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(54) **APPLICATOR FOR APPLYING A HAIR PRODUCT, AND ASSOCIATED APPLICATION METHOD**

APPLIKATOR ZUM AUFTRAGEN EINES HAARPRODUKTS UND DAZUGEHÖRIGES  
ANWENDUNGSVERFAHREN

APPLICATEUR POUR APPLIQUER UN PRODUIT CAPILLAIRE, ET PROCÉDÉ D'APPLICATION  
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## Description

**[0001]** The present invention relates to an applicator for applying a hair product, in particular a hairstyling composition comprising a fixing agent for shaping the hair.

**[0002]** Generally, in order to shape a head of hair, the arrangement of the hair is changed and then the conferred shape is fixed.

**[0003]** For this, the hair is styled, for example with instruments that deliver heat, such as a hot-air hair dryer, and a mechanical stress is applied to the hair, in particular to the roots. Typically, this technique, referred to as blow drying, produces a volume effect that it is the aim to maintain over time. Thus, use is made of hairstyling compositions comprising a fixing agent such as aerosol lacquers, capable of helping the hair shaping created to withstand the movements of the day, and gravity. This use of a hairstyling composition comprising a fixing agent is in particular necessary for people with fine and/or straight hair for the shape retention of the hair shaping given during the blow drying.

**[0004]** However, the use of aerosol lacquers, in particular on such fine and/or straight hair, leads to inconveniences, in particular aesthetic inconveniences. Specifically, with such an aerosol system, the product is delivered in the form of droplets which are deposited on the surface of the hair. When the droplets dry, each one forms a small join, of around 200  $\mu\text{m}$ .

**[0005]** It happens, in particular when the user wishes to obtain considerable fixing and then proceeds to dispense the product for more than 20 seconds for example, that the coalescent droplets on the hair produce sizeable local accumulations of product that are more extensive, over several millimetres.

**[0006]** This mainly poses two problems. Firstly, shiny regions appear in the head of hair, giving an affected, and therefore unnatural, appearance to the hairstyle. Next, when the head of hair moves, these local accumulations of product restrict the movement of the hairs, revealing that the head of hair has been fixed, and therefore giving it an artificial effect.

**[0007]** To overcome this problem, it is possible to limit the application time of the aerosol lacquer, for example to 10 seconds. Thus, this coalescence phenomenon, and therefore the artificial effect, is avoided, but the hairstyle is not well fixed, and does not therefore last for a long time during the day.

**[0008]** Another solution is to use lacquers that employ more concentrated formulations. Thus, by using these products for a limited time, for example of the order of 10 seconds, the problem of the coalescence of the deposited droplets is also limited. However, this solution requires the use of resins in dispersion form in order to be able to be diffused in the form of a spray. The problem with this solution is that it then becomes very difficult to comb and wash the hair because the joins based on resins in dispersion form are much more difficult to remove.

**[0009]** Tests have been carried out to reduce the ability

of the droplets to spread along or between the hairs, such as for example by reducing the surface tension of the liquid, but the results have not been deemed to be sufficient.

**[0010]** Furthermore, so as to be able to benefit from a device that is compatible with a wide range of hairstyling compositions without spraying, the Applicant Company has developed an applicator comprising a plurality of protruding spikes that delimit, at their free ends, cavities for retaining the composition to be applied. For more details on the design of this applicator, reference may be made to the Patent Application WO-A2-2012/107887, and in particular to the embodiments in Figures 2F, 3F and 3G.

**[0011]** Once the cavities of the spikes of the applicator have been loaded with composition by direct withdrawal from a receptacle containing the composition, the composition is retained inside said cavities by capillary action before being deposited on the hair in the form of droplets.

**[0012]** With this applicator, no or little effect of coalescence of the droplets of product is noted, and therefore the shiny appearance of the hairstyle is avoided.

**[0013]** However, the Applicant company has observed that the droplets are deposited mainly on a first upper layer of the hair. The hairs are therefore mainly held in this first layer of the hair. Thus, when the head of hair moves, it is possible to observe an affected phenomenon of a united movement of the hairs.

**[0014]** If the applicator is used by trying to slide the spikes under the first layer of hairs, it is seen that the droplets are captured by this first layer of hairs, during the movement for introducing the applicator, then producing the same effects.

**[0015]** In order to be able to place the hairstyling composition under the first layer of hairs, another approach consists in lifting a portion of the hair and applying the composition to the lifted portion. For more details on this type of hair-shaping method, reference may be made for example to the Patent Application FR-A1-3 029 397.

**[0016]** This method is suitable for achieving a lifting of the roots of the hair, in particular at the border between the face and the hair, but is trickier to carry out for the other regions of the hair in so far as it is necessary to move some hairs to reach other hairs. Moreover, the method requires the deposition of quite large amounts of hairstyling composition since it is distributed in the volume of the head of hair. Hence, the drying of the composition is relatively long and requires patience since it is necessary to wait for it dry completely before being able to move.

**[0017]** WO 2015/034105 A2 discloses a method for uniformly applying a hair preparation to a hair strand using a hair preparation applying implement.

**[0018]** It is therefore understood that there is a need to overcome the aforementioned drawbacks

**[0019]** The present invention relates to an applicator for applying a hair product, as defined in claim 1, and to a corresponding method for applying a hairstyling composition, as defined in claim 15. Preferred features are

set out in the dependent claims.

**[0020]** One subject of the invention is an applicator for applying a hair product comprising a base and spikes protruding from the base and having an elongate shape.

**[0021]** At least a plurality of spikes each have a surface tension that varies along its length. A distal application portion of each spike of said plurality of spikes has a surface tension greater than that of a proximal portion of said spike.

**[0022]** The term "spikes" is understood to mean separable protruding elements on the applicator. The spikes can have a cylindrical, conical, parallelepipedal, triangular, irregular, etc. shape.

**[0023]** The "proximal portion" of a spike is understood to mean the portion of the spike that is closest to the base, and the "distal portion" the end portion of the spike that is furthest from the base while being located on the same side of the proximal portion with respect to the base. The distal application portion of each spike of said plurality of spikes may be adjacent to the proximal portion of said spike.

**[0024]** In the scientific literature, one of the best known methods for measuring the surface tensions of solids is the sessile drop method.

**[0025]** A drop of liquid is deposited on the solid surface to be characterized. At equilibrium, the angle  $\alpha$  that the liquid forms with the solid surface is measured.

**[0026]** The Young-Dupré law gives a relationship between the solid-vapour (S), solid-liquid (SL) and liquid-vapour (L) surface tensions which is defined by:

$$\gamma_S = \gamma_{SL} + \gamma_L \cos \alpha$$

**[0027]** With this law, it is possible to measure the surface tension of a solid  $\gamma_S$  using different liquids.

**[0028]** The distal portions of the spikes may have one or more surface tension values. The proximal portions of the spikes may have one or more surface tension values which remain lower than that (those) of the distal portions.

**[0029]** The surface tension values of the distal application portions and of the proximal portions of the spikes are advantageously chosen as a function of the hair product to be applied.

**[0030]** The surface tension of the distal application portions of the spikes may advantageously be greater than that of the hair product to be applied. The surface tension of the proximal portions of the spikes may advantageously be lower than that of the hair product to be applied.

**[0031]** During the loading of the spikes of the applicator with the hair product, a layer of hair product forms on each spike. Then, before and while the applicator is introduced into the head of hair so that the spikes penetrate under the first layer of the hair, the hair product has a tendency to move towards the ends of the spikes given the surface tension of the distal application portions and of the proximal portions of said spikes relative to the surface tension of the hair product.

**[0032]** Thus, the hair product is deposited mainly on the layer of hair that is located under the first layer of the hair without necessarily treating the entire volume of the hair, i.e. without treating either the first layer of hair or the inner layer of hair that is in the immediate vicinity of the scalp.

**[0033]** The deposited product may dry relatively quickly in so far as it is located close to the outer surface of the first layer of the hair.

**[0034]** Preferably, the distal application portion of each spike of said plurality of spikes is provided with the free end of said spike.

**[0035]** According to one particular design, the distal application portion and proximal portion of each spike of said plurality of spikes are fixed relative to one another.

**[0036]** With such a design, the distal application and proximal portions of each spike may be made in one piece. In this case, it is possible to locally provide a step of surface tension of each spike in order to reduce the surface tension of the proximal portion. Alternatively, it is possible to produce the distal application and proximal portions of each spike as two separate parts which are then fastened together by any appropriate means. In another variant, each spike of said plurality of spikes is provided with a sleeve delimiting the proximal portion of said spike.

**[0037]** According to another particular design, the distal application and proximal portions of each spike of said plurality of spikes can slide relative to one another, and are partly mounted one inside the other.

**[0038]** In this case, the applicator may further comprise an actuating member for the displacement of the distal application and proximal portions of each spike of said plurality of spikes relative to one another.

**[0039]** In one embodiment, the actuating member comprises a plate that is movable relative to the base and that supports the proximal portion, or the distal application portion, of each spike of said plurality of spikes. The applicator may further comprise at least one elastically deformable return element which is interposed between the plate and the base.

**[0040]** In one particular embodiment, the distal application portions of the spikes have a flat shape or a section that decreases in the direction of their free end. In the latter case, they may be produced for example in the form of points or portions of spheres, in particular hemispheres.

**[0041]** The flat shape of the distal application portions of the spikes, or the decreasing section in the direction of their free end of these distal portions, favours the retention of the product on the applicator, then the transfer to the hair in the form of films.

**[0042]** Thus, after the product has been transferred to the hair, the risk of the formation of wide joins upon drying is limited and the number of separate joins is increased. A fixing effect is thus obtained without any stiffening effect on the hair and associated inconveniences.

**[0043]** As a variant, it does however remain possible

to provide distal application portions for the spikes having other shapes, for example a concave shape so as to form product-retaining cavities, a corrugated shape, etc.

**[0044]** In one embodiment, the base of the applicator delimits a frontal face from which the spikes protrude, the density of spikes on said frontal face being between 1 and 20 per cm<sup>2</sup>, and preferably between 3 and 12 per cm<sup>2</sup>.

**[0045]** Said frontal face of the base of the applicator may be between 10 and 1000 cm<sup>2</sup>, and preferably between 50 and 400 cm<sup>2</sup>. The total number of spikes may vary from 20 to 20 000, better still from 50 to 10 000, and preferably from 100 to 2000.

**[0046]** Preferably, the spikes extend in the same direction and are also preferably the same height. In order to promote uniform application of the composition, the spikes may be identical to one another.

**[0047]** The spikes may for example have a constant section over their entire height or, on the contrary, a variable section. The spikes have, for example, a section that is circular or polygonal, such as rectangular, square, etc., or else irregular in shape.

**[0048]** By way of indication, the transverse dimension of the spikes may be between 0.5 mm and 10 mm and preferably between 1 mm and 5 mm. The height of the spikes may for example be between 10 mm and 40 mm, and preferably between 12 mm and 30 mm.

**[0049]** In one embodiment, all of the spikes of the applicator each have a surface tension that varies in the direction of the length thereof. Alternatively, only some of the spikes of the applicator may each have a surface tension that varies in the direction of the length thereof.

**[0050]** Another subject of the invention is a system for packaging and applying a product, notably a cosmetic product, comprising a receptacle for storing said product, and an applicator as defined above mounted in a removable manner between a closure position of the receptacle and an application position in which the applicator is separated from said receptacle.

**[0051]** Another subject of the invention is a method of applying a hairstyling composition comprising at least one fixing agent to hair with the aid of an applicator as defined above, comprising:

- a step of loading the spikes of the applicator with the hairstyling composition having a surface tension which is lower than that of the distal portion of each spike of said plurality of spikes and which is greater than that of the proximal portion of each spike of said plurality of spikes, and
- a step of transferring the hairstyling composition retained on the spikes of the applicator to the hair by introducing said spikes into the hair.

**[0052]** The method according to the invention may be implemented on dry hair or wet hair. Preferably, the hair is dry.

**[0053]** Once the composition has been transferred on-

to the hair, the applicator can be withdrawn and the composition deposited on the hair can be dried, for example with the aid of a hair dryer or heating hood, or else left to dry naturally.

**[0054]** As indicated above, the method comprises a prior step that consists in loading the spikes of the applicator with the hairstyling composition to be applied.

**[0055]** The applicator may be loaded with composition before each use.

**[0056]** Mainly, the composition may be withdrawn directly by the spikes of the applicator from a receptacle containing the composition. In one alternative, the spikes of the applicator may for example be pressed onto a sponge impregnated with composition, in order to be loaded with composition. As a variant, the applicator is submerged in the composition. The applicator may also be brought into contact with a roller loaded with composition.

**[0057]** Preferably, the applicator can be cleaned after use and the composition remaining on the applicator after use can be removed easily, the applicator being cleaned for example with water or with the aid of any suitable solvent, by using an absorbent cloth, by aspiration or by gas jet, etc.

**[0058]** The fact that the applicator is reloadable with composition allows it to be reused.

**[0059]** The applicator is reloaded for example with a composition identical to the composition used previously, or it can be loaded with a different composition.

**[0060]** The loading of composition onto the applicator may involve the removal of excess composition from the applicator so that the composition is not present anywhere other than on the spikes.

**[0061]** The compositions that can be used are in the form of liquids or gels, creams, pastes, which may or may not comprise a pulverulent phase, or powder. When the composition is liquid, it may be in the form of a lotion or emulsion.

**[0062]** The composition may be in the form of a liquid, a lotion or a fluid emulsion or a gel that is not very thick.

**[0063]** The viscosity of the composition varies preferably from 1 to 200 cps at 25°C and at a shear rate of 1 s<sup>-1</sup>. The viscosity measurements to which reference is made are taken using a rheometer with cone-plate geometry.

**[0064]** In particular, a composition known to a person skilled in the art for styling and fixing the hair may be chosen, in particular those that are introduced into aerosol devices in the presence of a propellant gas so as to be used in lacquer form. It is also possible to use a composition inspired by these compositions but superconcentrated in fixing agent.

**[0065]** The composition comprises at least one fixing agent, if necessary in a cosmetically acceptable medium, the latter preferably being water-, alcohol- or aqueous alcohol-based.

**[0066]** The cosmetic composition may in particular comprise one or more organic solvents, preferably in an

amount by mass of between 0.05 and 95%, very preferably between 1 and 70% by weight, relative to the total weight of the composition.

**[0067]** This organic solvent may be a C<sub>2</sub> to C<sub>4</sub> lower alcohol, in particular ethanol and isopropanol, polyols and polyol ethers such as propylene glycol, polyethylene glycol or glycerol. The organic solvent is preferably ethanol or isopropanol, and even more preferably is ethanol.

**[0068]** The composition may comprise one or more fixing polymers as fixing agent. The expression "fixing polymer" is understood to mean any polymer that makes it possible to give a shape to the hair or to hold the hair in a given shape.

**[0069]** All the anionic, cationic, amphoteric and non-ionic fixing polymers and mixtures thereof that are used may be used as fixing polymers in the compositions to be applied to the hair according to the method of the invention. For more details on the fixing polymers that can be used, reference may be made for example to the abovementioned Patent Application WO-A2-2012/107887.

**[0070]** As indicated above, the surface tension of the distal application portions of the spikes is greater than that of the hair composition to be applied, and preferably at least 10% greater than that of the composition. The surface tension of the proximal portions of the spikes is lower than that of the hair composition to be applied, and preferably at least 10% lower than that of the composition.

**[0071]** By way of example, in the case of ethanol-based formulae with a surface tension equal to 22.5 mN.m<sup>-1</sup>, the distal portions of the spikes may be made from a plastic material having a surface tension greater than or equal to 25 mN.m<sup>-1</sup>, notably a PE having a surface tension between 31 and 36 mN.m<sup>-1</sup>, or a PVC having a surface tension equal to 39 mN.m<sup>-1</sup>, or a POM having a surface tension equal to 43 mN.m<sup>-1</sup>, or a Nylon having a surface tension equal to 46 mN.m<sup>-1</sup>. The distal portions of the spikes may be made from other types of materials, for example of ceramic or of metal oxide, in particular of silica having a surface tension greater than or equal to 100 mN.m<sup>-1</sup>, or else of metal, for example of aluminium having a surface tension equal to 1100 mN.m<sup>-1</sup>, or of iron having a surface tension equal to 2000 mN.m<sup>-1</sup>. The proximal portions of the spikes may be made from a fluorinated material such as Teflon or PTFE having a surface tension between 10 and 20 mN.m<sup>-1</sup>.

**[0072]** Also by way of example, in the case of aqueous ethanol-based formulae containing 40% ethanol and 60% water with a surface tension equal to 39 mN.m<sup>-1</sup>, the distal portions of the spikes may be made from a plastic material having a surface tension greater than or equal to 43 mN.m<sup>-1</sup>, notably a POM having a surface tension equal to 43 mN.m<sup>-1</sup> or a Nylon having a surface tension equal to 46 mN.m<sup>-1</sup> or else made of ceramic or of metal oxide, in particular of silica having a surface tension greater than or equal to 100 mN.m<sup>-1</sup>, or else of metal, for example of aluminium having a surface tension equal

to 1100 mN.m<sup>-1</sup>, or of iron having a surface tension equal to 2000 mN.m<sup>-1</sup>. The proximal portions of the spikes may be made from a material having a surface tension less than or equal to 35 mN.m<sup>-1</sup>, in particular a PE having a surface tension between 31 and 35 mN.m<sup>-1</sup> or else from a fluorinated material such as Teflon or PTFE having a surface tension between 10 and 20 mN.m<sup>-1</sup>.

**[0073]** Again by way of example, in the case of aqueous ethanol-based formulae containing 10% ethanol and 90% water with a surface tension equal to 46 mN.m<sup>-1</sup>, the distal portions of the spikes may be made from a plastic material having a surface tension greater than or equal to 51 mN.m<sup>-1</sup>, notably a polyacrylonitrile having a surface tension equal to 51 mN.m<sup>-1</sup>, or else made of ceramic or of metal oxide, in particular of silica having a surface tension greater than or equal to 100 mN.m<sup>-1</sup>, or else of metal, for example of aluminium having a surface tension equal to 1100 mN.m<sup>-1</sup>, or of iron having a surface tension equal to 2000 mN.m<sup>-1</sup>. The proximal portions of the spikes may be made from a material having a surface tension less than or equal to 41 mN.m<sup>-1</sup>, in particular a PE having a surface tension between 31 and 36 mN.m<sup>-1</sup> or else from a fluorinated material such as Teflon or PTFE having a surface tension between 10 and 20 mN.m<sup>-1</sup>.

**[0074]** Again by way of example, in the case of aqueous formulae having a surface tension equal to 72 mN.m<sup>-1</sup>, the distal portions of the spikes may be made of ceramic or of metal oxide, in particular of silica having a surface tension greater than or equal to 100 mN.m<sup>-1</sup>, or else of metal, for example of aluminium having a surface tension equal to 1100 mN.m<sup>-1</sup>, or of iron having a surface tension equal to 2000 mN.m<sup>-1</sup>. The proximal portions of the spikes may be made from a polymer material or from a fluorinated material such as Teflon or PTFE having a surface tension between 10 and 20 mN.m<sup>-1</sup>.

**[0075]** The surface tension of the composition must be considered with the adjuvants that it contains. Thus, if the composition is aqueous and contains a surfactant, this reduces the surface tension and leads to considering not the surface tension of the water but the surface tension of the fluid. The same reasoning applies for the surfaces of the spikes. For example, as indicated above, a surface treatment may modify the surface tension of the material of the spikes. For example, if a silica zone is treated by a phosphate-type treatment, or a treatment that renders it hydrogenated or fluorinated, the surface tension of this zone may for example change from 150 mN.m<sup>-1</sup> to 40, 30 or even be less than 20 mN.m<sup>-1</sup>.

**[0076]** As regards the applicator, it may be rigid, semi-rigid or flexible. The base of the applicator may be rigid, semi-rigid or flexible. The base is preferably made of a non-absorbent material. The term "non-absorbent" is understood to mean intrinsically impermeable to the composition, that is to say not allowing the diffusion of the composition inside it. The non-absorbent material may be for example a metallic or thermoplastic material, in particular chosen from polyolefins, and polyamides including nylons and polyester. The spikes are also pref-

erably made of a non-absorbent material.

**[0077]** By way of indication, the base of the applicator may have a transverse dimension of a few centimetres, or else be much larger to cover a large part of the head in a single action.

**[0078]** The present invention will be better understood from studying the detailed description of embodiments that are given by way of entirely non-limiting examples and are illustrated by the appended drawings, in which:

[Fig 1] illustrates an application method according to one implementation example of the invention,  
 [Fig 2] is a front view of an applicator according to an exemplary embodiment of the invention which is used in the application method of Figure 1,  
 [Fig 3] and  
 [Fig 4] are cross-sectional views along the axes III-III and IV-IV of Figure 2,  
 [Fig 5] is a detail view of Figure 3,  
 [Fig 6] is a detail view of an applicator according to another exemplary embodiment of the invention, and  
 [Fig 7] and  
 [Fig 8] are cross-sectional views of an applicator according to another exemplary embodiment of the invention.

**[0079]** The method according to the invention can be implemented directly by the consumer in order to put in place or touch up his or her hairstyle, as is illustrated in Figure 1. Alternatively, the method can be implemented in a professional setting.

**[0080]** The method of the invention is implemented with the aid of an applicator 10 for applying a hairstyling composition comprising at least one fixing agent to the consumer's hair. As will be described in more detail subsequently, the transfer of the composition from the applicator 10 to the hair is carried out by introducing said applicator into the hair. The applicator 10 is pre-loaded with composition to be applied before the step of transferring to the hair.

**[0081]** As illustrated more clearly in Figures 2 to 4, the applicator 10 comprises a base 12 and a plurality of spikes 14 extending therefrom. As will be described in more detail subsequently, each spike 14 of the applicator 10 has a surface tension which is variable along the length thereof.

**[0082]** In the exemplary embodiment illustrated, the applicator 10 also comprises a tab 15 to facilitate the gripping thereof and the handling thereof. The tab 15 extends from the base 12 on the opposite side from the spikes 14. Alternatively, it is possible for the applicator 10 not to have such a tab.

**[0083]** The base 12 has a cylindrical overall shape. In a variant, it is possible to provide other shapes, for example polygonal, oval, etc. for the base.

**[0084]** The spikes 14 make it possible to apply the composition to the consumer's hair. The spikes 14 extend transversely with respect to the base 12. The longitudinal

axes of the spikes 14 are mutually parallel. The spikes 14 are preferably identical to one another. The spikes 14 extend from a frontal face 16 of the base 12.

**[0085]** The base 12 is delimited axially by the first frontal face 16 and by a second frontal face 18 opposite the first frontal face 16. The frontal faces 16, 18 form end faces of the base 12. The frontal faces 16, 18 are in this case flat. As a variant, these faces might be slightly convex or concave.

**[0086]** In the exemplary embodiment illustrated, the spikes 14 are spaced apart regularly from one another. Depending on the spacing of the spikes 14, the fixing effect of one and the same composition will be different. By way of indication, the spacing or distance between the spikes 14 may be between 2 mm and 8 mm. Alternatively, it might be possible to provide an inter-spike 14 spacing that is not regular, for example when the composition is intended to be deposited in a particular pattern.

**[0087]** The spikes 14 have an elongate shape. In the exemplary embodiment illustrated, the spikes 14 have a cylindrical overall shape. Alternatively, the spikes 14 can have other shapes. The spikes 14 have in this case a height of 12 mm. In other embodiments, it is possible to provide a height of between 10 mm and 40 mm, and preferably between 12 mm and 30 mm. The applicator comprises in this case more than 100 spikes. In a variant, it is possible to provide a different number of spikes. By way of indication, the diameter of each spike 14 is in this case 1.5 mm. In other embodiments, it is possible to provide a spike diameter of between 0.5 mm and 10 mm, and preferably between 1 mm and 5 mm.

**[0088]** In the exemplary embodiment illustrated, each spike 14 comprises a free end 14a of flat shape. As a variant, it is possible to make provision for ends of the spikes of other shapes, for example rounded shapes, in particular spherical shapes, or else pointed shapes, or generally a section that decreases in the direction of its free end. Alternatively, the free ends of the spikes may be provided with cavities, for example of spherical shape.

**[0089]** The applicator 10 can be made by moulding a rigid plastic material, for example PP, PE, HDPE, etc., or else a flexible plastic material. In the exemplary embodiment illustrated, the applicator 10 is made by moulding in one piece. The spikes 14 are made as one piece with the base 12.

**[0090]** As indicated above, the surface tension of each spike 14 of the applicator 10 varies in the direction of its length. The surface tension of a distal portion 20 (Figure 5) of each spike 14 provided with the free end 14a is greater than the surface tension of a proximal portion 22 of said spike 14. The proximal portion 22 of said spike is connected to the base 12. More precisely, the proximal portion 22 of the spike is connected to the frontal face 16 of the base. The distal portion 20 prolongs the proximal portion 22. Preferably, the length of the distal portion 20 is less than 50% of the total length of said spike 14.

**[0091]** In the exemplary embodiment illustrated, a shoulder is made between the distal portion 20 and the

proximal portion 22. The distal portion 20 in this case has a reduced diameter compared to the proximal portion 22. Alternatively, the distal portion 20 and proximal portion 22 of each spike may be of the same diameter. In this case, the distal portion 20 and proximal portion 22 of said spike 14 are delimited solely by the variation in the surface tension of said spike 14, and not also by a difference in diameter.

**[0092]** The spikes 14 of the applicator are made by moulding in one piece. In order that, for each spike 14, the proximal portion 22 has a reduced surface tension compared to that of the distal portion 20, a surface treatment is provided on said spike in the region intended to form this proximal portion. It is for example possible to make provision for a deposition by plasma technology or else by Corona treatment.

**[0093]** The surface tension values of the distal portions 20 and of the proximal portions 22 of the spikes 14 of the applicator are chosen depending on the hairstyling composition to be applied to the hair.

**[0094]** Preferably, the surface tension of the distal portions 20 of the spikes 14 is greater than that of the hairstyling composition to be applied, and preferably at least 10% greater. The surface tension of the proximal portions 22 of the spikes is lower than that of the hairstyling composition to be applied, and preferably at least 10% lower.

**[0095]** The composition to be applied may be in the form of liquids or gels, creams, pastes, which may or may not comprise a pulverulent phase, or powder. When the composition is liquid, it may be in the form of a lotion or emulsion.

**[0096]** Preferably, the composition is thick, either by the addition of a third thickening compound, or because the concentration of resin gives a thickened appearance. The viscosity of the composition may vary preferably from 10 to 100 cps at 25°C and at a shear rate of 1 s<sup>-1</sup>.

**[0097]** For application to the hair, the user can act as follows.

**[0098]** First of all, the user loads the composition onto the spikes 14 of the applicator, for example by dipping them into a receptacle containing the composition. Thus, a layer of composition covers each of the spikes 14.

**[0099]** Next, the user introduces the applicator into the hair so that the spikes 14 penetrate under the first layer of the hair, for example from 5 mm to 10 mm.

**[0100]** Before and during the introduction of the applicator into the hair so that the spikes 14 penetrate under the first layer of the hair, the composition present on the proximal portions 22 of the spikes 14 has a tendency to move towards the distal portions 20 thereof, given the surface tension of these proximal portions relative to that of the composition. The composition is then mainly concentrated on the distal portions 20 of the spikes.

**[0101]** Hence, the composition is deposited by the distal portions 20 of the spikes 14 by capillary action in a localized manner mainly in the layer of hair that is located under the first layer of the hair. The deposited composition may dry relatively quickly in so far as it is located

close to the outer surface of the first layer of the hair.

**[0102]** As indicated above, in this exemplary embodiment, the spikes 14 of the applicator are made by moulding in one piece.

5 **[0103]** As a variant, the distal portions 22 of the spikes could be produced in the form of attached elements that are fastened to the proximal portions 20 by any appropriate means, for example by adhesive bonding or else by overmoulding. The distal portions 22 and the proximal portions 20 of the spikes are in this case made from different materials having different surface tension values.

10 **[0104]** In another embodiment variant illustrated in Figure 6, in which identical elements bear the same references, each spike 14 is equipped with a sheath or sleeve 24 that partially covers it. The sleeve 24 is mounted on the associated spike 14 to bear against the base 12 and to leave an end portion of said spike uncovered. In this embodiment variant, the sleeve 24 delimits the proximal portion 22 of the associated spike and the portion of the spike left free by the sleeve delimits the distal portion 20. Each sleeve 24 is made from a material having a lower surface tension than that of the material of the spike 14.

15 **[0105]** In the exemplary embodiments described above, the distal portions 22 and the proximal portions 20 of the spikes of the applicator are fastened relative to one another.

20 **[0106]** Alternatively, as illustrated in Figures 7 and 8, in which identical elements bear the same references, each spike 40 of the applicator comprises distal and proximal portions that slide relative to one another.

25 **[0107]** In this embodiment, the base 12 comprises a plurality of teeth 30 extending therefrom and transversely to said base. The longitudinal axes of the teeth 30 are mutually parallel. The teeth 30 are preferably identical to one another. The teeth 30 extend from a frontal face 16 of the base 12. The teeth 30 are here spaced apart regularly from one another. Alternatively, it is possible to provide a non-regular inter-teeth 30 spacing. The teeth 30 have an elongate shape, here a cylindrical shape. As a variant, it is possible to provide other shapes.

30 **[0108]** In the exemplary embodiment illustrated, each tooth has a free end 30a of flat shape. As a variant, it is possible to make provision for ends of the teeth of other shapes, for example rounded shapes, in particular spherical shapes, or else pointed shapes, or generally a section that decreases in the direction of its free end. Alternatively, the free ends of the teeth may be provided with cavities, for example of spherical shape.

35 **[0109]** The applicator also comprises a plate 32 slidably mounted relative to the base 12 and positioned on the opposite side from the teeth 30. The plate 32 comprises a plurality of teeth 34 extending therefrom and transversely to said plate. Each tooth 34 is slit along its entire length. The number of teeth 34 is equal to the number of teeth 30. Each tooth 34 extends through two through-recesses 36 of oblong shape of the plate 32. Each tooth 34 partly covers one of the teeth 30 of the plate and is slidably mounted thereon.

[0110] The applicator 10 also comprises a plurality of springs 38 interposed between the plate 32 and the base 12. One end of each spring 38 is fastened to the plate 32 whilst the other end of the spring is fastened to the base 12. The springs 38 are positioned around some of the teeth 34. The springs 38 may for example be of helical type.

[0111] As indicated above, the plate 32 is slidably mounted relative to the base 12. The plate 32 is movable between a far-away end position illustrated in Figure 7 and a close-up end position illustrated in Figure 8. The movement from the far-away end position to the close-up end position may be obtained by the user by exerting pressure on the plate 32. When the pressure by the user on the plate 32 ceases, the springs 38 return to their initial shape via elasticity, which also causes the plate to return to its starting far-away end position before stress loading.

[0112] In the close-up end position, each tooth 34 leaves the end portion of the tooth 30 over which it slides free. In this position, the length of the end portion of the tooth 30 left free by the tooth 34 is preferably less than 50% of the length of the portion of said tooth 34 which covers said tooth 30.

[0113] The surface tension of the teeth 30 is greater than that of the teeth 34. With respect to the base 12, each tooth 30 and the associated tooth 34 form a spike 40. The tooth 34 forms the proximal portion of the spike relative to the base 12 and the tooth 30 forms the distal portion.

[0114] For application to the hair, the user can act as follows.

[0115] First of all, the user loads the composition onto the spikes 40 of the applicator, for example by dipping them into a receptacle containing the composition. The surface tension of the teeth 34 of the spikes is greater than that of the composition, and the surface tension of the teeth 30 is lower than that of the composition.

[0116] A layer of composition covers the teeth 30, 34 of each of the spikes 40. The loading of the applicator 10 with composition is preferably carried out with the plate 32 in its far-away end position. Alternatively, the loading of the applicator 10 may be carried out with the plate 32 positioned between its far-away end position and its close-up end position.

[0117] Next, the user introduces the applicator into the hair so that the spikes 40 penetrate under the first layer of the hair, for example from 5 mm to 10 mm, and makes the teeth 34 slide over the teeth 30 by exerting a pressure on the plate 32.

[0118] Before and during the introduction of the applicator into the hair so that the spikes 40 penetrate under the first layer of the hair, the composition present on the teeth 34 of the spikes 40 has a tendency to move towards the teeth 30 thereof, given the surface tension of these portions of teeth 34 relative to that of the composition. Furthermore, during the sliding of the teeth 34 over the teeth 30, the composition also moves along the teeth 30 forming a droplet at the end of each spike 40, which is

transferred to the hair. A very localized fixing is thus obtained on the layer located under the first layer of the hair.

[0119] In the exemplary embodiment illustrated, the teeth 34 slide along the teeth 30. As a variant, it is possible to provide an applicator in which the teeth 30 of the spikes 40 move relative to the teeth 34.

[0120] In the exemplary embodiment illustrated, the movement of the teeth 34 relative to the teeth 30 is controlled manually. As a variant, this movement could be controlled in an assisted manner, for example with an electromagnet or else a motor.

## Claims

1. Applicator for applying a hair product comprising a base (12) and spikes (14; 40) protruding from the base and having an elongate shape, **characterized in that** at least a plurality of spikes (14; 40) each have a surface tension that varies along its length, a distal application portion (20; 30) of each spike of said plurality of spikes having a surface tension greater than that of a proximal portion (22; 34) of said spike.
2. Applicator according to claim 1, in which the distal application portion (20; 30) of each spike of said plurality of spikes is provided with the free end (14a; 30a) of said spike.
3. Applicator according to claim 1 or 2, in which the distal application portion (20; 30) of each spike of said plurality of spikes is adjacent to the proximal portion (22; 34) of said spike.
4. Applicator according to any one of the preceding claims, in which the distal application portion (20) and proximal portion (22) of each spike of said plurality of spikes are fixed relative to one another.
5. Applicator according to claim 4, in which the distal application and proximal portions (20, 22) of each spike (14) are made in one piece.
6. Applicator according to claim 4, in which each spike of said plurality of spikes is provided with a sleeve (24) delimiting the proximal portion (22) of said spike.
7. Applicator according to any one of claims 1 to 3, in which the distal application and proximal portions (30, 34) of each spike (40) of said plurality of spikes can slide relative to one another, and are partly mounted one inside the other.
8. Applicator according to claim 7, further comprising an actuating member for the displacement of the distal application and proximal portions (30, 34) of each spike (40) of said plurality of spikes relative to one



another.

9. Applicator according to claim 8, in which the actuating member comprises a plate (32) that is movable relative to the base and that supports the proximal portion, or the distal application portion, of each spike of said plurality of spikes.
10. Applicator according to claim 9, further comprising at least one elastically deformable return element (42) which is interposed between the plate (32) and the base (12).
11. Applicator according to any one of the preceding claims, in which the base delimits a frontal face (16) from which the spikes (14; 40) protrude, the density of spikes on said frontal face being between 1 and 20 per cm<sup>2</sup>, and preferably between 3 and 12 per cm<sup>2</sup>.
12. Applicator according to any one of the preceding claims, in which the transverse dimension of the spikes (14; 40) is between 0.5 mm and 10 mm, and preferably between 1 mm and 5 mm.
13. Applicator according to any one of the preceding claims, in which the height of the spikes (14; 40) is between 10 mm and 40 mm, and preferably between 12 mm and 30 mm.
14. System for packaging and applying a product, notably a cosmetic product, comprising a receptacle for storing said product, and an applicator according to any one of the preceding claims mounted in a removable manner between a closure position of the receptacle and an application position in which the applicator is separated from said receptacle.
15. Method of applying a hairstyling composition comprising at least one fixing agent to hair with the aid of an applicator according to any one of claims 1 to 13, comprising:
  - a step of loading the spikes of the applicator with the hairstyling composition having a surface tension which is lower than that of the distal portion of each spike of said plurality of spikes and which is greater than that of the proximal portion of each spike of said plurality of spikes, and
  - a step of transferring the hairstyling composition retained on the spikes of the applicator to the hair by introducing said spikes into the hair.

#### Patentansprüche

1. Applikator zum Auftragen eines Haarprodukts, umfassend eine Basis (12) und Zacken (14; 40), die von

der Basis vorragen und eine langgestreckte Form aufweisen, **dadurch gekennzeichnet, dass** wenigstens eine Vielzahl von Zacken (14; 40) jeweils eine Oberflächenspannung aufweisen, die entlang ihrer Länge variiert, wobei ein distaler Auftragabschnitt (20; 30) jeder Zacke der Vielzahl von Zacken eine Oberflächenspannung aufweist, die höher als jene eines proximalen Abschnitts (22; 34) der Zacke ist.

2. Applikator gemäß Anspruch 1, wobei der distale Auftragabschnitt (20; 30) jeder Zacke der Vielzahl von Zacken das freie Ende (14a; 30a) der Zacke aufweist.
3. Applikator gemäß Anspruch 1 oder 2, wobei der distale Auftragabschnitt (20; 30) jeder Zacke der Vielzahl von Zacken zu dem proximalen Abschnitt (22; 34) der Zacke benachbart ist.
4. Applikator gemäß einem der vorstehenden Ansprüche, wobei der distale Auftragabschnitt (20) und der proximale Abschnitt (22) jeder Zacke der Vielzahl von Zacken relativ zueinander fixiert sind.
5. Applikator gemäß Anspruch 4, wobei der distale Auftrag- und der proximale Abschnitt (20, 22) jeder Zacke (14) in einem Stück hergestellt sind.
6. Applikator gemäß Anspruch 4, wobei jede Zacke der Vielzahl von Zacken mit einer Hülse (24) versehen ist, die den proximalen Abschnitt (22) der Zacke begrenzt.
7. Applikator gemäß einem der Ansprüche 1 bis 3, wobei der distale Auftrag- und der proximale Abschnitt (30, 34) jeder Zacke (40) der Vielzahl von Zacken relativ zueinander gleiten können und zum Teil innerhalb des anderen angebracht sind.
8. Applikator gemäß Anspruch 7, ferner umfassend ein Betätigungselement zum Verschieben des distalen Auftrag- und des proximalen Abschnitts (30, 34) jeder Zacke (40) der Vielzahl von Zacken relativ zueinander.
9. Applikator gemäß Anspruch 8, wobei das Betätigungselement eine Platte (32) umfasst, die relativ zu der Basis beweglich ist und die den proximalen Abschnitt oder den distalen Auftragabschnitt jeder Zacke der Vielzahl von Zacken trägt.
10. Applikator gemäß Anspruch 9, ferner umfassend wenigstens ein elastisch verformbares Rückföhrelement (42), das zwischen der Platte (32) und der Basis (12) angeordnet ist.
11. Applikator gemäß einem der vorstehenden Ansprü-

che, wobei die Basis eine Vorderseite (16) begrenzt, von der die Zacken (14; 40) vorragen, wobei die Dichte der Zacken an der Vorderseite zwischen 1 und 20 pro cm<sup>2</sup> und vorzugsweise zwischen 3 und 12 pro cm<sup>2</sup> beträgt.

12. Applikator gemäß einem der vorstehenden Ansprüche, wobei die Querabmessung der Zacken (14; 40) zwischen 0,5 mm und 10 mm und vorzugsweise zwischen 1 mm und 5 mm beträgt.
13. Applikator gemäß einem der vorstehenden Ansprüche, wobei die Höhe der Zacken (14; 40) zwischen 10 mm und 40 mm und vorzugsweise zwischen 12 mm und 30 mm beträgt.
14. System zum Verpacken und Auftragen eines Produkts, insbesondere eines kosmetischen Produkts, umfassend einen Behälter zum Aufbewahren des Produkts und einen Applikator gemäß einem der vorstehenden Ansprüche, der auf eine abnehmbare Weise zwischen einer Schießstellung des Behälters und einer Auftragstellung, in der der Applikator von dem Behälter getrennt ist, angebracht ist.
15. Verfahren zum Auftragen einer Haarstylingzusammensetzung, die wenigstens ein Festigungsmittel umfasst, auf Haar mithilfe eines Applikators gemäß einem der Ansprüche 1 bis 13, umfassend:
  - einen Schritt des Beladens der Zacken des Applikators mit der Haarstylingzusammensetzung, die eine Oberflächenspannung aufweist, die niedriger als jene des distalen Abschnitts jeder Zacke der Vielzahl von Zacken ist und die höher als jene des proximalen Abschnitts jeder Zacke der Vielzahl von Zacken ist, und
  - einen Schritt des Überführens der auf den Zacken des Applikators zurückgehaltenen Haarstylingzusammensetzung auf das Haar durch Einführen der Zacken in das Haar.

## Revendications

1. Applicateur pour l'application de produit capillaire comprenant une embase (12) et des picots (14 ; 40) s'étendant en saillie par rapport à l'embase et présentant une forme allongée, **caractérisé en ce qu'**au moins une pluralité de picots (14 ; 40) présentent chacun une tension superficielle variable le long de sa longueur, une portion distale d'application (20 ; 30) de chaque picot de ladite pluralité de picots présentant une tension superficielle supérieure à celle d'une portion proximale (22 ; 34) dudit picot.
2. Applicateur selon la revendication 1, dans lequel la portion distale d'application (20 ; 30) de chaque picot

de ladite pluralité de picots est pourvue de l'extrémité libre (14a ; 30a) dudit picot.

3. Applicateur selon la revendication 1 ou 2, dans lequel la partie distale d'application (20 ; 30) de chaque picot de ladite pluralité de picots est adjacente à la partie proximale (22 ; 34) dudit picot.
4. Applicateur selon l'une quelconque des revendications précédentes, dans lequel les parties distale d'application (20) et proximale (22) de chaque picot de ladite pluralité de picots sont fixes l'une relativement à l'autre.
5. Applicateur selon la revendication 4, dans lequel les parties distale d'application et proximale (20, 22) de chaque picot (14) sont réalisées en une seule pièce.
6. Applicateur selon la revendication 4, dans lequel chaque picot de ladite pluralité de picots est pourvu d'un manchon (24) délimitant la portion proximale (22) dudit picot.
7. Applicateur selon l'une quelconque des revendications 1 à 3, dans lequel les parties distale d'application et proximale (30, 34) de chaque picot (40) de ladite pluralité de picots sont coulissantes l'une relativement à l'autre, et montées en partie l'une à l'intérieur de l'autre.
8. Applicateur selon la revendication 7, comprenant en outre un organe d'actionnement pour le déplacement des parties distale d'application et proximale (30, 34) de chaque picot (40) de ladite pluralité de picots l'une relativement à l'autre.
9. Applicateur selon la revendication 8, dans lequel l'organe d'actionnement comprend une platine (32) mobile par rapport à l'embase et supportant la partie proximale, ou la partie distale d'application, de chaque picot de ladite pluralité de picots.
10. Applicateur selon la revendication 9, comprenant en outre au moins un élément de rappel (42) déformable élastiquement qui est interposé entre la platine (32) et l'embase (12).
11. Applicateur selon l'une quelconque des revendications précédentes, dans lequel l'embase délimite une face frontale (16) par rapport à laquelle s'étendent en saillie les picots (14 ; 40), la densité de picots sur ladite face frontale étant comprise entre 1 et 20 par cm<sup>2</sup>, et de préférence entre 3 et 12 par cm<sup>2</sup>.
12. Applicateur selon l'une quelconque des revendications précédentes, dans lequel la dimension transversale des picots (14 ; 40) est comprise entre 0,5 mm et 10 mm, et de préférence entre 1 mm et 5 mm.

13. Applicateur selon l'une quelconque des revendications précédentes, dans lequel la hauteur des picots (14 ; 40) est comprise entre 10 mm et 40 mm, et de préférence entre 12 mm et 30 mm. 5
14. Système de conditionnement et d'application d'un produit, notamment d'un produit cosmétique, comprenant un récipient de stockage dudit produit, et un applicateur selon l'une quelconque des revendications précédentes monté de manière amovible entre une position de fermeture du récipient et une position d'application dans laquelle l'applicateur est séparé dudit récipient. 10
15. Procédé d'application sur des cheveux d'une composition de coiffage comprenant au moins un agent fixant à l'aide d'un applicateur selon l'une quelconque des revendications 1 à 13, comprenant : 15
- une étape de chargement des picots de l'applicateur, avec la composition de coiffage présentant une tension superficielle qui est inférieure à celle de la partie distale de chaque picot de ladite pluralité de picots, et qui est supérieure à celle de la partie proximale de chaque picot de ladite pluralité de picots, et 20
  - une étape de transfert sur les cheveux de la composition de coiffage retenue sur les picots de l'applicateur par introduction desdits picots dans la chevelure. 25 30

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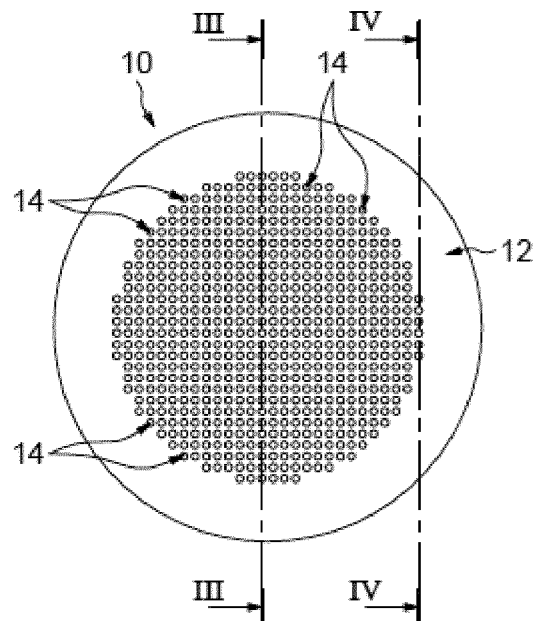
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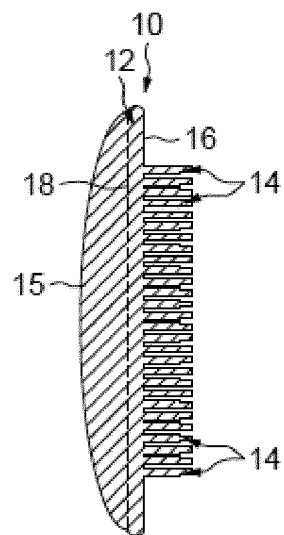
[Fig 1]



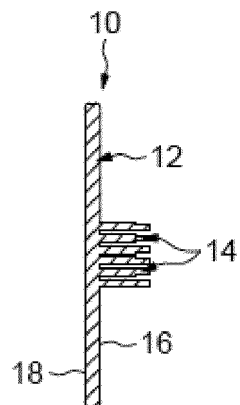
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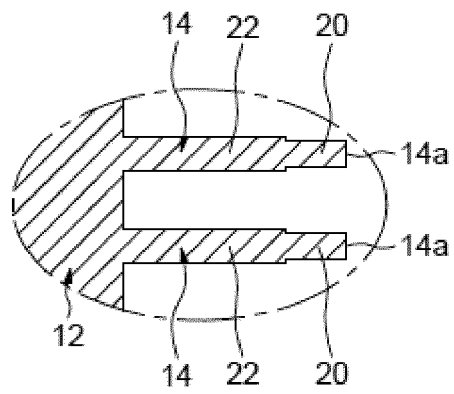
[Fig 3]



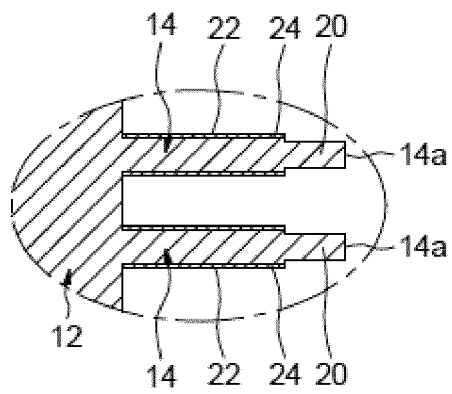
[Fig 4]



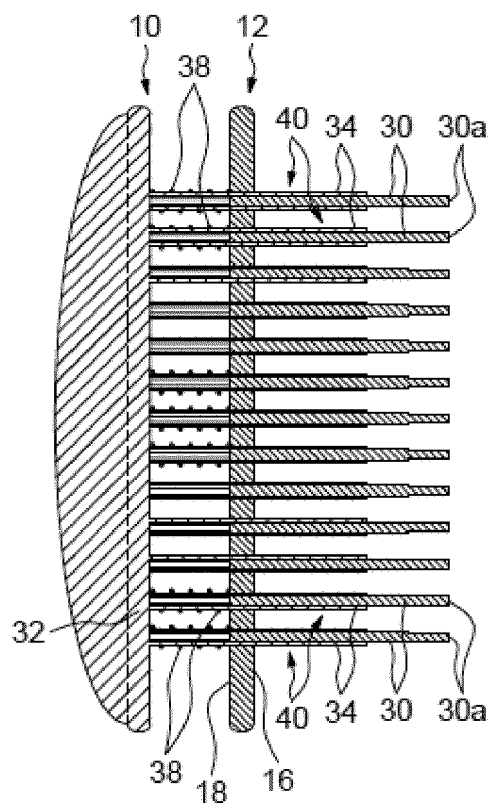
[Fig 5]



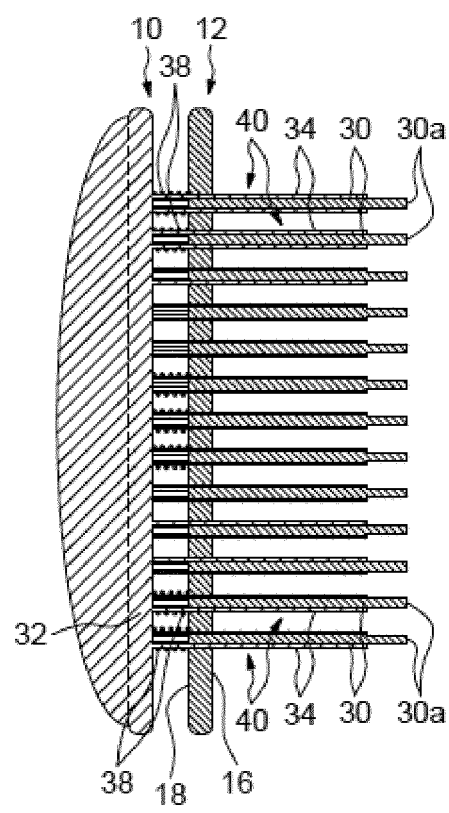
[Fig 6]



[Fig 7]



[Fig 8]





**REFERENCES CITED IN THE DESCRIPTION**

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