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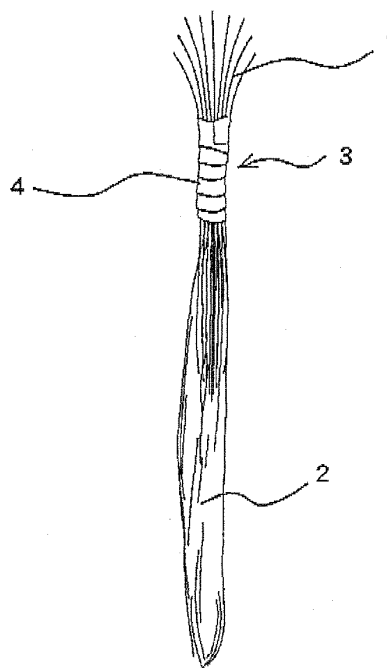
(54) **STRUCTURE FOR BONDING GRAY HAIR BUNDLE TO FIBER BUNDLE FOR HAIR AND METHOD OF BONDING GRAY HAIR BUNDLE TO FIBER BUNDLE FOR HAIR**

(57) The invention provides a scalp hair strand/supplemental hair fiber strand attachment structure and method, which enables the scalp hair strand (1) to be firmly tied to the supplemental hair fiber strand (2) without giving a pull to the scalp from which scalp hairs grow, doing damage to the scalp and inflicting pain on the wear-

er while at work, with ease, in very short work time, and with no need of expertise.

The tying portion of the scalp hair strand (1) to the supplemental hair fiber strand (2) is tied up via a binder or bonding adhesive and the tying portion (3) of both strands is further wrapped around with a tape (4) having an adhesive.

Fig.1



Description

ART FIELD

[0001] The present invention relates generally to a supplemental hair fiber strand attachment method, and more particularly to a method of attaching a supplemental fiber strand for human or artificial hairs to scalp hairs.

BACKGROUND ART

[0002] To change the length or amount of hairs, the attachment of a supplemental hair fiber strand to scalp hairs has generally been used. Called hair extension, the hair fiber strand is broken down to two types: one made of human hairs and the other made of synthetic fibers such as polyethylene.

[0003] Supplemental hair fiber strands fabricated from human hairs have a natural texture, are well compatible with scalp hairs, and are skin-friendly, because they are themselves made from human hairs. On the other hand, supplemental hair fiber strands fabricated from synthetic fibers such as polyethylene fibers have some merits of costing less, being compatible with hairs in various colors, and changing less in quality. Thus, supplemental hair fiber strands fabricated from human hairs and synthetic fibers have their own merits; so they are used for separate purposes depending on users' demands.

[0004] The supplemental hair fiber strand fabricated from human hairs or man-made fibers is attached to the hair to make the whole hair longer than scalp hairs or volumize and/or extend the hair, and it is generally attached to the hair by weaving a portion of the hair or using fixing means such as metal fixtures.

[0005] Generally, the attachment of the supplemental hair fiber strand to the hair is implemented by weaving it through a portion of the hair, for instance, brading it with the hair in three or four.

[0006] For brading the supplemental hair fiber stand with the hair in four as an example, first, scalp hairs sorted out of a few mm² or a few cm² of the scalp are parted into two: scalp hair strands A and B.

[0007] Then, a supplemental hair fiber strand is placed near the scalp between the root of the scalp hair strands A and B.

[0008] Then, on the supplemental hair fiber strand, then scalp hair strand A crosses the scalp hair strand B, in which case the intersection of the scalp hair strands A and B is positioned on the upper surface of the supplemental hair fiber strand.

[0009] Thereafter, with the intersection of the scalp hair strands A and B as a fulcrum, the supplemental hair fiber strand is parted into two portions: upper and lower. On the intersection of the scalp hair strands A and B, the upper and lower portions of the supplemental hair fiber stand cross each other, in which case that intersection is placed on the upper surface of the scalp hair strands A and B.

[0010] And again, the scalp hair strands A and B cross each other, and the second intersection of the scalp hair strands A and B is positioned on the upper surface of the Intersection of the upper and lower portions of the supplemental hair fiber strand. Thereafter, the upper and lower portions of the supplemental hair fiber strand cross each other, and the interjection of the upper and lower portions of the supplemental hair fiber strand are positioned on the upper surface of the second intersection of the scalp hair strands A and B. This cycle is repeated a few times, and the finally formed intersection is tied up with a rubber cord or the like.

[0011] With the attachment method by weaving, the supplemental hair fiber strand could be fixed in place with little risk of untying, and the amount of fibers or scalp hairs could easily and freely be adjusted. However, although weaving allows the supplemental hair fiber strand to be surely fixed to the scalp hairs, yet it offers some problems in that stronger pulls are given to the scalp hairs, and pain is inflicted on the wearer. Further, weaving requires expertise, and unsuccessful weaving would result in detachment of the supplemental hair fiber strand just after attachment, and untying. Thus, weaving requires careful and reliable work, and is time consuming.

[0012] Further, upon removal of the supplemental hair fiber strand, the scalp hairs would get entangled in the supplemental hair fiber stand, inflicting pain on the wearer and doing damage to the scalp hairs.

[0013] With the attachment of the supplemental hair fiber strand using a metal fixture, on the other hand, the metal ring fixture is passed through scalp hairs, then the supplemental hair fiber strand is inserted into the metal ring mixture, and then the scalp hairs are located within the metal ring fixture while they are tied up by the supplemental hair fiber strand. Finally, the metal fixture is crushed flat.

[0014] Referring typically to the "extension attachment method" set forth in JP(A)2004-156157, the extension is attached in place using the extension, a bar engagement with the extension, a ring adapted to fix the extension in place and a nipper adapted to crush the ring flat.

[0015] The attachment method involves the first step of inserting the hooked bar into the ring, the second step of catching hairs up in the hook, the third step of pulling the inserted bar out of the ring, the fourth step of again inserting the bar into the ring to catch the extension up in the hook, the fifth step of pulling the inserted bar from the ring, and the sixth step of crushing the ring flat by the nipper to fix the extension in the hairs.

[0016] Publication: JP(A)2004-156157

[0017] With the attachment method using such a metal fixture (ring) as described above, however, a problem is that because the size of the metal fixture is predetermined, the amount of fibers in the supplemental hair fiber strand could not be adjusted as desired, and the metal fixture would be likely to get loose and even come off. Another problem is that the metal fixture positioned near the scalp would make the wearer feel uncomfortable, and

the scalp hairs would wear away due to the friction of them with the metal fixture.

[0018] While asleep, the metal fixture would strike upon the head of the wearer, keeping the wearer from sleeping well or inflicting pain on the wearer.

[0019] And removal of the supplemental hair fiber strand requires deformation of the metal fixture: it is time consuming and requires expertise.

SUMMARY OF THE INVENTION

[0020] Having for the object to provide a solution to the aforesaid problems, the invention provides a scalp hair strand/supplemental hair fiber strand attachment structure and method which makes a supplemental hair fiber strand attachment easier and ensures that a supplemental hair fiber strand is attached to a wearer quickly yet without any load on the scalp or scalp hairs and any expertise.

[0021] That is, the scalp hair strand/supplemental hair fiber strand attachment structure and method of the invention are embodied as set forth below.

(1) A scalp hair strand/supplemental hair fiber strand attachment structure, comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** both stands are tied together at a tying portions, and said tying portion is tied up by wrapping a bonding adhesive and a tape having an adhesive around said tying portion.

(2) A scalp hair strand/supplemental hair fiber strand attachment structure, comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** both stands are tied together at a tying portion by means of a binder or bonding adhesive, and said tying portion is wrapped around with a tape having an adhesive.

(3) The scalp hair/supplemental hair fiber strand attachment structure according to (1) or (2) above, **characterized in that** the tape having an adhesive is fabricated of a fabric or unwoven fabric.

(4) The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of (1) to (3) above, **characterized in that** the tape having an adhesive is capable or incapable of stretching.

(5) The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of (1) to (4) above, **characterized in that** the tape having an adhesive is colored at an end portion.

(6) The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of (1) to (5) above, **characterized in that** the binder or bonding adhesive is a hot-melt resin.

(7) The scalp hair strand/supplemental hair fiber

strand attachment structure according to any one of (1) to (6) above, **characterized in that** the binder or bonding adhesive is a keratin resin or thermoplastic resin.

(8). The scalp hair strand /supplemental hair fiber strand attachment structure according to (6) above, **characterized in that** said hot-melt resin or thermoplastic resin is a polyamide resin, a polyester resin, a polyolefin resin (such as polyethylene resin and polypropylene resin), or a polyphenylene sulfide resin.

(9) The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of (1) to (8) above, **characterized in that** the binder or bounding adhesive has been coated on and applied to the supplemental hair fiber strand at one end or on the way.

(10) The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of (1) to (9) above, **characterized in that** the tying portion of both strands has the root of the scalp hair strand tied to one end of the supplemental hair fiber strand.

(11) The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of (1) to (10) above, **characterized in that** the tying portion of both strands has the root of the scalp hair strand tied to the supplemental hair fiber strand on the way.

(12) The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of (1) to (11) above, **characterized in that** the tying portion of both strands has the scalp hair strand on the way tied to the supplemental hair fiber strand on the way.

(13) The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of claims (1) to (12) above, **characterized in that** the tying portion of both strands has the scalp hair strand on the way tied to the supplemental hair fiber strand at one end.

(14) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp

hair strand, **characterized in that** the root of said scalp hair strand is tied to one end of the supplemental hair fiber strand via a binder or bonding adhesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive.

(15) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** said scalp hair strand on the way is tied to one end of the supplemental hair fiber strand via a binder or bonding adhesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive.

(16) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** the root of the scalp hair strand is tied to the supplemental hair fiber strand on the way via a binder or bonding adhesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive.

(17) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** the root of the scalp hair strand is tied to a bent supplemental hair fiber strand on the way via a binder or bonding adhesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive.

(18) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** after one end of the supplemental hair fiber strand having a binder or bonding adhesive coated on and applied to the one end is engaged with the root of said plurality of scalp hairs, a tape having an adhesive is wrapped around said engaging portion and, thereafter, the binder or bonding adhesive inside is molten or polymerized for curing by heating means from outside the tape having an adhesive.

(19) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** after one end of a supplemental hair fiber strand having a binder or bonding adhesive coated on and applied to the one end, with one end of a tape having an adhesive being

bonded to the supplemental hair fiber strand, is engaged with the root of said plurality of scalp hairs, said engaging portion is wrapped around with the tape having an adhesive and, thereafter, the binder or bonding adhesive inside is molten or polymerized for curing by heating means from outside the tape having an adhesive.

(20) The scalp hair strand/supplemental hair fiber strand attachment, method according to any one of (14) to (19) above, **characterized in that** the supplemental hair fiber strand has been provided on the way or at one end with a hot-melt or thermoplastic resin serving as the binder or bonding adhesive.

(21) The scalp hair strand/supplemental hair fiber strand attachment method according to any one of (18) to (20) above, **characterized in that** the heating means is ultrasonic irradiation.

(22) A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** after the root of said scalp hairs is engaged with one end of a supplemental hair fiber strand that has previously been provided at the one end with a hot-melt or thermoplastic resin serving as a binder or bonding adhesive, a front portion of a tape having an adhesive is wrapped around an end of said engaging portion one to three times to fix the root of the scalp hairs to the one end of the supplemental hair fiber strand for temporal fixation and, then, ultrasonic waves are applied to near said engaging portion to heat said engaging portion and melt said resin and, thereafter, said engaging portion is wrapped with the rest of the tape having an adhesive, followed by spontaneous cooling and curing.

(23) To supplemental hair fiber strand used with the scalp hair strand/supplemental hair fiber strand attachment method according to any one of (14) to (22) above, which has a binder or bonding adhesive coated on and applied to one end, and one end of a tape having an adhesive bonded thereto.

[0022] The scalp hair strand/supplemental hair fiber strand attachment structure and method according to the invention have such advantages as set forth below.

(i) According to the scalp hair strand/supplemental hair fiber strand attachment structure and method, the tying portion of the scalp hair and supplemental hair fiber strands is tied up by the binder or the bonding adhesive and the tape having an adhesive, or the tying portion of both strands is tied up via the binder or bonding adhesive, and the tying portion of both strands is further wrapped around with the tape having an adhesive. It is thus easy to tie together the scalp hair and supplemental hair fiber strands,

achieve some considerable reductions of work time, and make sure the scalp hair and supplemental hair fiber strands are tied together with no expertise.

Any weaving is dispensed with to tie together the scalp hair and supplemental hair fiber strands; so any pull is not given to the scalp from which scalp hairs are growing, resulting in no pain being inflicted on the scalp, and the wearer does not feel any pain while at tying work.

And the tying portion of the scalp hair and supplemental hair fiber strands is wrapped around with the tape having an adhesive: the amount of the binder or adhesive required remains small, and the binder or bonding adhesive is neither exposed out at the tying portion, nor is the binder or bonding adhesive in contact with the bonding adhesive or hairs at adjacent other tying portions, so that the scalp hair and supplemental hair fiber strands do not get untangled in each other, and the bonding adhesive does not stick to them.

Further, the site coated with the bonding adhesive is covered up with the tape having an adhesive: tying work can be implemented without taking care of what it looks like, and high-quality tying work can always be implemented with improvements in work efficiency.

Still further, the bonding adhesive such as resin is not exposed out, which is unlikely to the wearer feel stiff or other sense of discomfort about the scalp and enables the wearer to put the supplemental hair fiber strand naturally on.

On the other hand, the amount of the binder or bonding adhesive used is so small that the supplemental hair fiber strand can easily be removed, and the amount of the agent used for removal of the bonding adhesive can be limited, doing no damage to the hair. And the tying portion of the scalp hair and supplemental hair fiber strands tied together via the binder or bonding adhesive such as resin is wrapped around with the tape having a bonding adhesive, so that the binder or bonding adhesive is protected by the tape having an adhesive. Protected against moisture from hair washing during showering and perspiration and heats from driers, irons, etc., the tying portion of the scalp hair and supplemental hair fiber strands is less likely to untie, so that the wearer can put the supplemental hair fiber strand on over an extended period of time.

Further, any metal fixture is not used at the tying portion so that the tying portion can be slimmed down; so it is aesthetic and can be brushed with a coarse brush.

(ii) The tape having an adhesive is fabricated from a fabric or unwoven fabric so that even when it is wetted with water or heated from outside, the tying portion can have more strength by the contraction of the tape having an adhesive. Further, the tape dries up quickly, giving no sense of discomfort to the

wearer.

(iii) If the tape having an adhesive colored at an end portion is used, the end of the tape having an adhesive can then be easily found in removal of the supplemental hair fiber strand: removal work can be facilitated with improvements in work efficiency.

(iv) If the binder or bonding adhesive is formed of hot-melt resin, tying work can be implemented without the hairs or hands being stained, because it is solid at normal temperature. After heated and molten, it is firmly bonded and tied to the supplemental hair fiber strand so that tying work can be implemented quickly and surely; the wearer can put the supplemental hair fiber strand on without untying and over an extended period of time.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

Fig. 1 is illustrative of the outside shape of the scalp hair strand/supplemental hair fiber strand attachment structure according to the invention.

Fig. 2 is illustrative of Example a of the supplemental hair fiber strand in the invention.

Fig. 3 is illustrative of Example b of the supplemental hair fiber strand in the invention.

Fig. 4 is illustrative of Example c of the supplemental hair fiber strand in the invention.

Fig. 5-1 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 5-2 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 5-3 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 5-4 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 5-5 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fibers strand attachment method according to the invention.

Fig. 5-6 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 5-7 is illustrative of a step in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-1 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-2 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-3 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand at-

tachment method according to the invention.

Fig. 6-4 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-5 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-6 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-7 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-8 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

Fig. 6-9 is illustrative of a step in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method according to the invention.

EXPLANATION OF THE REFERENCE NUMERALS

[0024]

- 1: Scalp hair strand,
- 2: Supplemental hair fiber strand,
- 3: Tying portion of the scalp hair strand/supplemental hair fiber strand,
- 4: Tape having an adhesive,
- 4a: End of the tape having an adhesive,
- 5: Bonding adhesive applied portion,
- 6: Heating means, and
- 7: Temporal fixing tool.

BEST MODE FOR CARRYING OUT THE INVENTION

[0025] The invention provides a scalp hair strand/supplemental hair fiber strand attachment structure and method. More specifically, the invention provides a scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, wherein the tying portion of both strands is tied up by a bonding adhesive and a tape having an adhesive which is wrapped around the tying portion. The invention also provides a scalp hair strand/supplemental hair fiber strand attachment method wherein the root of the scalp hair strand is tied to one end of the supplemental hair fiber strand via a binder or bonding adhesive, and the tying portion of both strands is wrapped around with a tape having an adhesive.

[0026] In the scalp hair strand/supplemental hair fiber strand attachment structure and method, hairs sorted out of an area of 1 to 20 mm² in general, and 5 to 15 mm² in particular, on the surface of the scalp may be used as the scalp hair strand here, and the tying portion of the scalp hair strand/supplemental hair fiber strand, at which

the scalp hair strand and the supplemental hair fiber strand are tied up, is formed at a position 0.5 to 5 cm, preferably 1 to 3 cm from the surface of the scalp, i.e., the root of the scalp hair strand.

[0027] By way of example but not by way of limitation, the supplemental hair fiber strand here refers to a fiber strand that can be attached to the scalp hairs, for instance, a supplemental hair fiber strand composed of human hairs, and an artificial supplemental hair fiber strand composed of synthetic fibers such as polyethylene.

[0028] And the scalp hairs here refer to the ones growing from the scalp; however, for instance, a hair wig or hairs grafted onto the surface of the scalp may also be tied as the scalp hairs to the supplemental hair fiber strand.

[0029] It is here noted that in the scalp hair strand/supplemental hair fiber strand attachment structure and method, although there is no limit to the amount of hairs sorted out of a portion of the surface of the scalp, it is desired that depending on the amount of the supplemental hair fiber strand to be tied up, the scalp hair strand be composed of scalp hairs properly sorted out of the scalp. As noted above, it is desired that scalp hairs sorted out of the area of 1 to 20 mm², especially 5 to 15 mm² be configured into the scalp hair strand, because the supplemental hair fiber strand is naturally tied up to the scalp hair strand upon finishing.

[0030] In the scalp hair strand/supplemental hair fiber strand attachment structure and method of the invention, the tape having an adhesive used is fabricated of a fabric or unwoven fabric that is preferably capable of stretching. That tape is sized to have a width of 1 to 8 mm, specially 2 to 5 mm, and a length of 15 to 50 mm, especially 20 to 40 mm.

[0031] The fabric or unwoven fabric tape having an adhesive works for firmly lying together the scalp hair and supplemental hair fiber strands because it shrinks when wetted upon washing or with sweat or the like, and dries fast because of its high water repellency, making the wearer comfortable.

[0032] That tape having an adhesive may or may not be capable of stretching; however, when the stretchable tape having an adhesive is used, it deforms following the deformation of the tying portion of the scalp hair and supplemental hair fiber strands due to the movement of hairs and the various shapes of the tying portion upon attachment, so that the scalp hair strand is less likely to come off the supplemental hair fiber strand, making tying easy and giving aesthetic finishing touches to the tying portions.

[0033] Further in the scalp hair strand/supplemental hair fiber strand attachment structure and method of the invention, use may be made of a tape having an adhesive with its end colored.

[0034] By the "tape having an adhesive with its end colored" is meant a tape having an adhesive, which is colored at a position that becomes the final end of the

tape to be wrapped around the tying portion. With that tape having an adhesive, the supplemental hair fiber strand could easily be removed from the scalp hair strand because that end is easily visible. That end of the tape is preferably colored in white, etc. in such a way as to be easily visible while at work.

[0035] The binder or bonding adhesive used for the tying of the scalp hair and supplemental hair fiber strands in the invention may be any desired material that can tie together the scalp hair and supplemental hair fiber strands. For instance, there is the mention of olefin resins such as polyethylene and polypropylene, polyvinyl chloride, polyvinyl acetate, polyamide, polyethylene terephthalate, and polyphenylene sulfide, but preference is given to adhesives such as keratin resin and gelatin, and the prepolymers (containing small amounts of curing agents) of such resins may just as well be used. In addition, the prepolymers of photo-curable resins may be used, in which case they may be cured by irradiation with ultraviolet radiation or visible light, in place of the aforesaid ultrasonic waves.

[0036] In the scalp hair strand/supplemental hair fiber strand attachment method of the invention, it is preferable that the binder or bonding adhesive used for the tying of the scalp hair and supplemental hair fiber strands is molten or polymerized by heating means for curing. For the heating means, specifically but not exclusively, use may be made of heating machines such as commercially available ultrasonic welding (bonding) machines. Such ultrasonic welding machines are designed to apply ultrasonic vibration energy to the hot-melt or thermoplastic resin used as the aforesaid binder or bonding adhesive to melt or heat them.

[0037] In particular, the hot-melt resin or thermoplastic resin previously coated and hardened by heating to a portion of the supplemental hair fiber strand melts by heating, entering the vicinity of the engaging portion of the scalp hairs with the supplemental hair fibers. Later spontaneous cooling causes it to be solidified so that the scalp hair strand bonds firmly to the supplemental hair fiber strand. It is thus possible to prevent the hand or hair from getting stained with the adhesive, etc., as often encountered with the use of a liquid adhesive, and implement sure tying without relying upon an expert in the art.

[0038] When the aforesaid heating means is used, the scalp hair and supplemental hair fiber strands may be firmly tied together if heat-curable binders or bonding adhesives are used.

{Examples}

[0039] The present invention is now explained with reference to some examples.

[0040] Fig. 1 is illustrative of the outside configuration of the scalp hair strand/supplemental hair fiber strand of the invention; Figs. 2 to 4 are illustrative of examples of the supplemental hair fiber strand used herein; Figs. 5-1 to 5-7 are illustrative of the steps in Example 1 of the

scalp hair strand/supplemental hair fiber strand attachment method of the invention; and Figs. 6-1 to 6-9 are illustrative of the steps in the scalp hair strand/supplemental hair fiber strand attachment method of the invention.

[0041] Throughout Figs. 1 to 6, reference numeral 1 stands for a scalp hair strand; 2 a supplemental hair fiber strand; 3 a tying portion of the scalp hair strand/supplemental hair fiber strand; 4 a tape having an adhesive; 4a an end of the tape having an adhesive; 5 a portion coated with a bonding adhesive; 6 heating means; and 7 a temporal fixing tool.

[0042] In one scalp hair strand/supplemental hair fiber strand attachment structure of the invention as shown in Fig. 1, the supplemental hair fiber strand 2 is fixed to the scalp hair strand 1 made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp, and the tying portion 3 of both strands is tied up by wrapping the bonding adhesive and the tape 4 having an adhesive around the tying portion 3.

[0043] In another scalp hair strand/supplemental hair fiber strand attachment structure of the invention, the supplemental hair fiber strand 2 is fixed to the scalp hair strand 1 made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp, the tying portion 3 of both strands is tied up via a binder or a bonding adhesive, and the tying portion 3 of both strands is wrapped around with the tape 4 having an adhesive.

[0044] The binder or bonding adhesive may be applied to the tying portion 3 when the scalp hair strand 1 is tied up to the supplemental hair fiber strand 2 or, alternatively, it may have been applied to the supplemental hair fiber strand 2 at one end or on the way. In the supplemental hair fiber strand 2 that has had the hot-melt or thermoplastic resin serving as the binder or bonding adhesive applied and hardened at one end or on the way, a portion coated with the hot-melt or thermoplastic resin defines the tying portion to the scalp hairs; the supplemental hair fibers remain in order while at tying work. That is, the tying work is easy to implement, and the finishing touches are aesthetic with much higher work efficiency.

[0045] In the scalp hair strand/supplemental hair fiber strand attachment structure and method of the invention, use may be made of the supplemental hair fiber strand 2 which has the binder or bonding adhesive applied at one end or on the way, which has the tape 4 having a bonding adhesive bonded at one end, which has none of the binder or bonding adhesive applied on it, which has none of the tape 4 having an adhesive applied on it, etc., as can be seen from the examples of the supplemental hair fiber strand of the invention shown in Fig. 2 to 4. There is no limit to the type, size and shape of the supplemental hair fiber strand 2; generally available supplemental hair fibers strands may be used.

[0046] In the example of the supplemental hair fiber strand 2 shown in Fig. 2, the bonding adhesive is coated on one end of the supplemental hair fiber strand 2 to form a bonding adhesive applied portion 5, and one end of the

tape 4 having an adhesive is further bonded to the supplemental hair fiber strand 2.

[0047] In the example of the supplemental hair fiber strand 2 shown in Fig. 3, the supplemental hair fiber strand 2 is composed of a bundle of supplemental hair fibers.

[0048] In the example of the supplemental hair fiber strand 2 shown in Fig. 4, the bonding adhesive is coated on and applied to the bent supplemental hair fiber strand 2 on the way to form a bonding adhesive applied portion 5, and one end of the tape 4 having an adhesive is further bonded to the supplemental hair fiber strand 2.

[0049] In the scalp hair strand/supplemental hair fiber strand attachment structure of the invention, the tying portion 3 of the scalp hair strand 1 and the supplemental hair fiber strand 2 may be defined by (1) tying the root of the scalp hair strand 1 to the supplemental hair fiber strand 2 at one end, (2) tying the root of the scalp hair strand 1 to the supplemental hair fiber strand 2 on the way, (3) trying the scalp hair strand 1 on the way to the supplemental hair fiber strand 2 on the way, and (4) tying the scalp hair strand 1 on the way to the supplemental hair fiber strand 2 at one end; it is preferable to make a selection in consideration of the hair style of the wearer, the type, shape and length of the supplemental hair fiber strand 2, etc.

[0050] There is no limit to the type of the aforesaid binder or bonding adhesive used as long as it is enough to tie the scalp hair strand to the supplemental hair fiber strand; however, particular preference is given to the bonding adhesive based on keratin resin.

[0051] Instead of the binder or bonding adhesive, it is also possible to use a hot-melt resin or thermoplastic resin that is solid at normal temperature but melts upon heating. For the hot-melt or thermoplastic resin, for instance, there is the mention of olefin resins such as polyethylene and polypropylene, polyvinyl chloride resins, polyvinyl acetate resins, polyamide resins, polyethylene terephthalate resins, polyester resins and polyphenylene sulfide resins. If the hot-melt resin is beforehand coated on and applied to the supplemental hair fiber strand 2 at one end or on the way, it is then possible to implement tying work without the hands or hairs being stained, because the hot-melt resin is hardened already while at work. Further, if the tying portion 3 is wrapped around with the tape 4 having an adhesive and the hot-melt resin is heated by heating means such as an ultrasonic welding machine from outside the tape 4 having an adhesive, then it melts to tie up the engaging portion (3a) of the scalp hair strand 1 and supplemental hair fiber strand 2, thereby making sure the tying of both the strands.

[0052] The taps 4 having an adhesive used should be capable of wrapping up the outer surface of the tying portion of the scalp hair strand/supplemental hair fiber strand. For the material for the tape 4 having an adhesive, it is suitable to use a fabric or unwoven fabric resistant enough to hair washing or perspiration where the scalp hair and supplemental hair fiber strand are tied up, and

rain so that the tying portion is less likely to untie. That fabric or unwoven fabric is also resistant enough to heat from driers, irons, etc.

[0053] The tied scalp hair and supplemental hair fiber strands must be untied when the scalp hairs grow too much to get out of control or the hair style is changed.

[0054] The tape 4 having an adhesive, used with the scalp hair strand/supplemental hair fiber strand attachment structure of the invention, may be colored at an end portion to make untying easy. If the end 4a, i.e., a portion of the tape having an adhesive that becomes the final end when it is wrapped around the tying portion 3, is colored, then where the end of the tape 4 is located is easily found to improve on work efficiency for removal.

[0055] The scalp hair strand/supplemental hair fiber strand attachment method of the invention is now explained with reference to Figs. 5.

[0056] Figs. 5-1 to 5-7 are illustrative of the steps in Example 1 of the scalp hair strand/supplemental hair fiber strand attachment method of the invention.

[0057] Example 1 is directed to the scalp hair strand/supplemental hair fiber strand attachment method wherein the supplement hair fiber strand 2 of Fig. 2 is used, and one end of the supplemental hair fiber strand 2 is tied to the root of the scalp hair strand 1.

[0058] The attachment method of Example 1 comprises the following steps.

[0059] In the first step, a plurality of scalp hairs are sorted out of a portion of the surface of the scalp into the scalp hair strand 1 (Fig. 5-1).

[0060] In the second step, one end of the supplemental hair fiber strand 2 is engaged with the root of the scalp hair strand 1 (Fig. 5-2).

[0061] The supplemental hair fiber strand 2 shown in Fig. 5-1 is coated at one end (the portion 5 having the bonding adhesive coated on it) with the binder or bonding adhesive, and has one end of the tape having an adhesive bonded to it.

[0062] In the third step, one end of the supplemental hair fiber strand 2 is engaged with the root of the plurality of scalp hairs, and the tape 4 having an adhesive is wrapped around the engaging portion 3a (Figs. 5-3 and 5-4).

[0063] In that case, the tape 4 having an adhesive is put on in the root (upward) direction of the scalp hair strand to make the untying of the scalp hair and supplemental hair fiber strands less likely to occur.

[0064] In the fourth step, the binder or bonding adhesive inside is molten or polymerized for curing from outside the tape 4 having an adhesive put on in the third step, using the heating means 6 built up of a tweezers type of ultrasonic irradiation machine adapted to radiate ultrasonic waves across (Fig. 5-5).

[0065] In the fifth step, the portion molten or polymerized for curing in the fourth step is shaped while kept in place by fingers or a press member to confirm whether or not it is cured (Fig. 5-6).

[0066] Through the a fore said steps, the tying by the

scalp hair strand/supplemental hair fiber strand attachment method of the invention is completed (Fig. 5-7).

[0067] In Example 1, the supplemental hair fiber strand 2 used is provided at one end (the portion 5 coated with the bonding adhesive) with the binder or bonding adhesive, and has one end of the tape 4 having a bonding adhesive bonded to it; however, it is understood that even the supplemental hair fiber strand 2 having none of the binder or bonding adhesive coated on it or none of the tape having a bonding adhesive bonded to it may be tied up in the same manner.

[0068] It is noted that when there is no binder or bonding adhesive applied beforehand, the binder or bonding adhesive may be coated on the aforesaid engaging portion. 3a after the engagement in the second step of one end of the supplemental hair fiber strand 2 with the scalp hair strand 1.

[0069] When the supplemental hair fiber strand 2 is used with the tape 4 having an adhesive being not bonded to it beforehand, the tape 4 having an adhesive may be wrapped around the aforesaid engaging portion 3a (Figs. 5-3 and 5-4) with the end of the tape 4 having an adhesive bonded to the lower end of the engaging portion 3, after the engagement in the third step of one end of the supplemental hair fiber strand 2 with the root of the scalp hair strand 1.

[0070] Figs. 6-1 to 6-9 are illustrative of the steps in Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method of the invention.

[0071] In the attachment method of Example 2, the supplemental hair fiber strand 2 is engaged with the scalp hair strand 1 using at the engaging portion the temporal fixing tool 7 having a groove of U shape in section, so that the tying work of the scalp hair and supplemental hair fiber strands can be facilitated.

[0072] It is noted that Example 2 of the scalp hair strand/supplemental hair fiber strand attachment method, too, uses the supplemental hair fiber strand 2 of Fig. 2 to tie one end of the supplemental hair fiber strand 2 to the root of the scalp hair strand 1; however, the use of the temporal fixing tool 7 enables the scalp hair strand 1 to be tied up to even the supplemental hair fiber strand 2 of Fig. 3 in the same manner.

[0073] The attachment method of Example 2 involves the following steps.

[0074] In the first step, a plurality of scalp hairs are sorted out of a portion of the surface of the scalp into the scalp hair strand 1 (Fig. 6-1).

[0075] In the second step, the scalp hair strand 1 made in the first step is held in place by the temporal fixing tool 7 (Fig. 6-2).

[0076] In the third step, one end of the supplemental hair fiber strand 2 is engaged with the scalp hair strand 1 held by the temporal fixing tool 7, so that they are held by the temporal fixing tool 7 (Figs. 6-3 and 6-4).

[0077] In the fourth step, the tape 4 having an adhesive is wrapped around the temporal fixing tool 7 by which the scalp hair 1 and the supplemental hair fiber strand 2 are

held in place (Figs. 6-5 and 6-6).

[0078] In the fifth step, the bonding adhesive inside and the temporal fixing tool 7 are heated, molten and polymerized for curing from outside the tape 4 having an adhesive wrapped around in the fourth step by the heating means 6 (Fig. 6-7).

[0079] The temporal fixing tool 7 used in Example 2 is formed of the hot-melt or thermoplastic resin that is molten upon heating; upon heating by the heating means 6, the resin is molten while the scalp hair strand 1 and the supplemental hair fiber strand 2 held within the temporal fixing tool 7 are held in place, so that the scalp hair strand 1 and the supplemental hair fiber strand 2 are tied together.

[0080] And during smelling, the molten resin is not exposed out, so that work can be implemented without the hands or hairs being stained, because the tape 4 having an adhesive is wrapped around the temporal fixing tool 7.

[0081] In the sixth step, the portion polymerized for curing in the fifth step is shaped while kept in place by fingers or a press member to confirm whether or not it is cured (Fig. 6-8).

[0082] Through the aforesaid steps, the tying by the scalp hair strand/supplemental hair fiber strand attachment method of the invention is completed (Fig. 6-9).

[0083] Preferably in the invention, irradiation with ultrasonic waves is used for the heating means, in which case the frequency is preferably 10 to 100 kHz, and more preferably 20 to 60 kHz, and the irradiation time is preferably 20 to 60 seconds, and more preferably 30 to 40 seconds per site.

Claims

1. A scalp hair strand/supplemental hair fiber strand attachment structure, comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** both stands are tied together at a tying portion, and said tying portion is tied up by wrapping a bonding adhesive and a tape having an adhesive around said tying portion.
2. A scalp hair strand/supplemental hair fiber strand attachment structure, comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** both stands are tied together at a tying portion by means of a binder or bonding adhesive, and said tying portion is wrapped around with a tape having an adhesive.
3. The scalp hair/supplemental hair fiber strand attachment structure according to claim 1 or 2, **characterized in that** the tape having an adhesive is fabricated

of a fabric or unwoven fabric.

4. The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of claims 1 to 3, **characterized in that** the tape having an adhesive is capable or incapable of stretching. 5
5. The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of claims 1 to 4, **characterized in that** the tape having an adhesive is colored at an end portion. 10
6. The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of claims 1 to 5, **characterized in that** the binder or bonding adhesive is a hoL-melt resin. 15
7. The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of claims 1 to 6, **characterized in that** the binder or bonding adhesive is a keratin resin or thermoplastic resin. 20
8. The scalp hair strand /supplemental hair fiber strand attachment structure according to claim 6, **characterized in that** said hot-melt resin or thermoplastic resin is a polyamide resin, a polyester resin, a polyolefin resin (such as polyethylene resin and polypropylene resin), or a polyphenylene sulfide resin. 25
9. The scalp hair strand/supplemental hair fiber strand attachment structure according to any one of claims 1 to 8, **characterized in that** the binder or bonding adhesive has been coated on and applied to the supplemental hair fiber strand at one end or on the way. 30
10. The scalp hair strand/supplemental hair fiber strand attachment, structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of claims 1 to 9, **characterized in that** the tying portion of both strands has the root of the scalp hair strand tied to one end of the supplemental hair fiber strand. 35
11. The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of claims 1 to 10, **characterized in that** the tying portion of both strands has the root of the scalp hair strand tied to the supplemental hair fiber strand on the way. 40
12. The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of claims 1 to 11, **characterized in that** the tying portion of both strands has the scalp hair strands on the way tied to the supplemental hair fiber strand on the way. 45
13. The scalp hair strand/supplemental hair fiber strand attachment structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand according to any one of claims 1 to 12, **characterized in that** the tying portion of both strands has the scalp hair strand on the way tied to the supplemental hair fiber strand at one end. 50
14. A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** the root of said scalp hair strand is tied to one end of the supplemental hair fiber strand via a binder or bonding adhesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive. 55
15. A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** said scalp hair strand on the way is tied to one end of the supplemental hair fiber strand via a binder or bonding adhesive, and the tying portions of both strands is further wrapped around with a tape having an adhesive.
16. A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** the root of the scalp, hair strand is tied to the supplemental hair fiber strand on the way via a binder or bonding adhesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive.
17. A scalp hair strand/supplemental hair fibers strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** the root of the scalp hair strand is tied to a bent supplemental hair fiber strand on the way via a binder or bonding ad-

hesive, and the tying portion of both strands is further wrapped around with a tape having an adhesive.

18. A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** after one end of the supplemental hair fiber strand having a binder or bonding adhesive coated on and applied to the one end is engaged with the root of said plurality of scalp hairs, a tape having an adhesive is wrapped around said engaging portion and, thereafter, the binder or bonding adhesive inside is molten or polymerized for curing by heating means from outside the tape having an adhesive.
19. A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** after one end of a supplemental hair fiber strand having a binder or bonding adhesive coated on and applied to the one end, with one end of a tape having an adhesive being bonded to the supplemental hair fiber strand, is engaged with the root of said plurality of scalp hairs, said engaging portion is wrapped around with the tape having an adhesive and, thereafter, the binder or bonding adhesive inside is molten or polymerized for curing by heating means from outside the tape having an adhesive.
20. The scalp hair strand/supplemental hair fiber strand attachment method according to any one of claims 14 to 19, **characterized in that** the supplemental hair fiber strand has been provided on the way or at one end with a hot-melt or thermoplastic resin serving as the binder or bonding adhesive.
21. The scalp hair strand/supplemental hair fiber strand attachment method, according to any one of claims 18 to 20, **characterized in that** the heating means relies up ultrasonic irradiation.
22. A scalp hair strand/supplemental hair fiber strand attachment method for a structure comprising a scalp hair strand made by sorting a plurality of scalp hairs out of a portion of the surface of the scalp and a supplemental hair fiber strand fixed to the scalp hair strand, **characterized in that** after the root of said scalp hairs is engaged with one end of a supplemental hair fiber strand that has previously been provided at the one end with a hot-melt or thermoplastic resin serving as a binder or bonding adhesive, a front portion of a tape having an adhesive is

wrapped around an end of said engaging portion one to three times to fix the root of the scalp hairs to the one end of the supplemental hair fiber strand for temporal fixation and, then, ultrasonic waves are applied to near said engaging portion to heat said engaging portion and melt said resin and, thereafter, said engaging portion is wrapped with the rest of the tape having an adhesive, followed by spontaneous cooling and curing.

23. A supplemental hair fiber strands used with the scalp hair strand/supplemental hair fiber strand attachment method according to any one of claims 14 or 22, which has a binder or bonding adhesive coated on and applied to one end, and one end of a tape having an adhesive bonded thereto.

Fig.1

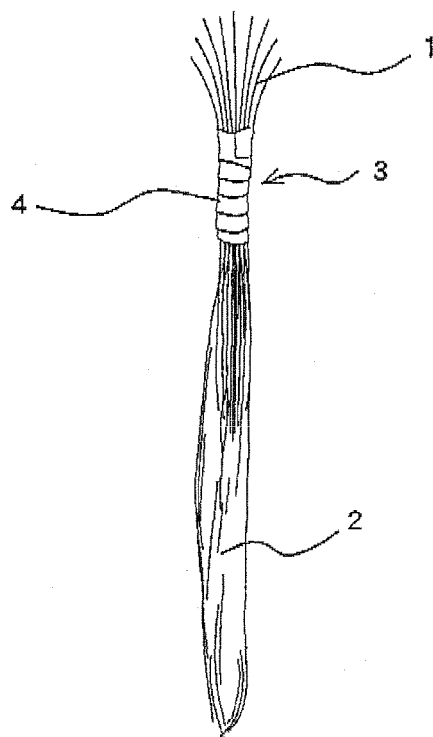


Fig.2

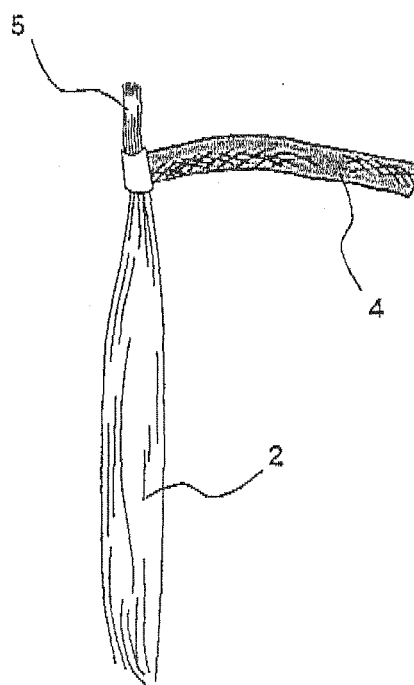


Fig.3

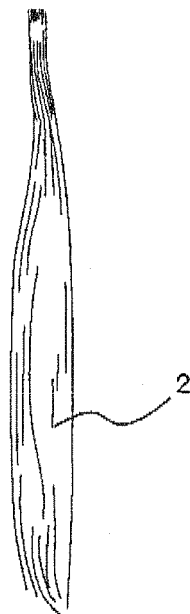


Fig.4

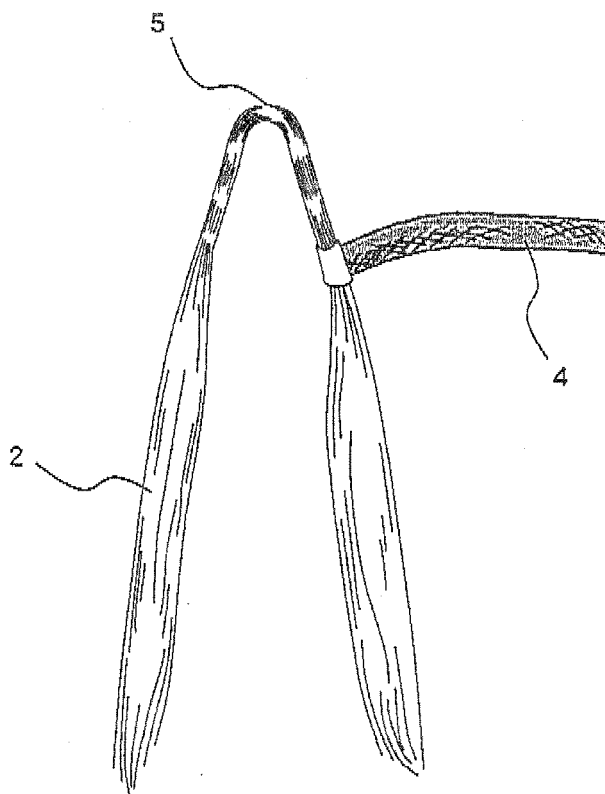


Fig.5-1

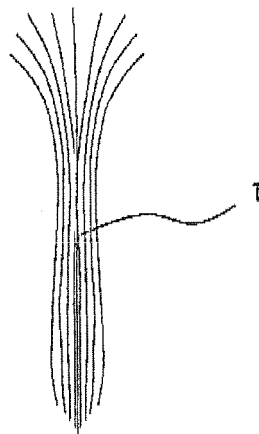


Fig.5-2

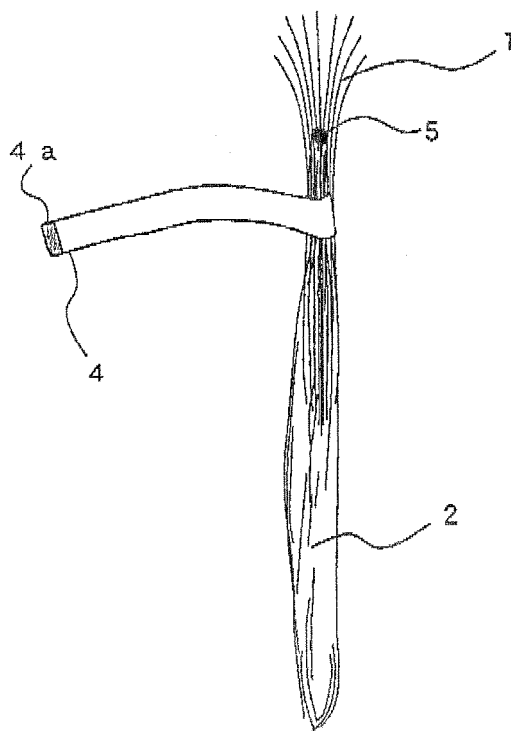


Fig.5-3

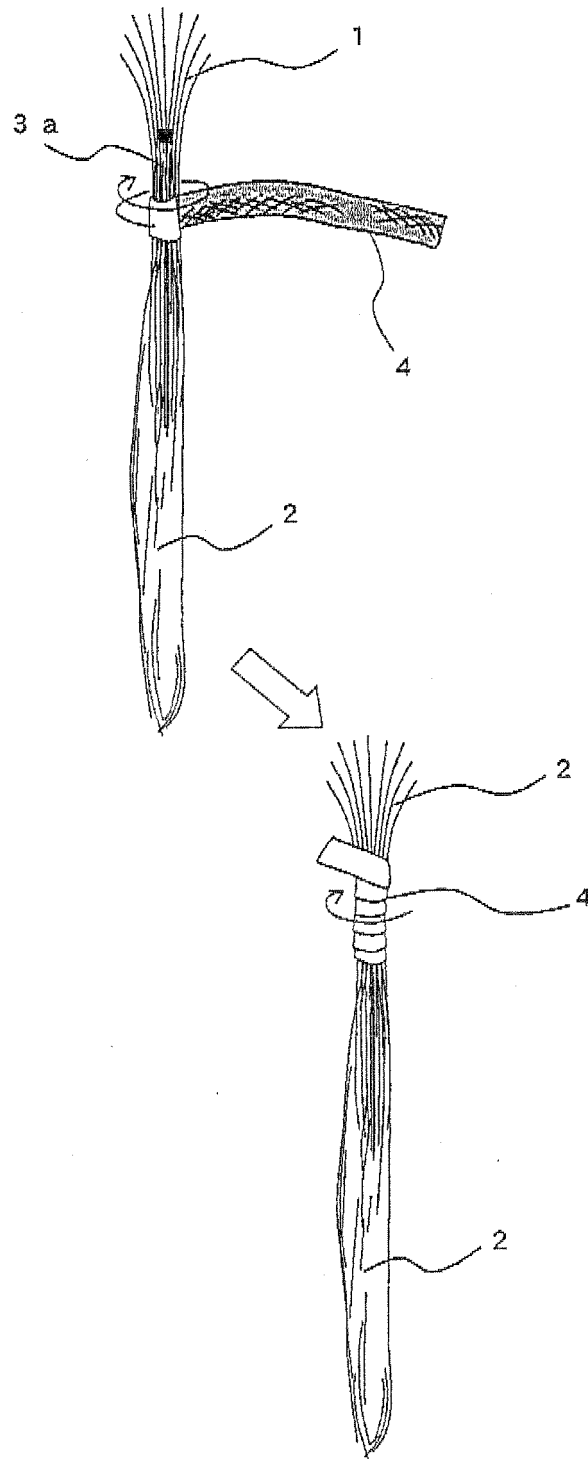


Fig.5-4

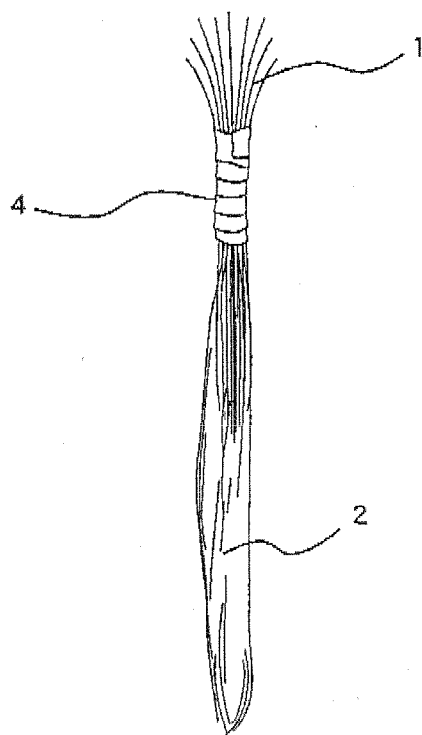


Fig.5-5

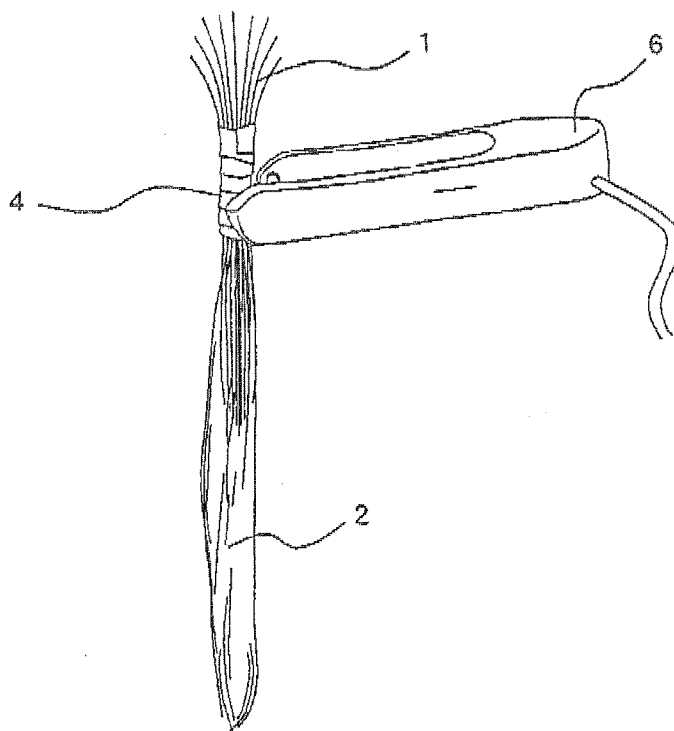


Fig.5-6

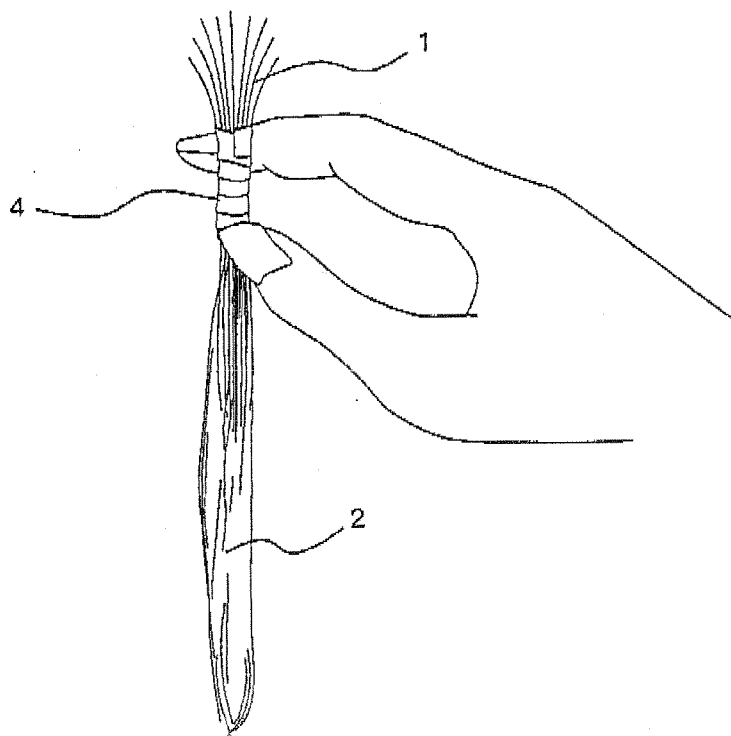


Fig.5-7

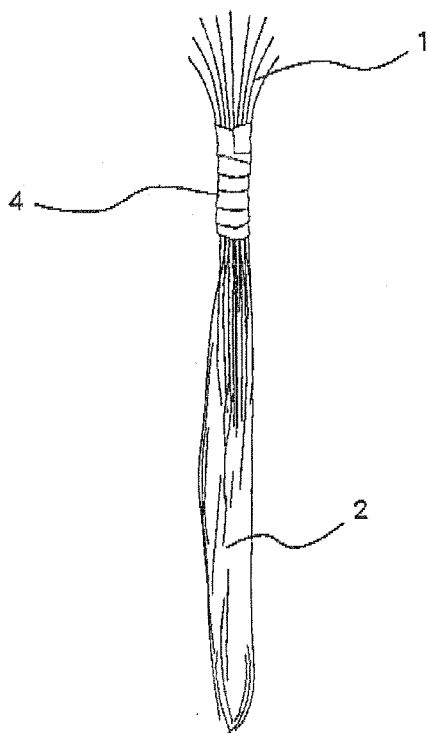


Fig.6-1

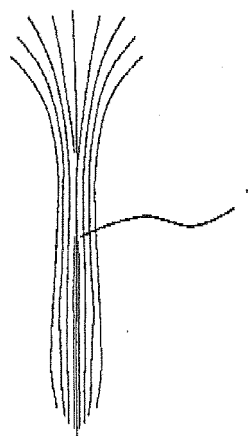


Fig.6-2

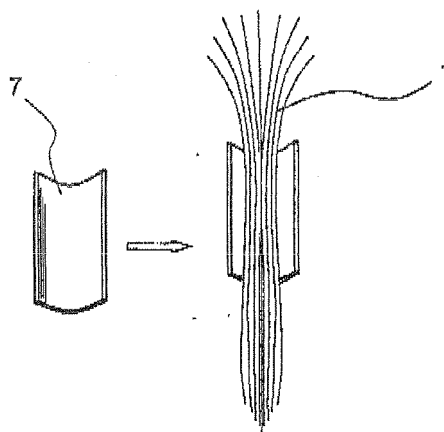


Fig.6-3

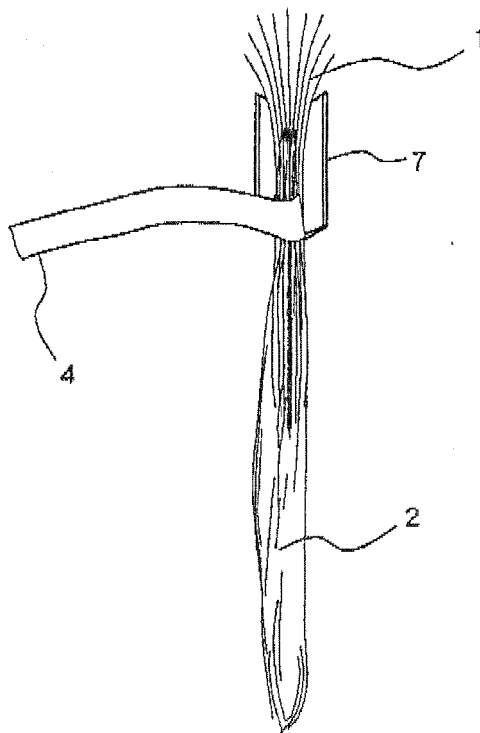


Fig.6-4

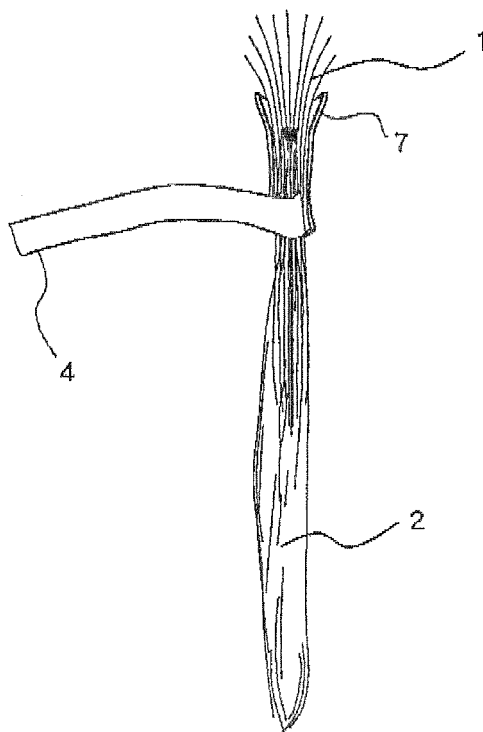


Fig.6-5

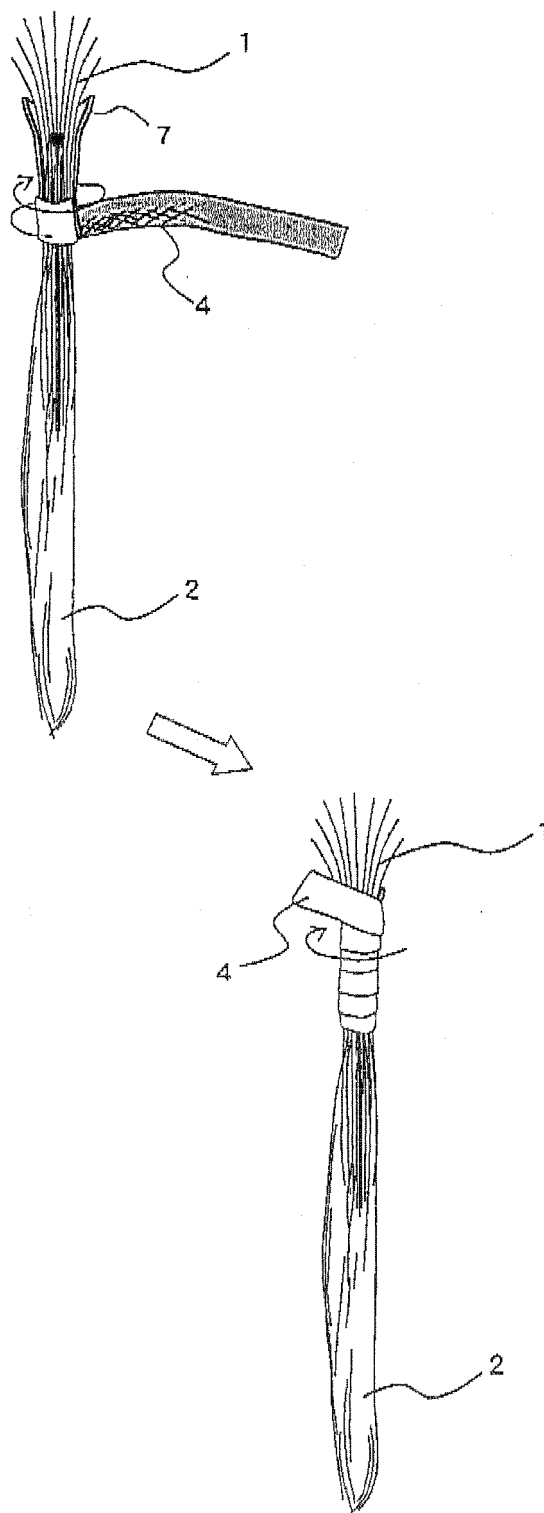


Fig.6-6

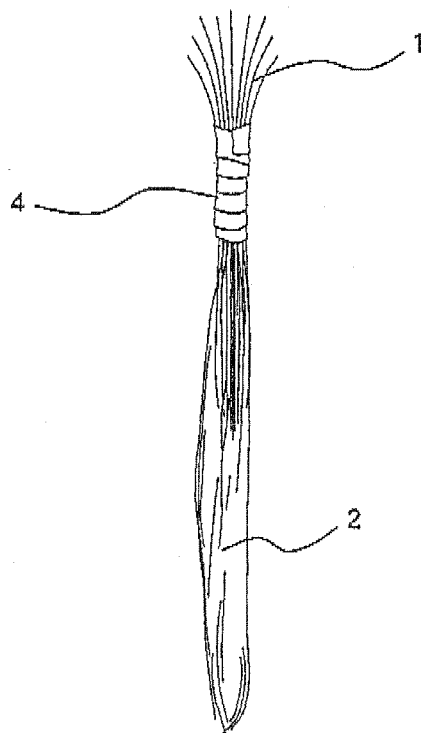


Fig.6-7

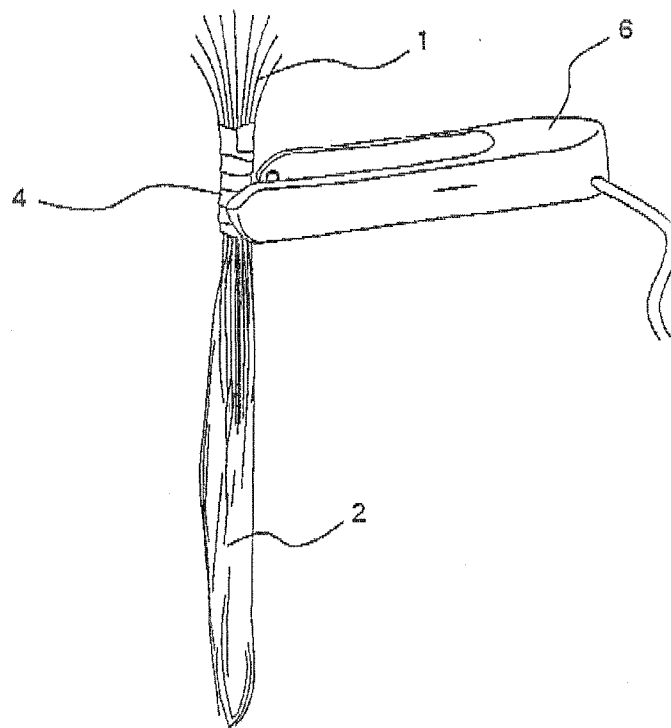


Fig.6-8

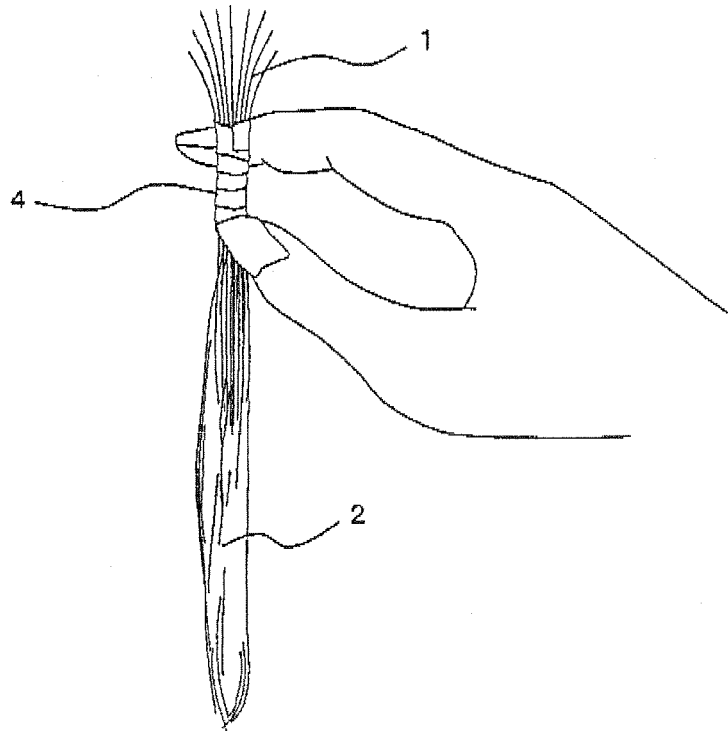
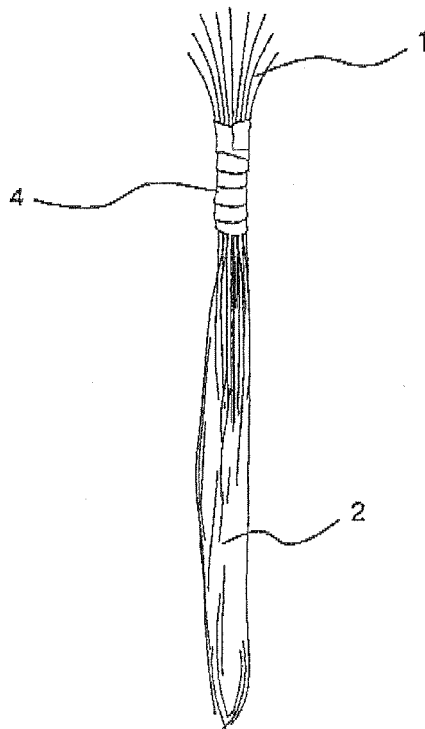


Fig.6-9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2007/054492

A. CLASSIFICATION OF SUBJECT MATTER A41G5/00 (2006.01) i		
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) A41G3/00, 5/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2007 Kokai Jitsuyo Shinan Koho 1971-2007 Toroku Jitsuyo Shinan Koho 1994-2007		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2003-278021 A (Hideji YASUI), 02 October, 2003 (02.10.03), (Family: none)	1-23
A	US 2004/0149302 A1 (Toda), 05 August, 2004 (05.08.04), & JP 2004-232147 A & GB 2397762 A	1-23
A	US 5107867 A (Barrington), 28 April, 1992 (28.04.92), (Family: none)	1-23
A	JP 2004-27402 A (Yoshikuni ITO), 29 January, 2004 (29.01.04), (Family: none)	1-23
☒ 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 05 June, 2007 (05.06.07)		Date of mailing of the international search report 19 June, 2007 (19.06.07)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2007/054492

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5868145 A (Spann), 09 February, 1999 (09.02.99), (Family: none)	1-23

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REFERENCES CITED IN THE DESCRIPTION

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