stop could be engaged before the tube is sufficiently compressed. Such a condition is detected by the operator because the operator senses there has been no flexing of the handles before the stop is encountered.

Similarly, Figure 9 illustrates the effect of having the screw 58 adjusted in much too far. In this situation the bulge 74 fails to contact the stop 72 so, after sufficient compression has been applied to the tube, further increased squeezing of the handles mainly causes excessive flexing of the handles without a discernable further closing of the jaws 36 and 38. Although the position as illustrated in Figure 9 is also extreme, it can be seen that closer to (but still short of) the desired setting, excessive force could be applied after the tube is sufficiently compressed thereby damaging the hair. Such a poor adjustment condition is sensed by a skilled operator as excessive flexing of the handles before the stop is engaged .

The faces 76 and 78 have generally parallel edges for most of their length, and their width is the same as or slightly greater than the length of the tubes 18. Typically the tubes are about 7mm long, 2.5mm internal diameter and 3mm external diameter. So the jaws are about 7mm wide at the groove. The grooves 80 and 82 together form a cylindrical hole 83 of 3mm diameter across the jaws when the jaws are closed.

When the lock 10 of hair is to be removed, the flattened tube 26 is placed between the jaws, with its thin edges in the grooves 80 and 81, and the handles are squeezed by one hand of the operator. The tube opens up and is formed by the grooves 80 and 81 into a near perfect cylindrical tube again. The plug 14 and strands of natural hair 16 are then easily removed from the tube. The tube may be reused if desired, an

advantage made possible by the smooth surfaces 77 and 79 not damaging the coloured surface during flattening of the tube, plus the smooth surface and accurate sizing of the grooves 80 and 82 causing a full and accurate reforming of the tube. It has been found that tubes may be successfully reused more than ten times in this manner.

It is not feasible to reform the tube by squeezing the flattened tube between the flat surfaces 77 and 79. Those surfaces are too smooth to properly grip the edges of the flattened tube 26 and, if attempted, the flattened tube almost always rotates uncontrollably instead of opening out. Also, on the rare occasions that the flattened tube may be encouraged to grip, the tube would not open out to a smoothly formed cylinder.

Towards their forward ends 62 and 64 the handles 34 and 42 include wing portions 84 and 86 extending outwards in the plane of motion of the handles and towards the jaws. The wing portions 84 and 86 are smoothly blended into the shape of the handles and assist in preventing the operator's hand from sliding forwards, thus improving operator comfort.

Whilst the above description includes the preferred embodiments of the invention, it is to be understood that many variations, alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the essential features or the spirit or ambit of the invention.

It will be also understood that where the word "comprise", and variations such as "comprises" and "comprising", are used in this specification, unless the context requires otherwise such use is intended to imply the inclusion of a stated feature or features but is not to be taken as excluding the presence of other feature or features.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that such prior art forms part of the common general knowledge.

Claims

1. A method of attaching supplemental hair to human natural hair, by using a hand tool comprising a pair of jaws with attached handles, a stop means, and a spring means urging the jaws apart, said method comprising:

(a) threading a plurality of strands of said human hair through a plastically deformable tube,

(b) inserting into the tube an end of a lock of said supplemental hair,

(c) squeezing the handles to squeeze the tube between the jaws to thereby flatten the tube by plastic deformation to clamp the lock and strands together,

(d) continuing to squeeze the handles closer together, to cause the handles and/or the jaws to flex without significantly further deforming the tube, until the stop means is engaged preventing the handles being squeezed closer together,

(e) reducing the squeezing action on the handles until the spring means opens the jaws, so releasing the deformed tube.

2. A method according to claim 1 wherein the hand tool has a pliers-like construction including a first handle, a second handle, a first jaw and a second jaw.

3. A method according to claim 2 wherein said first handle has a tubular portion within which is an adjustment screw which adjusts longitudinally to said first handle to set the extent of said flex before said stop means is engaged.

4. A method according to claim 2 or 3 wherein a handle-linking member is slidably engaged at a first of its ends with said first handle and pivotally engaged at the second of its ends with said second handle and a portion of said handle-linking member spaced from said handle-linking member's ends bears against said stop means thus preventing the handles being squeezed closer together.

5. A method according to any one of the previous claims wherein the stop means is a protrusion located within said second handle.

6. A method according to claim 2 or 3 wherein the first jaw and the first handle are fastened together in a fixed relationship, the second jaw pivots from the first handle on a first pin, the second handle pivots from the second jaw on a second pin , and a handle-linking member is slidably engaged at a first of its ends with said first handle and pivots on a third pin through said second handle, said first end of the handle-linking member bears against said adjustment screw at a contact, and wherein the axis of said third pin is prevented by the stop means from passing through a straight line drawn between the axis of the second pin and said contact between the handle-linking member and the adjustment screw.

7. A method according to any one of the previous claims wherein said flattening of the tube occurs by squeezing the tube between smooth flat opposed faces on the jaws without causing significant damage to a coloured coating on the outer surface of the tube.

8. A pliers-like hand tool for attaching supplemental hair to human natural hair, said hand tool comprising a pair of opposed jaws with attached handles for squeezing the jaws towards each other, a spring means urging the jaws apart, each said jaw having a smooth face opposing another smooth face on the other jaw and a smooth surfaced straight groove upon each of said opposed smooth faces, wherein when said jaws are closed said grooves in conjunction form a smooth-surfaced hole between the jaws.

9. A hand tool according to claim 8 wherein said grooves have a semi-circular cross-section such that when said jaws are closed said smooth-surfaced hole between the jaws is cylindrical.

10. A method of attaching a lock of supplemental hair to human natural hair, and later detaching the lock of supplemental hair, comprising the steps of:

(a) threading a plurality of strands of said human hair through a plastically deformable tube which has a coloured coating on its outer surface,

(b) inserting into the tube an end of a lock of said supplemental hair,

(c) squeezing the tube between a pair of jaws of a hand tool to thereby flatten the tube to clamp the lock and strands together, each said jaw having a smooth face opposing another smooth face on the other jaw, and said flattening of the tube occurring by squeezing the tube between said smooth faces without causing significant damage to said coating,

(d) inserting the flattened tube between the jaws and within a smooth surfaced straight groove having a semi-circular cross-section let into each said smooth face, and squeezing the tube within said grooves to thereby unflatten the tube and reform it to a cylindrical shape without causing significant damage to said coating, and

(e) sliding said end of the lock of supplemental hair out of the tube.

11. A method according to any one of claims 1 to 7 or claim 10 wherein said lock of said supplemental hair comprises a plurality of individual hairs bonded together at one end by a short cylindrical plug of hardened adhesive, said plug being a loose sliding fit in said tube.

12. A method of attaching a lock of supplemental hair to human natural hair comprising the steps of:

(a) threading a plurality of strands of said human hair through a plastically deformable tube,

(b) inserting into the tube an end of a lock of said supplemental hair, and

(c) squeezing the tube between a pair of jaws of a hand tool to thereby flatten the tube to clamp the lock and strands together,

said hand tool actuating as described in this specification with reference to Figures 5 to 7.

13. A method of detaching a lock of supplemental hair previously attached to a plurality of strands of human hair by clamping said lock and said strands of human hair together in a flattened plastically deformable tube which has a coloured coating on its outer surface, said method of detaching comprising the steps of:

(a) inserting the flattened tube between a pair of jaws of a hand tool and squeezing the flattened tube to thereby unflatten the tube, and

(b) sliding said end of the lock of supplemental hair out of the tube,

wherein each said jaw has formed therein a smooth surfaced straight groove having a semi-circular cross-section sized to be a snug fit on the tube before said flattening, and said flattened tube is positioned within said smooth grooves when squeezed to unflatten the tube, said tube thereby being reformed to a cylindrical shape without causing significant damage to said coating.

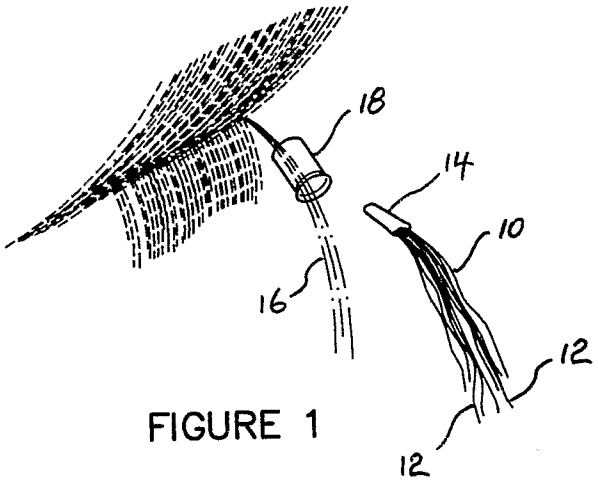

FIGURE 1

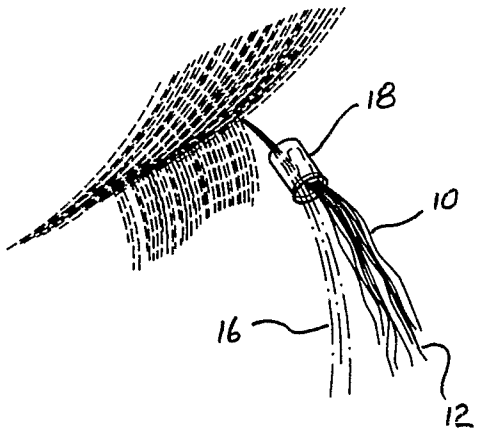

FIGURE 2

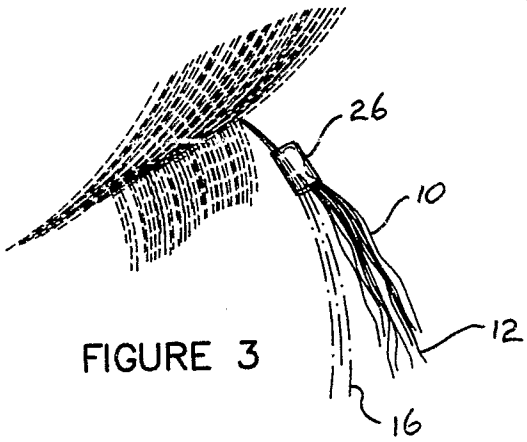

FIGURE 3

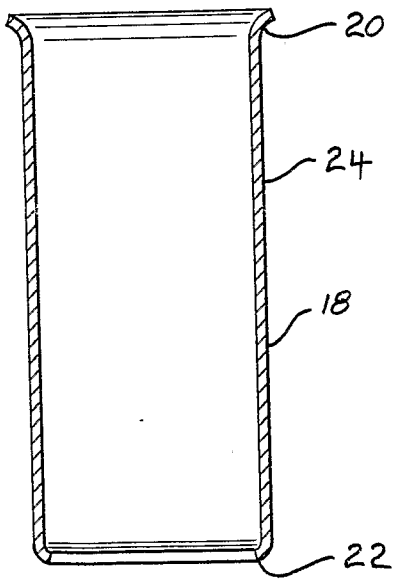

FIGURE 4

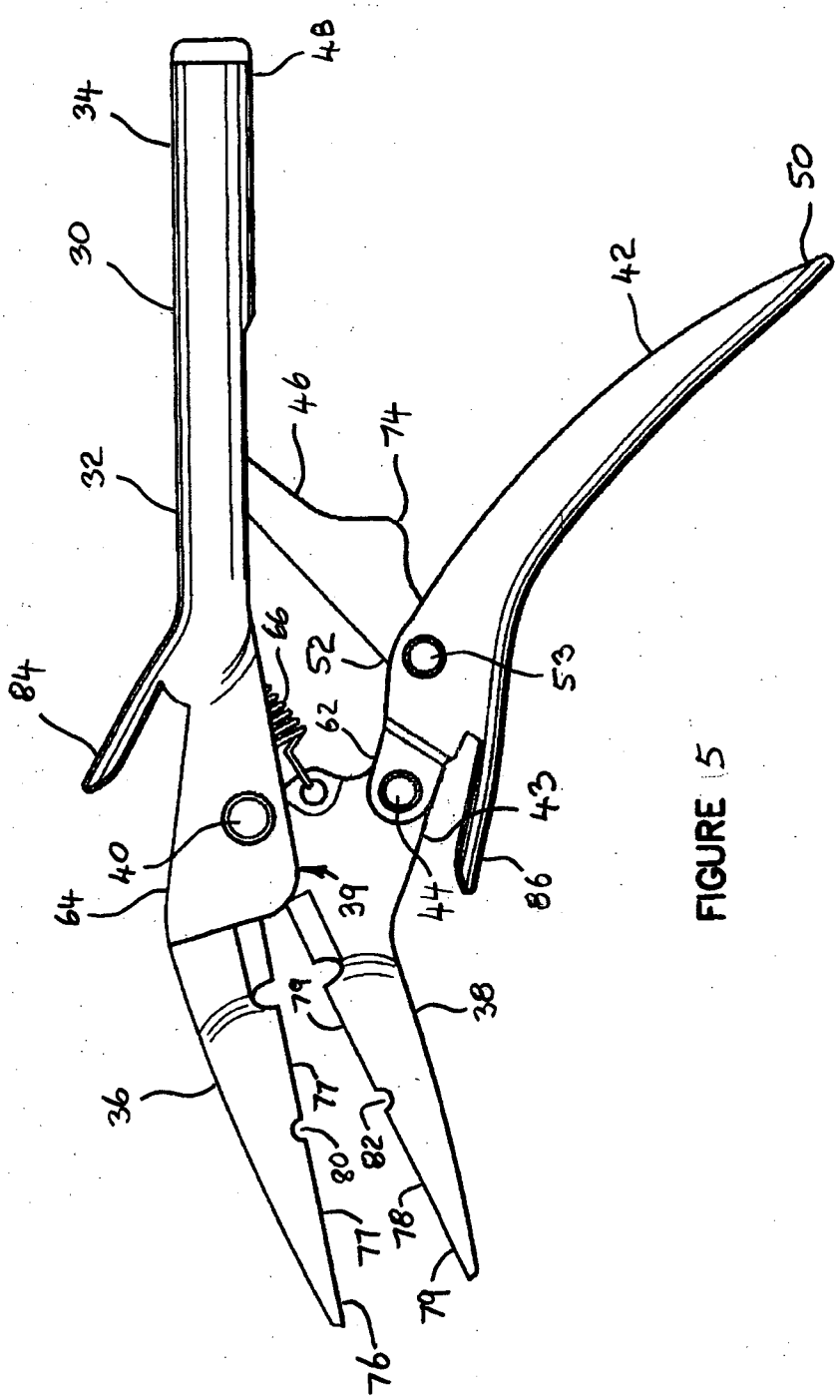
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FIGURE 5

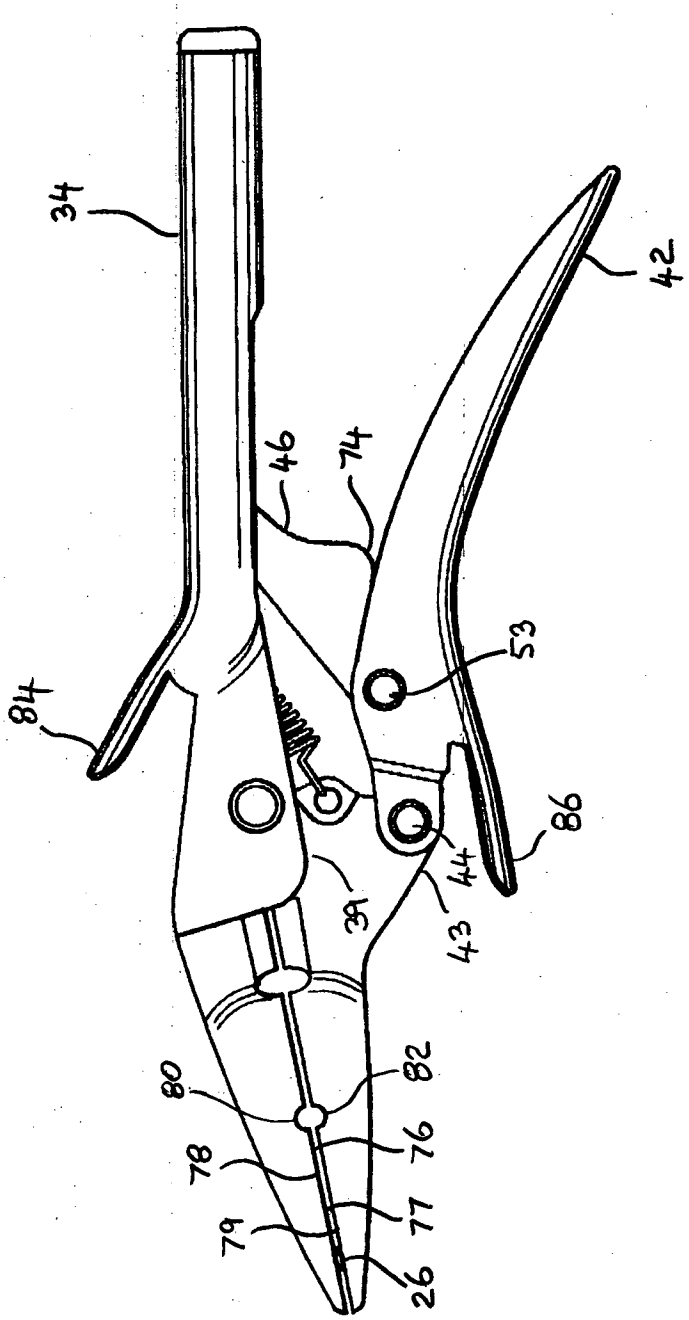

FIGURE 6

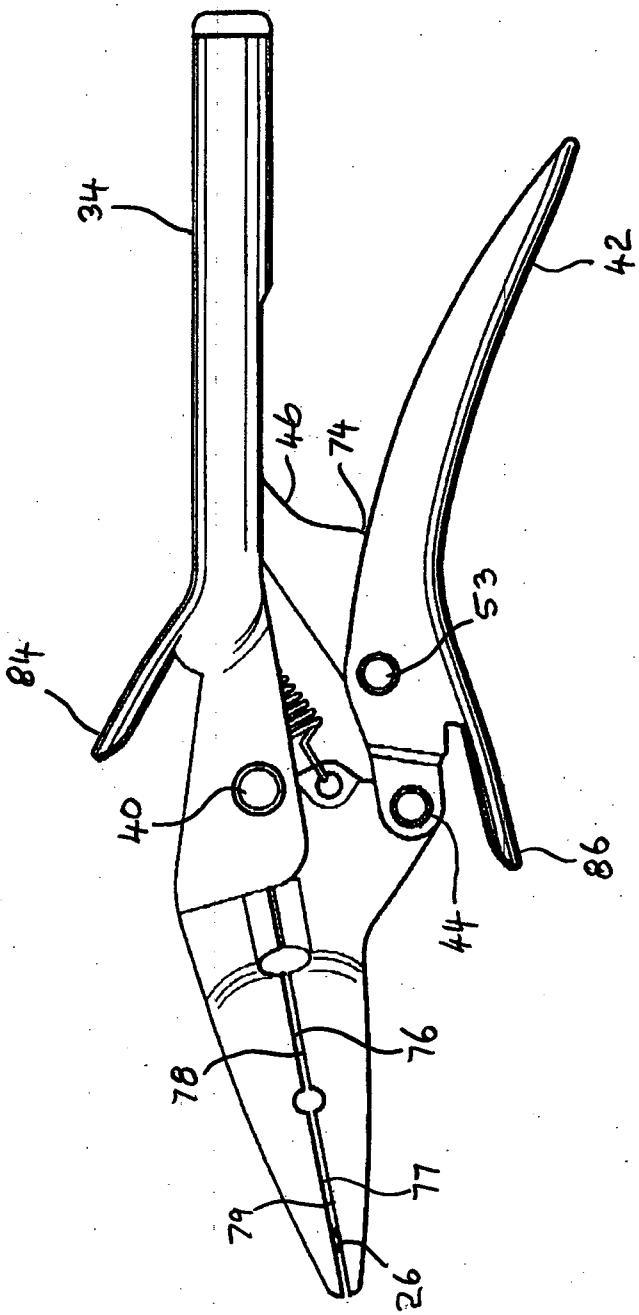

FIGURE 7

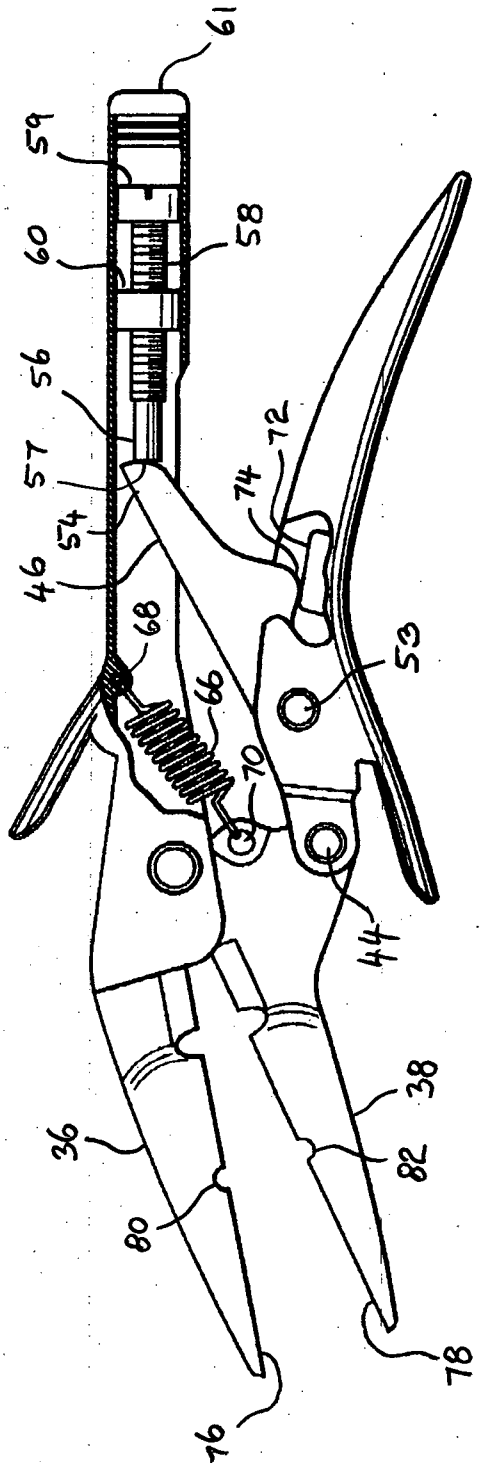

FIGURE 8

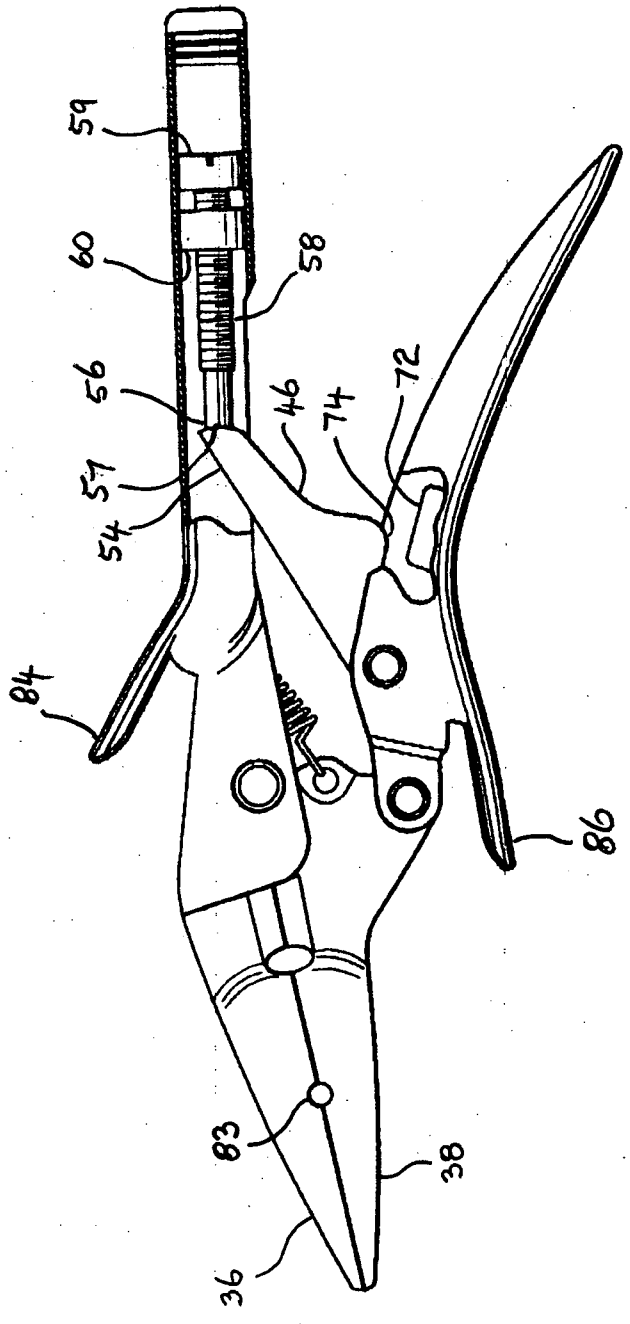

FIGURE 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/000808

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

A41G 3/00 (2006.01) ***A41G 5/00*** (2006.01) ***A45D 1/00*** (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)
DWPI: IPC Marks A41G 3/00, 5/00, A45D/- +Keywords (attach, fix, add, glue, increase, decrease, artificial, supplement, extend, tube, metal, flat, hair)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5107867 A (BARRINGTON) 28 April 1992	1-13
A	US 2004/0149301 A (ARROYO et al) 5 August 2004	1-13
A	US 2006/0086368 A (SALINAS) 27 April 2006	1-13
A	WO 2004/043182 A (EURO HAIR FASHION B.V) 27 May 2004	1-13
A	AU 59307/99B (768600) (BANFIELD) 11 May 2000	1-13
A	JP 2004285551 A (RIJERU YG) 14 October 2004	1-13

☐ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search
21 August 2007

Date of mailing of the international search report
24 AUG 2007

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2007/000808

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	5107867		NONE				
US	2004149301	AU	2004210116	BR	PI0407105	CA	2514867
		EP	1587383	HK	1076362	MX	PA04001036
		US	6938624	US	7246623	US	2006005848
		WO	2004068984				
US	2006086368	AU	2005247321	CA	2567072	EP	1750533
		US	2005252517	US	2005252518	WO	2005115187
WO	2004043182	AU	2003284834	EP	1560504		
AU	5930799	AU	59307/99				
JP	2004285551		NONE				

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

END OF ANNEX