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(54) Title: SYSTEM AND METHOD FOR HEAT CONDUCTIVE BRUSH

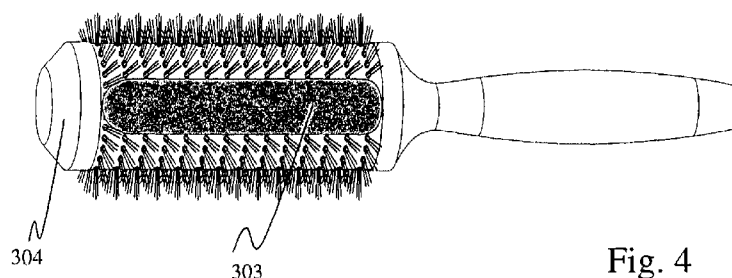


Fig. 4

(57) Abstract: The invention is a brush having heat-conductive and heat-generating elements within or upon it, allowing for continuous application of heat to hair while brushing. A further provision is for retractable bristles.

SYSTEM AND METHOD FOR HEAT CONDUCTIVE BRUSH

BACKGROUND

Technical Field

[0001] Embodiments of the present invention relate generally to systems and methods for a heat conductive styling brush.

Description of Related Art

[0002] Hair styling is often accomplished using a brush and hair dryer. The technique may vary according to hair type and style desired. The hair dryer will generally have variable heat and speed settings to aid in styling hair with a brush and hair dryer. Often the brush will have a metal barrel which is heated by the hair dryer and allows one to style your hair more easily. The subject's wet hair is wrapped in a towel and excess water is squeezed out. Any hair products such as styling gel, conditioner etc. may be added at this point. Some will use a leave-in conditioner that will protect hair from the high heat of the dryer. Starting at the back of the head and dry hair in sections, one pulls the brush through the hair gently from root to ends for a straight, sleek look. For more curl or wave, one wraps the hair around the brush and hold the dryer over it until the barrel heats up. To lock the curl in place one uses the cool setting on the dryer for a moment, then holds the brush in the hair without the dryer for a period to let the barrel cool more.

[0003] Work continues with the sides, ending with the top of the head and bangs. When the hair is completely dry, it is brushed into place. Then generally it will be set with a product such as hair spray or pomade to hold the style.

[0004] Hair is most fragile when it is wet, thus the styling of hair in this state is liable to damage the hair especially when heat is applied. Similarly putting hair in pony tails, clips or braids when wet is known to be destructive, causing split ends etc. Thus ideally one uses a wide toothed comb and/or a seamless one.

[0005] Heat styling tools are often used with a frequency of once or twice a week. Generally users will comb/brush the hair before using heat products, since when hair

is smooth it's quicker and easier to style and takes less heat. Hair protection products are often used to protect hair from the effects of heat treatment.

[0006] As noted hair can be damaged by chemical exposure, prolonged or repeated heat exposure (as through the use of heat styling tools), and by excessive perming and straightening.

[0007] Hair straightening is a hair styling technique which involves the flattening and straightening of hair in order to give it a smooth, streamlined and less curly or kinky appearance. It may be accomplished by using hair irons and hot combs, chemical relaxers, or regional methods known for instance as Japanese or Brazilian hair straightening. Some shampoos, conditioners and gels can help to make hair temporarily straight. Hair irons and hot combs temporarily modify hair texture, whereas relaxers and the other methods permanently alter the structure of the hair, although new hair growth is not affected. The drug interferon alpha has been reported as being shown to modify hair follicles causing permanent change in a person's hair texture.

[0008] The hair iron or hair tong is a tool used to temporarily change the structure of the hair using heat, the various types including curling iron (used to make the hair curly), straightening irons (commonly called straighteners or flat irons, used to straighten the hair), and crimping irons (used to create crimps of the desired size in the hair). Most models have electric heating while cordless irons typically use a flammable gas such as butane for heat. Alternatively these may also use infrared technology.

[0009] Curling irons, also known as curling tongs, create waves or curls in the hair. There are many different types of modern curling irons, which can vary by diameter, material, and shape of barrel and the type of handle. The barrel's diameter can be anywhere from .5 inches (1.3 cm) to 2 inches (5.1 cm). Smaller barrels typically create spiral curls or ringlets, and larger barrels are used to give shape and volume to a hairstyle. These irons are typically made of Teflon, ceramic, tourmaline, metal, or titanium, each of which has its pros and cons. The barrel's shape can either be a cylinder, cone, or reverse cone, and the iron can have brush attachments or double and triple barrels.

[0010] The curling iron can also have either a spring-loaded, Marcel, or clipless handle. Spring-loaded handles are the most popular and use a spring to work the barrel's clamp. Clipless wands have no clamp; the user simply wraps hair around a rod. Most clipless curling irons come with a heat resistant glove to avoid burns.

[0011] Straightening irons, straighteners, or flat irons, operate by breaking down hair's hydrogen bonds. These are bonds in the hair's cortex, which cause hair to bend and become curly. Once the bonds are broken, hair is prevented from holding its original, natural form, though the hydrogen bonds can re-form if exposed to moisture.

[0012] Crimping irons or 'crimpers' work by crimping hair in a triangular or sawtooth manner. The look is similar to the crimps left after taking out small braids. Crimping irons come in different sizes with different sized ridges on the paddles. Larger ridges produce larger crimps in the hair and smaller ridges produce smaller crimps.

[0013] The flat-top, fade, and Gheri curl all are styles relying to some extent on chemical processing and heat application. The high-top fade was an alternative to the Jheri curl and featured geometrically precise sculpting of the hair, and generally shaved sides as sported by Kid of Kid&Play fame. The inimitable Doug E. Fresh, human beatbox, also sported such styles, his Get Fresh Crew hit "The Show" borrowing incidentally from the Inspector Gadget theme song, written by none other than Shuki Levy.

[0014] Using a common and low quality flat iron on a daily basis can be extremely harmful to hair strands. Indeed those possessed of curly hair who straighten often and heavily will like as not damage their hair to some extent. In special cases the hair straightening ritual may cause irreversible damage to the follicles.

[0015] Hair texture might be either hyper-sensitive or more resistant to the effects of extreme heat. However it seems that with the too frequent application of this hair styling technique the immunity of the strands against damage from external factors decreases; ideally one protects hair from deterioration by reduction of the damaging factors such as heat, chemical treatment, mechanical abuse, etc.

[0016] The temperature of the iron used will ideally be varied to match the hair texture. The first step in this process is to identify hair type, generally by visual inspection.

[0017] For example, for fine hair that is a bit more sensitive 180 degrees maximum temperature is recommended. This is also recommended for damaged hair. For thicker strands and curls 190-210 degrees C is recommended, and for normal healthy hair 180-190 degrees C is recommended.

[0018] As will be clear to practitioners shape also has a crucial role when straightening or curling hair with an iron. Besides the temperature and iron texture (often ceramic or tourmaline), a variety of shapes and widenesses are available. Generally one chooses a wider flat iron than the common 3-5cm iron for long hair (beyond the shoulders). Shorter hair may employ standard-sized irons. These are important factors since the application of the inappropriate hair straightener might cause breakage.

[0019] The above described methods all involve direct application of heat to hair by means of a heat source such as an iron or blower, which will generally apply heat in short episodes of intense heat (i.e high temperatures and/or flow rates). Hence, an improved method for hair styling with heat is still a long felt need.

BRIEF SUMMARY

[0020] An aspect of the present invention provides a heating hair brush comprising:

- a handle;
- a head;
- a set of bristles upon said head;
- a heat conductive material disposed upon said head;

whereby heat is imparted from said heat conductive material to hair while said hair is being brushed, allowing for heat-treatment of hair during brushing.

[0021] It is further within provision of the invention comprising heat generation and control means in thermal contact with said heat conductive material.

[0022] It is further within provision of the invention comprising heat storage material in thermal contact with said heat conductive material.

[0023] It is further within provision of the invention comprising exothermically reactive components in thermal contact with said heat conducting material.

[0024] It is further within provision of the invention further comprising a base station adapted to transfer energy to said hair brush.

[0025] It is further within provision of the invention wherein said base station comprises energy transfer means selected from the group consisting of: electrical energy transfer; thermal energy transfer; chemical energy transfer.

[0026] It is further within provision of the invention wherein said heat treatment comprises straightening of hair.

[0027] It is further within provision of the invention further comprising temperature indication means.

[0028] It is further within provision of the invention further wherein said bristles are retractable.

[0029] It is further within provision of the invention to provide a method for heating hair while brushing comprising brushing hair by use of a heated hair brush comprising bristles and heat conductive material disposed upon the head of said brush, whereby heat is imparted from said heat conductive material to hair while said hair is being brushed, allowing for heat-treatment of hair during brushing.

[0030] These, additional, and/or other aspects and/or advantages of the present invention are: set forth in the detailed description which follows; possibly inferable from the detailed description; and/or learnable by practice of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] In order to understand the invention and to see how it may be implemented in practice, a plurality of embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

FIG. 1 illustrates a reaction rate as a function of temperature; and

FIG. 2 illustrates a brush;

FIG. 3 illustrates one embodiment of the current invention;

FIG. 4 illustrates another embodiment of the current invention;

FIGS. 5ab, illustrate the retractable bristles of the current invention in one embodiment.

DETAILED DESCRIPTION

[0032] The following description is provided, alongside all chapters of the present invention, so as to enable any person skilled in the art to make use of said invention and sets forth the best modes contemplated by the inventor of carrying out this invention. Various modifications, however, will remain apparent to those skilled in the art, since the generic principles of the present invention have been defined specifically to provide a means and method for providing a system and method for heat assisted styling.

[0033] In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. However, those skilled in the art will understand that such embodiments may be practiced without these specific details. Just as each feature recalls the entirety, so may it yield the remainder. And ultimately when the features manifest, so an entirely new feature be recalled. Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic

described in connection with the embodiment is included in at least one embodiment of the invention.

[0034] The term '**plurality**' refers hereinafter to any positive integer (e.g, 1,5, or 10).

[0035] The invention comprises a brush having heat-conductive elements dispersed thereupon allowing for continuous application of heat at lower temperatures. This will tend to cause less damage than the alternative application of heat for shorter durations at higher temperatures due to the temperature dependence of protein denaturing which generally will have an activation energy proportional to an exponential function of the thermal energy involved, generally an Arrhenius relation:

$$R = A \exp \left(- \frac{E_A}{k_B T} \right)$$

[0036] The steep rise of this function with temperature (see Fig. 1) illustrates the dramatic effect of a small rise in temperature upon the reaction rate, in this case the potentially hair-damaging effects of protein denaturing and other reactions.

[0037] Fig. 2 shows a brush suitable for use with the invention. It has bristles 301 which may be of natural hair or synthetic material located on the head 304, and a handle 302.

[0038] Fig. 3 illustrates the modified brush of the invention in one possible embodiment. Some of the bristles are eliminated in favor of heat conducting strips 303 located on the head 304. This strip is in some embodiments heated from within for instance by means of an electrical circuit, stored heat, chemical reaction or other means, while in other embodiments the strip are heated externally for instance by means of a heated holder, heat gun or the like.

[0039] Fig. 4 illustrates another embodiment of the invention wherein only one section of the brush has the heat conductive element 303 of the invention, with the other side having full bristle population.

[0040] The heat source powering the brush may be for instance a set of batteries in the brush handle or elsewhere, which may themselves be rechargeable. In this case a stand for the brush with recharging means will of course be found felicitous.

[0041] Alternatively the brush may comprise material of high heat capacity such as metal, salt, ammonia, water, magnesium, and the like. This material may also comprise a phase-change material for heat storage in the form of latent heat. In any case the brush material would be heated prior to use for instance in a water bath, and the high heat capacity material in the brush would transfer its heat to the hair for a period of time limited only by the heat capacity, external temperature and thermal resistance between the brush and environment. Alternatively the brush internal heat storage may be heated using an outside heat source (such as electrical heating apparatus) prior to the use.

[0042] As a further alternative the brush may comprise materials suitable for generation of heat by means of exothermic chemical reaction. For example, combinations of two components such as water and calcium chloride, or oxygen and thermite, or other pairs forming exothermic reactions may be stored separately, and then introduced into the brush, mixed, and used to generate heat for period of time while the brush is being used to brush and heat hair simultaneously.

[0043] As will be appreciated by one skilled in the arts of coiffure, the removal of some of the bristles to achieve a less dense bristle density will in fact make the hairdressers job easier since with each stroke the amount of entrained hair is less. This of course involves a tradeoff of number of strokes vs. energy required per stroke, but as will be appreciated by one skilled in the art of muscle physiology, the use of a lower maximum energy may decrease the wasted energy in a nonlinear fashion such that one benefits in sum by a process requiring less work per time, over a longer time.

[0044] Figs. 5a, b illustrate another provision of the invention. Here the bristles 301 are made retractable, such that in Fig. 5a the bristles are extended while in 6b the bristles have been retracted. By this means the brush can be easily withdrawn from the hair even when voluminous thick tresses are cascading over the brush, making it hard to extract otherwise without considerable time, effort, and possible anguish.

[0045] The retraction of the bristles maybe accomplished for instance by means of rotating the handle or a knob, using mechanisms that will be clear to one skilled in the art.

[0046] Although selected embodiments of the present invention have been shown and described, it is to be understood the present invention is not limited to the described embodiments. Instead, it is to be appreciated that changes may be made to these embodiments without departing from the principles and spirit of the invention, the scope of which is defined by the claims and the equivalents thereof.

CLAIMS

What is claimed is:

1. A heating hair brush comprising:

a handle;

a head;

a set of bristles upon said head;

a heat conductive material disposed upon said head;

whereby heat is imparted from said heat conductive material to hair while said hair is being brushed, allowing for heat-treatment of hair during brushing.

2. The device of claim 1 further comprising heat generation and control means in thermal contact with said heat conductive material.
3. The device of claim 1 further comprising heat storage material in thermal contact with said heat conductive material.
4. The device of claim 1 further comprising exothermically reactive components in thermal contact with said heat conducting material.
5. The device of claim 1 further comprising a base station adapted to transfer energy to said hair brush.
6. The device of claim 5 wherein said base station comprises energy transfer means selected from the group consisting of: electrical energy transfer; thermal energy transfer; chemical energy transfer.
7. The device of claim 1 further comprising temperature indication means.
8. The device of claim 1 further wherein said bristles are retractable.
9. A method for heating hair while brushing comprising brushing hair by use of a heated hair brush comprising bristles and heat conductive material disposed upon the head of said brush, whereby heat is imparted from said heat conductive material to hair while said hair is being brushed, allowing for heat-treatment of hair during brushing.

10. The method of claim 10 further comprising heat generation and control means in thermal contact with said heat conductive material.
11. The method of claim 10 further comprising heat storage material in thermal contact with said heat conductive material.
12. The method of claim 10 further comprising exothermically reactive components in thermal contact with said heat conducting material.
13. The method of claim 10 further comprising a base station adapted to transfer energy to said hair brush.
14. The method of claim 14 wherein said base station comprises energy transfer means selected from the group consisting of: electrical energy transfer; thermal energy transfer; chemical energy transfer.
15. The method of claim 10 further comprising temperature indication means.
16. The method of claim 10 further wherein said bristles are retractable.

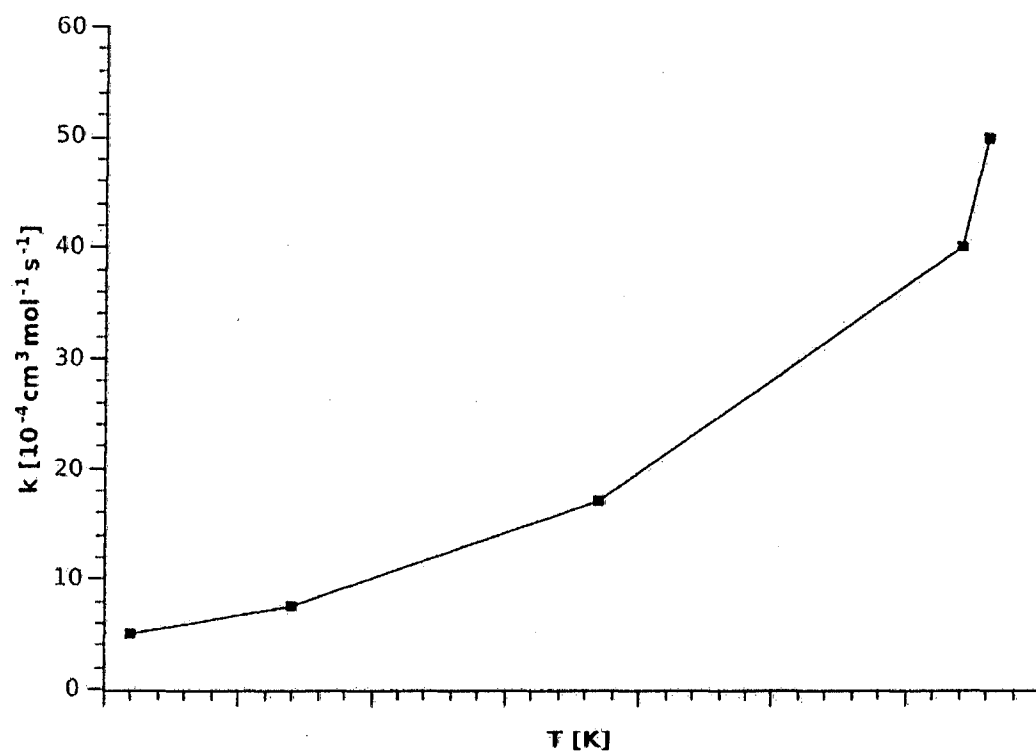


Fig. 1

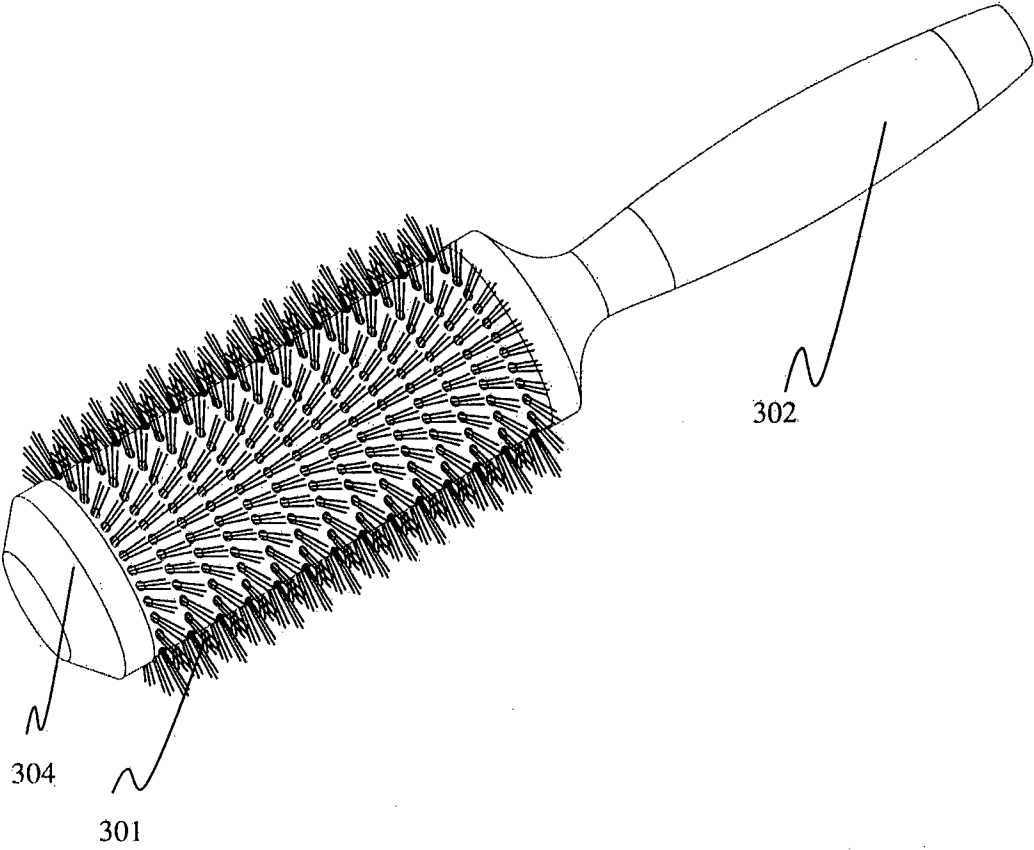


Fig. 2

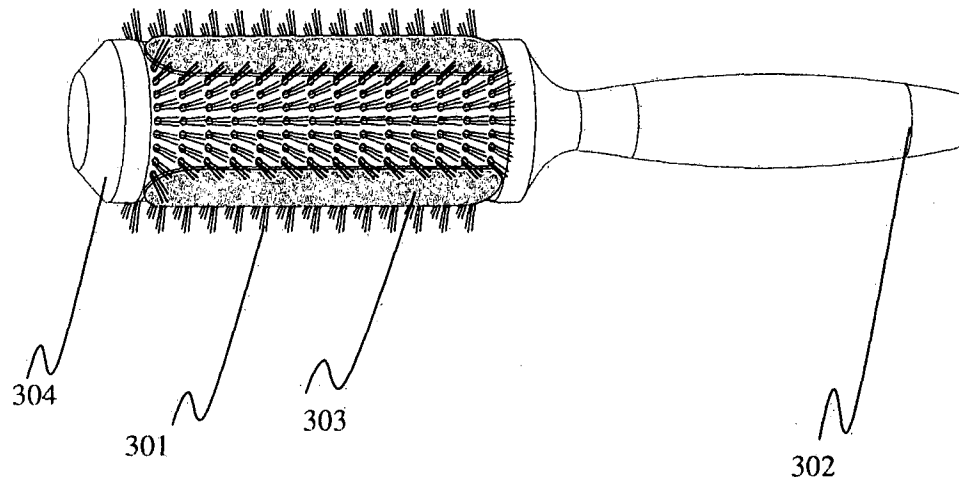


Fig. 3

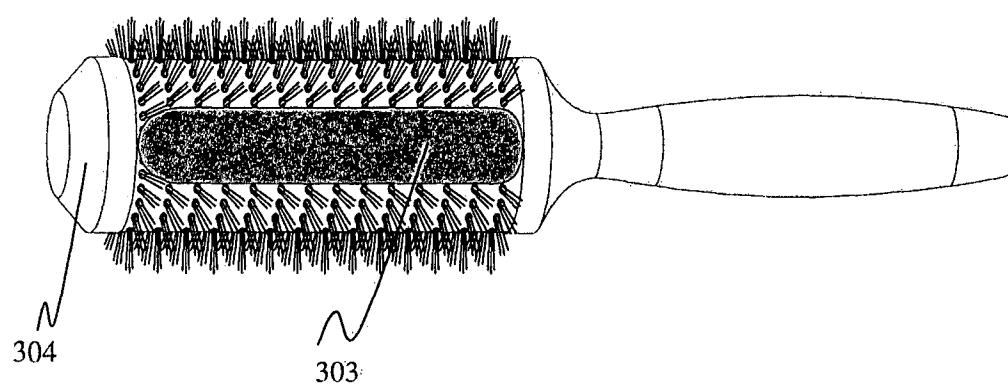


Fig. 4

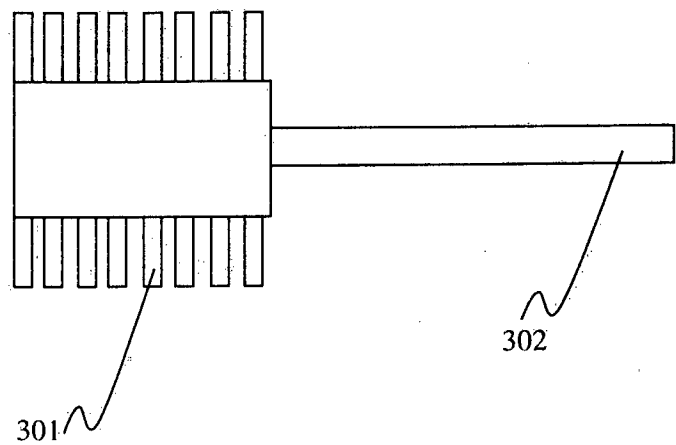


Fig. 5a

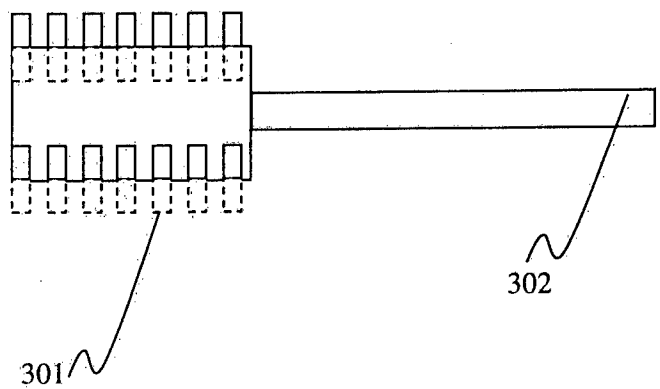


Fig. 5b

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2013/001354

A. CLASSIFICATION OF SUBJECT MATTER IPC (2013.01) A45D 20/48, A45D 20/52 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) IPC (2013.01) A45D 2/36, A45D 20/48, A45D 20/52, A46B 7/06 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) Databases consulted: THOMSON INNOVATION, Esp@cenet, Google Patents, FamPat database Search terms used: brush, hair brush - strip, metal, conductive material, latent heat, accumulator, magnesium, salt, water, ammonia, chemical reaction, exothermic reaction, thermite - constant temperature		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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☒ 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 27 Oct 2013		Date of mailing of the international search report 28 Oct 2013
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616		Authorized officer MOR Yosef Telephone No. 972-2-5651756

INTERNATIONAL SEARCH REPORT

International application No.

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Information on patent family members

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