(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 570 761 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.09.2005 Bulletin 2005/36

(51) Int Cl.[7]: **A45D 24/30**

(21) Application number: **04380241.2**

(22) Date of filing: **29.11.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK YU

(30) Priority: **27.11.2003 AR 0304366**

(71) Applicant: **Lanne, Carlos Ernesto**
Ciudad de Buenos Aires (AR)

(72) Inventor: **Lanne, Carlos Ernesto**
Ciudad de Buenos Aires (AR)

(74) Representative: **Isern-Jara, Nuria**
Avda. Diagonal, 463 Bis 2
08036 Barcelona (ES)

(54) Rigid comb for hair cleaning provided with teeth with microtextured extremes

(57) This is a type of comb made up of a handle (M) wherefrom a number of sweeping teeth (D) are projected, thus forming a rigid set of high mechanical strength, where said teeth (D) are aligned one after the other with a minimal separation in between to define the comb front, keeping the anchorage section of each tooth within the handle body (M), and projecting out of the handle in a length considerably greater than the anchorage length. The novelty lies in the fact that the teeth have a proximal section (D1) starting from their anchorage inside the handle (M) to a point of their total length outside the handle, where a distal section (D2) begins and extends up to the free end, and where the surface roughness of the former section is different from that of the distal section, which is microtexturized.

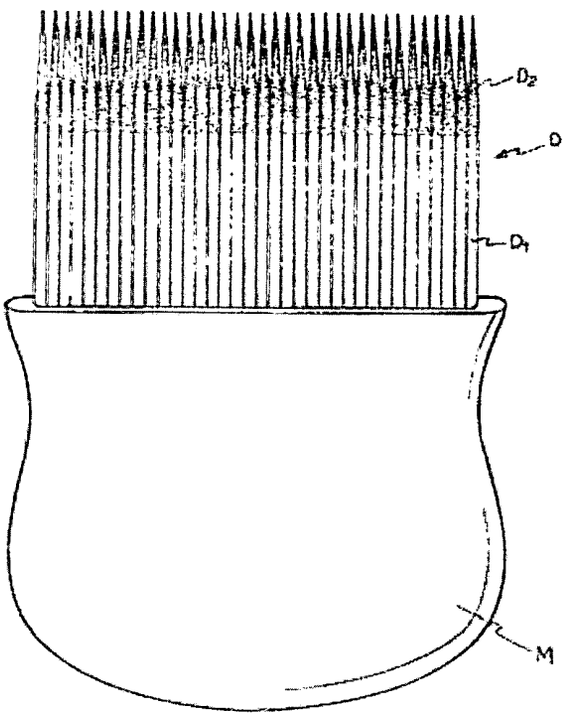


FIG. 8

EP 1 570 761 A1

Description

[0001] The main object of this patent of invention is A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING, especially designed to effectively catch, hold and remove lice and nits gripped on to the hair.

[0002] Basically, this patent of invention relates to a novel rigid comb of the kind used to conduct the aforementioned hair cleaning process through the sweeping action of very rigid teeth.

[0003] This cleaning task is aimed to fight Pediculosis, a skin injury produced by the bite of lice, very ravenous parasites found only on humans, which die soon outside their feeding environment.

[0004] When Pediculosis is detected, the best solution consists in finding and carefully removing lice and nits so as to root out the infestation and avoid its spread.

[0005] In the old days, the method used was either to nearly shave the head or wash the hair with abundant soapy hot water mixed with alcohol, vinegar and the like.

[0006] Today's rigid combs are the tools used for brushing such insects away, with very satisfactory results.

PRIOR ART

[0007] All these rigid combs have become popular since the launching of the German "Nishka" comb, featuring a great mechanical strength, consisting of a handle from which a number of fine tipped metal teeth were projected in parallel arrangement, with a minimal separation between them.

[0008] Although the results observed after using these well-known combs have been satisfactory, it has been noted that they work effectively in combing lice away but not nits.

[0009] As it is known, nits are the lice's eggs that live on the hair, close to the scalp, feeding on the blood stream ever since their birth. They are smaller than lice and stick to the hair thanks to a glue used by the female louse when laying the nit.

[0010] It has been checked that it is relatively easy to remove lice with these rigid combs, but not nits; therefore, the origin of the infection usually persists.

[0011] This is the reason why several structural modification proposals have been conceived for said rigid combs, which improve results.

[0012] In this regard, US patent 4,612,945 can be mentioned, which refers to a lice and nits removing comb. A cross section view of the comb shows long triangular teeth the thickness of which decreases towards the distal ends, so that the distance between two adjacent teeth is shorter near the handle and widens towards the free ends. Moreover, the teeth are arranged so that their longitudinal axes are parallel and in alternate planes one after the other.

[0013] With this structural design, the inventor intended to get a scissors effect to remove lice and nits. However, the results can be said not to have been entirely satisfactory, as the spacing between the distal ends is rather big, thus affecting the gadget's ability to catch and hold lice, particularly nits.

[0014] It must also be noted that such triangular section gives rise to cutting edges that tend to damage the hair, thus causing an unwanted effect.

[0015] US patent 4,671,303 tries to solve this problem by resorting to a number of rigid teeth keeping a distance of about 100 μm to 120 μm between them.

[0016] These teeth have a useful or active length of 9 mm or less, and stand out because their free or distal end sections are hook shaped, thus ensuring that lice and nits will be caught by the comb.

[0017] It has been verified that this solution is not really effective, as the teeth are short and in many cases their hook-shaped free ends do not manage to make contact with the scalp.

[0018] Likewise, the spacing between the teeth is too big, which makes it impossible to remove nits, as they do not reach the area where nits are usually glued, neither can teeth catch them when nits lie on the hair.

[0019] Considering the above-mentioned inconveniences, an attempt is being made today at reducing the distance between adjacent teeth, so that the separation is smaller than the size of lice and even nits, keeping the sweeping effect without harming the user's hair.

[0020] A further attempt is being made to give a special treatment to the outside surface of each tooth, with the purpose of granting a certain surface roughness that may help catch and hold these insects during the combing process.

[0021] In this respect, we can mention US patent 5.873.374, which describes a cleaning comb consisting of a handle and a number of rigid cylindrical needles (teeth) having a sharp and rounded tip.

[0022] This patent proposes a number of needles that combine four basic constructive terms, namely:

a) a 50 μm to 100 μm spacing between adjacent needles.
b) a 40 mm to 80 mm total length for each needle
c) a 20 mm to 60 mm length outside the handle for each needle
d) a rough needle surface

[0023] Regarding item d), it can be noted that a rough surface is a basic feature that does not constitute any novelty at all, as all surfaces have a certain degree of roughness which can be determined and measured. As all surfaces are rough, all the combs referred to are rough.

[0024] Preferably, it is said that such roughness mentioned in d) derives from the existence of an under 4 mm span helix-shaped (helicoidal) canalization.

[0025] By definition, it cannot get a roughness, since the surface has its own roughness, and according to the surface roughness definition, surface waviness or shape faults are not taken into account, which would be the case here.

[0026] There is also the possibility to define such canalization as a series of circumferential grooves separated by . 5 mm to .3 mm.

[0027] This US patent also highlights that the grooves' depth is less than .2 mm

[0028] The problem that arises with this type of structural solution lies in the need to properly determine the distance ratio between the teeth so as not to affect the sweeping action, because if the spacing is very small, it will be highly difficult for the teeth to run between the strands of hair up to the base, where nits are glued.

[0029] Even the grooves' depth causes a clear increase in the distance between adjacent teeth, which acts against nit retention as they tend to glide along the grooves without being trapped or held.

[0030] It has also been verified that this type of surface treatment on teeth causes the hair to gain electrostatic charge and get entangled when it reaches the handle area.

NOVELTY OF THE INVENTION — MAIN OBJECT

[0031] The rigid comb referred to herein suggests a new structural and functional solution that outperforms the above-mentioned patents.

[0032] Firstly, the result is a comb fitted with teeth designed to glide gently through the hair, avoiding unwanted electrostatic charges and tangles that affect the sweeping action and prevent the distal ends from acting on the hair base that harbors nits.

[0033] Furthermore, a minimal separation between adjacent teeth has been achieved, which ensures lice and nits catching without affecting the necessary comb movement.

[0034] For this purpose, such minimal spacing is combined with a microtexturized surface on the outside surface of each needle's distal section.

[0035] As this microtexturized surface only appears on the distal section, the possibility of electrostatic hair charge is null.

[0036] Likewise, said microtexturing grants an abrasive power that keeps the insects trapped during the sweeping process.

[0037] In addition, such microtexturized surface does not cause any variation in the distance between adjacent teeth, thus avoiding the risk that the trapped insect might get loose.

ROUGHNESS CONCEPT

[0038] Considering that it is a condition of this work to define a comb fitted with teeth having distal sections that include a clearly determined microtexturized surface, a definition of "roughness" is given below:

> "Roughness as applied to a surface is the set of surface irregularities as conventionally defined within the limits of the area where no shape faults or waviness are observed".

[0039] This definition has been taken from the Instituto de Racionalización de los Materiales [Material Rationalization Institute - IRAM] Standards, based on the following works:

- AMERICAN STANDARDS ASSOCIATION.
  ASA B 46.1.1955 - Surface Roughness, waviness and Lay.

- B.S.Y. - BRITISH STANDARS INSTITUTION.
  B.S. 1134-1961 - Surface Texture - (Method CLA).

- D.N.A. - DEUTSCHE, NORMEN AUSSCHUSS
  DIN: 762-1960 Erfassung gestaltabweeichungen 2 bi 5.
  Ordnung an Oberflächen and Hand von Oberflächenashnitten.

- U.N.I. - ENTE NAZIONALE ITALIANO DI UNIFICAZIONE.

UNI 3963-1960 Rugosità delle superficie-Definizioni, misura e norma generali.

- ISO - INTERNACIONAL ORGANIZATION FOR STANDARDIZATION
  Studies conducted by the Committee ISO/TG 57.

- Z.C.E.T.A. - STANDARDAZATION
  Z.C.E.T.A. 00139-1952 Surface irregularities: Roughness-Wavering-Lay.

- Surface Finish Bulletin
  Control of Surface Quality by James A. Broadston

[0040] Consequently, considering said IRAM 5065 standard, all surfaces can be said to have a certain roughness, which can be determined by using a rugosimeter.

[0041] Such standard sets forth the definitions that allow to assess roughness and its features.

[0042] In order to put into practice the advantageous functional conditions mentioned before, each tooth making up the rigid comb referred to in this invention has an outside surface defined as per two clearly distinguished sections, namely:

A proximal section, with a roughness degree ranging from
- a minimal Ra of .06 micrometers
- a medium Ra of .14 micrometers
- a maximum Ra of .32 micrometers with a .05 micrometer "standard" deviation.

A distal section, with a roughness degree ranging from:

- a minimal Ra of .09 micrometers
- a medium Ra of 1.1 micrometers
- a maximum Ra of 1.3 micrometers with a .1 micrometer "standard" deviation.

[0043] It can be noted that the former section has a (lower) degree of roughness to ensure that the hair can run gently as the comb works its way through the hair, preventing electrostatic charge and tangles. This section has been particularly designed to allow easy sweeping and combing.

[0044] The distal section's distinctive feature is its microtextured surface, achieved by high-speed glass microfibers blasting. Given its roughness degree, this microtexturing gives the comb the ability to hold the trapped insects, allowing the nits to come off the scalp.

[0045] This invention also contemplates the possibility of attaining such microtexturing by sand blasting, that is to say, by using fine sand grains, thus achieving a result similar to the one mentioned before.

[0046] This surface microtexturing is done on the distal section where each tooth tip acts on the hair base next to the scalp, where nits are usually harbored due to its proximity to the food source, which is the blood sucked by lice at birth.

[0047] The invention also contemplates the possibility of applying such microtexturing on part of the cylindrical surface of said distal section.

[0048] Therefore, the main object of this patent of invention is A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING, of the type made up of a handle and a number of sweeping teeth projecting therefrom, thus forming a rigid set of great mechanical strength, where said teeth are aligned one after the other, with a minimal separation between them, and emerging from the handle to a length considerably greater than the anchorage length.

[0049] The novelty lies in the fact that the teeth have a proximal section, extending from their anchorage inside the handle to a point of their total length outside the handle, where a distal section begins and extends up to the free tip, and this section's surface roughness is different from that of the proximal section.

[0050] Preferably, the teeth's proximal section has an even circular cross section.

[0051] Preferably, the cross section of the teeth's distal section shows a decreasing circle towards the free end, which turns into a sharp rounded tip.

[0052] Another key feature is that part of the outside surface of the distal section of each tooth is microtexturized. Another key feature is that all the outside surface of the distal section of each tooth is microtexturized.

BRIEF DESCRIPTION OF THE FIGURES

[0053] In order to sum up the advantages briefly described here, to which users and specialists will certainly add

many others, and in order to help understand the structural, constituent and functional features of the invented rigid comb, there follows an example of the preferred making of said comb, which is illustrated in the attached pictures, without following any particular scale. It is clearly stated that, being just an example, such illustrations should not be considered as granting a limited or exclusive protection scope to this patent of invention, but as merely explaining and illustrating the basic conception they are based on.

[0054] Figures 1 to 7 are microphotographies of six teeth belonging to the comb subject matter of this patent of invention.

[0055] Figure 8 is a perspective view schematically representing a rigid comb complying with the construction terms set forth in this invention.

[0056] Figure 9 is a blown-up cross section view as per drawing IX-IX indicated in figure 10.

[0057] Figure 10 is a frontal top view showing a partial detail of the inner face of the teeth-bearing handle.

[0058] Figure 11 is a blown-up detail showing a variation to this invention, where the distal section of the tooth is partially microtexturized.

[0059] It must be noted that, for all figures, the same reference numbers and letters correspond to the same or equivalent parts or elements making up the set, according to the example chosen for the present explanation of the invented object.

DETAILED DESCRIPTION OF A PREFERRED EXAMPLE

[0060] As it was previously explained, the rigid comb referred to in this patent of invention stands out because each tooth can be divided into two different sections having a different degree of roughness:

A proximal section having a certain degree of roughness that prevents hair tangles and electrostatic charges, and a distal section, which is fully microtexturized.

[0061] Figures 1 to 7 represent photomicrographies of six metal teeth complying with the conditions set forth in this invention.

[0062] They were obtained during a private trial conducted by the Instituto Nacional de Tecnologia Industrial [National Institute of Industrial Technology] (INTI) at the Centro de Investigación y Desarrollo en Mecánica [Mechanical Research and Development Center] (CEMEC), which resulted in a report dated 08/08/2003, O.T. N° 103/6444.

[0063] The samples were observed through an electronic microscope and the seven microphotographies represented in the figures were obtained.

[0064] The data appearing at the foot of each microphotography indicate, from left to right, the white cement value in the scale, the work voltage, the amplification expressed in powers of ten and an identification number.

[0065] Figures 1 and 2 show the section of the tooth next to the handle, while figures 3 to 7 represent the distal sections of the same teeth.

[0066] Moreover, a private trial was conducted at the same institute on a microtexturized metal plate, with the purpose of determining the degree of roughness of the distal section of the teeth making up the comb subject matter of this invention.

[0067] The Report was issued on September 10th, 2003 by the Centro de Investigación y Desarrollo en Fisica y Meteorología [Physical and Meteorological Research and Development Center] under number 6472.

[0068] Repeated measurements of Ra and Rz parameters were taken in different sections of each plate face, by using a .8 mm "cut-off".

Results Table

[0069]

a) Distal section

Parameter	Minimal value (μm)	Medium value (μm)	Maximum value (μm)	Standard deviation (μm)	Measurement uncertainty (μm)
Ra	.9	1.1	1.3	.1	± 6%
Rz	5.3	7.4	9.7	.8	± 6%

b) Section next to handle or support section

Parameter	Minimal value (μm)	Medium value (μm)	Maximum Value (μm)	Standard deviation (μm)	Measurement uncertainty (μm)
Ra	.06	.14	.32	.05	± 6%
Rz	.8	1.6	3.0	.3	± 6%

1.- Measurements were taken by using a "Surfanalyzer 500" Federal Roughness Meter.

2.- Measurements involved are related to the measurement standards stipulated by the INTI as per the current legislation, which represent the physical measurement units in compliance with the International Unit System (SI).

3.- The indicated expanded measurement uncertainty corresponds to each individual measurement uncertainty rather than to the average measured values. It was estimated by multiplying the combined standard uncertainty by a K = 2 coverage factor, which corresponds to a 95% reliability level for a normal distribution.

[0070] A look at Figures 8, 9, 10 and 11 shows that the comb subject matter of the invention belongs to the type of combs having a rigid handle (M) made of injected plastic material, from which a number of coinjected teeth (D) having a special structure are projected.

[0071] Preferably, the teeth (D) have circular cross section and each of them can be defined as a rigid body anchored to the support handle (M).

[0072] Each tooth has a proximal section (D1), the surface roughness of which does not affect combing. This section originates in its coinjection with the rest of the handle (M) and projects outwards in a short length. Then, the distal section (D2) begins, the cross section of which gradually decreases towards its free end, which is sharp and rounded.

[0073] There is a spacing of about .09 mm between two adjacent teeth, such parameter being measured from their respective geometrical axis.

[0074] Moreover, each tooth can have a total length (lt) of about 60 mm, and an active length (la) of about 40 mm, determined by the length protruding from the handle.

[0075] In addition, the higher roughness distal section (D2) can have a total length (Lr) of about 20 mm.

Figure 11 represents the case where each tooth of the invented comb has a partly microtexturized distal section (D2).

[0076] Having described and exemplified the nature and main object of this invention, as well as the way it can be put into practice, the inventor claims to be declared as the exclusive owner and holder of exclusive rights in relation to:

Claims

1. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING** of the type that consists of a handle wherefrom a number of sweeping teeth (D) are projected, making up a rigid set of great mechanical strength, where such teeth (D) are aligned one after the other with a minimal separation in between to define the comb front, keeping the anchorage section of each tooth within the handle body, and projecting out of the handle in a length considerably greater than the anchorage length, **characterized in that** such teeth have a proximal section starting from their anchorage inside the handle and extending outwards up to a point in its total length where the distal section originates and extends up to the free end, where the surface roughness of the proximal section is different from that of the distal section.

2. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's proximal section has an even circular cross section.

3. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's proximal section has a decreasing circular cross section.

4. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's distal section has a circular cross section that decreases towards the free end, which is a sharp rounded tip.

5. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's distal section has a partly microtexturized outside surface.

6. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's distal section has a fully microtexturized outside surface.

7. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's proximal section has a surface roughness comprising a minimum Ra of .06 micrometers, a medium Ra of .14 micrometers and a maximum Ra of about .32 micrometers, with a ± .05 micrometer standard deviation.

8. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's distal section has a surface roughness comprising a minimum Ra of .9 micrometers, a medium Ra of 1.1 micrometers and a maximum Ra of 1.3 micrometers, with a ± .1 micrometer standard deviation.

9. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** there is a free interdental space between adjacent teeth in the proximal section for the passage of hair during the sweeping process.

10. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** there is an abrasive interdental space between adjacent teeth in the distal section.

11. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's distal section has a fine sandblasted microtexturized outside surface.

12. **A RIGID COMB HAVING MICROTEXTURIZED-TIP TEETH FOR HAIR CLEANING**, as claimed in 1 above, **characterized in that** each tooth's distal section has a fine glass fiber blasted microtexturized outside surface.

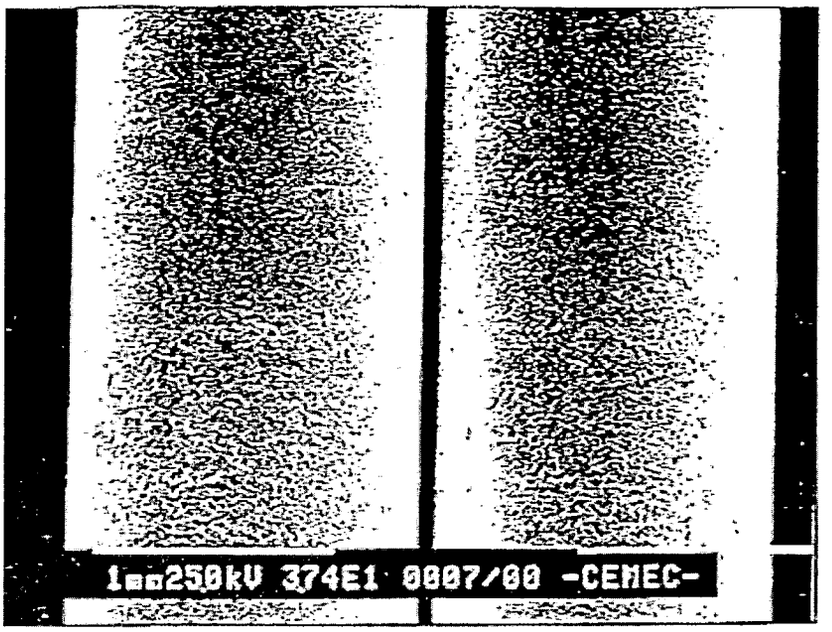


Fig. 1

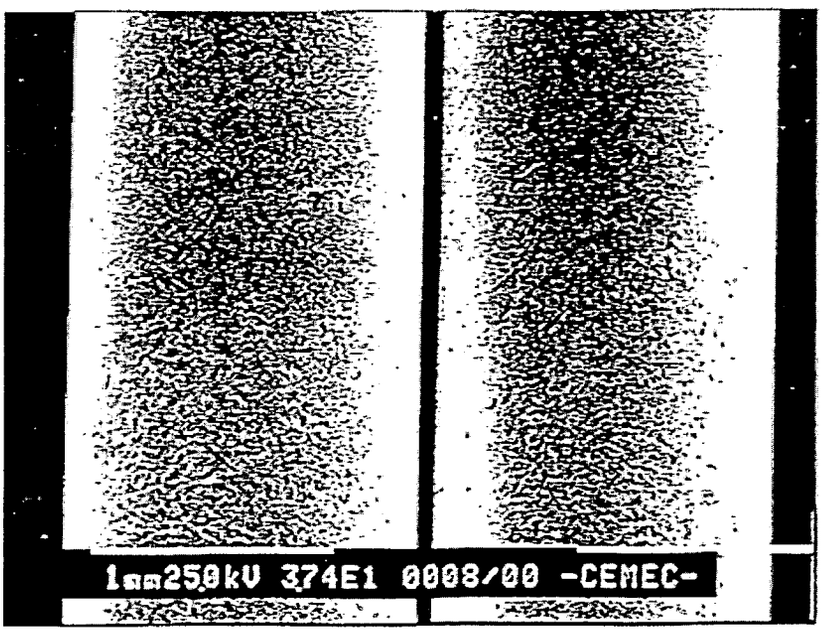


Fig. 2

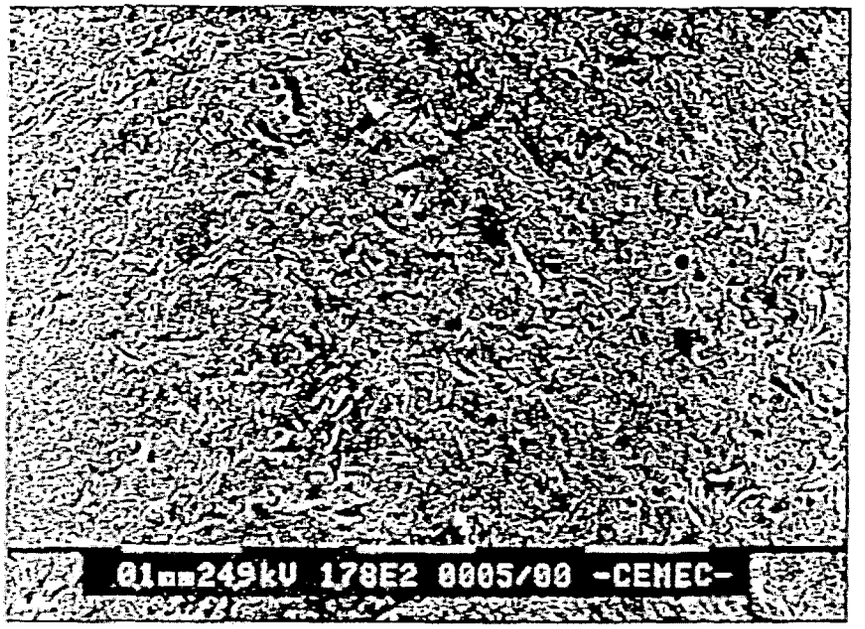

01mm249kV 178E2 0005/00 -CEMEC-

Fig. 3

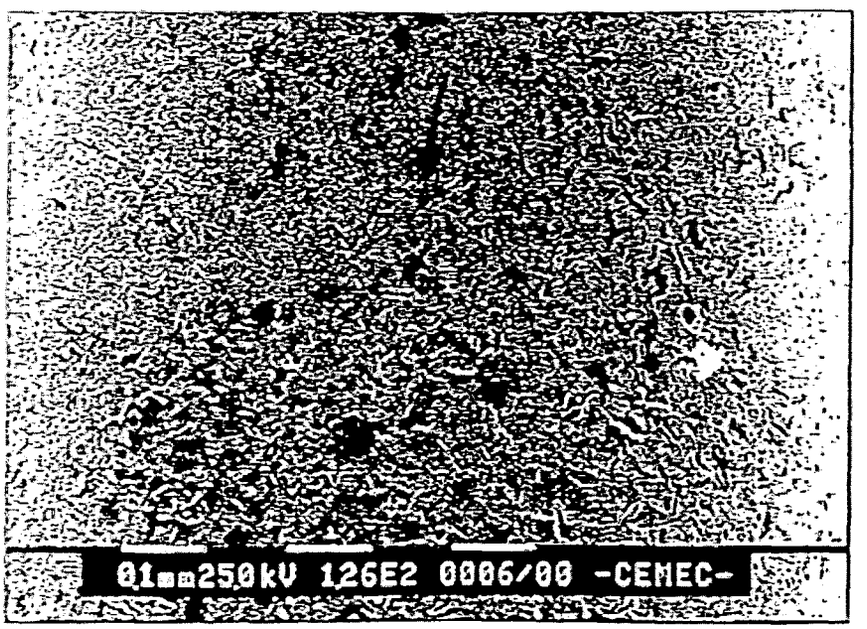

01mm250kV 126E2 0006/00 -CEMEC-

Fig. 4

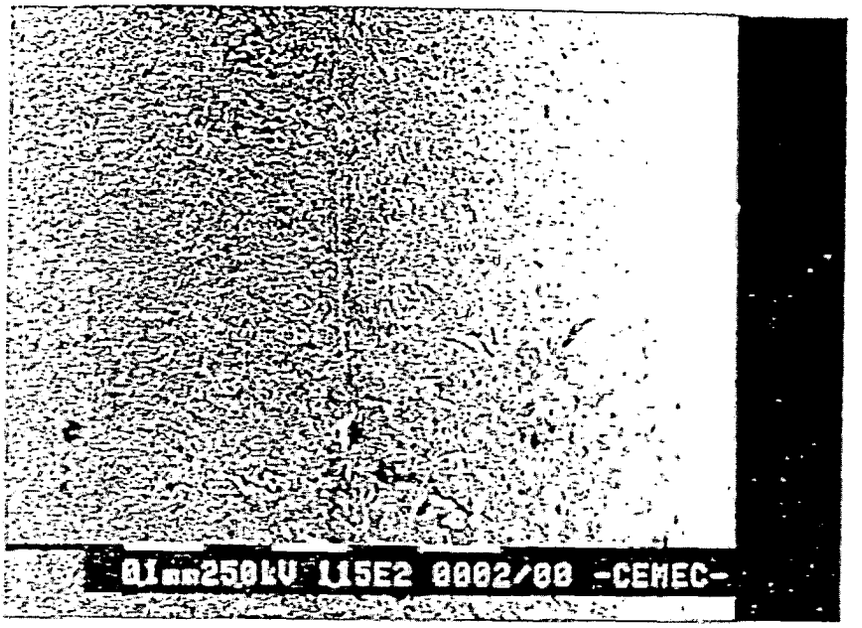

0Imm250kV 115E2 0002/00 -CEMEC-

Fig. 5

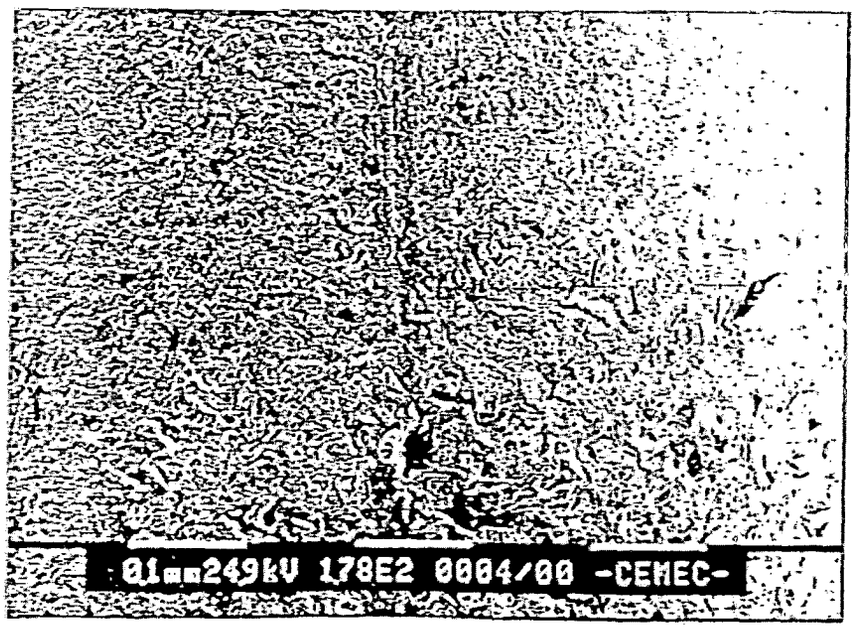

0Imm249kV 178E2 0004/00 -CEMEC-

Fig. 6

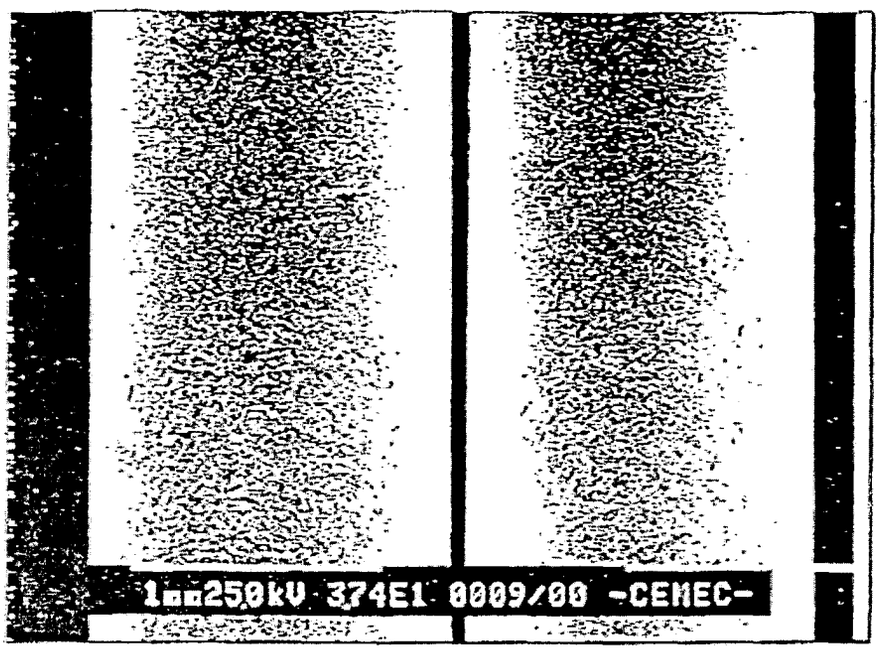


Fig. 7

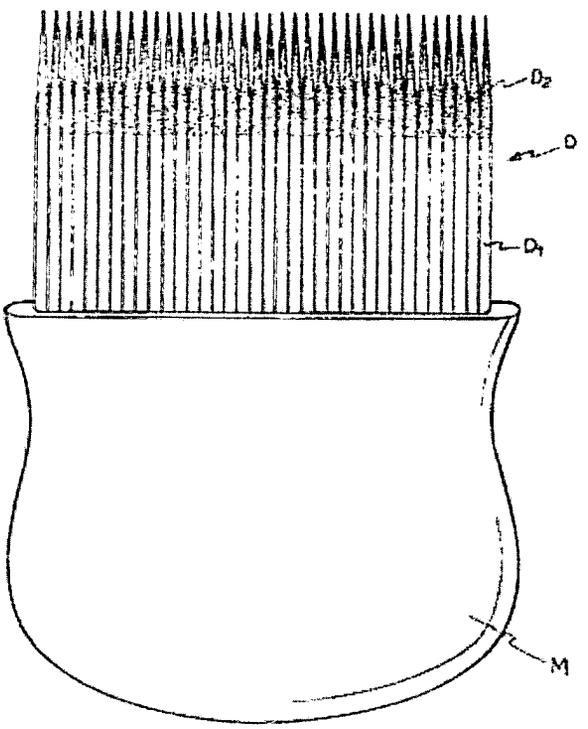


FIG. 8

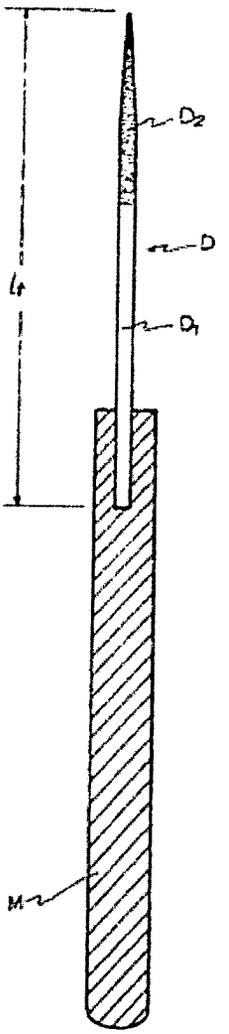


FIG. 9

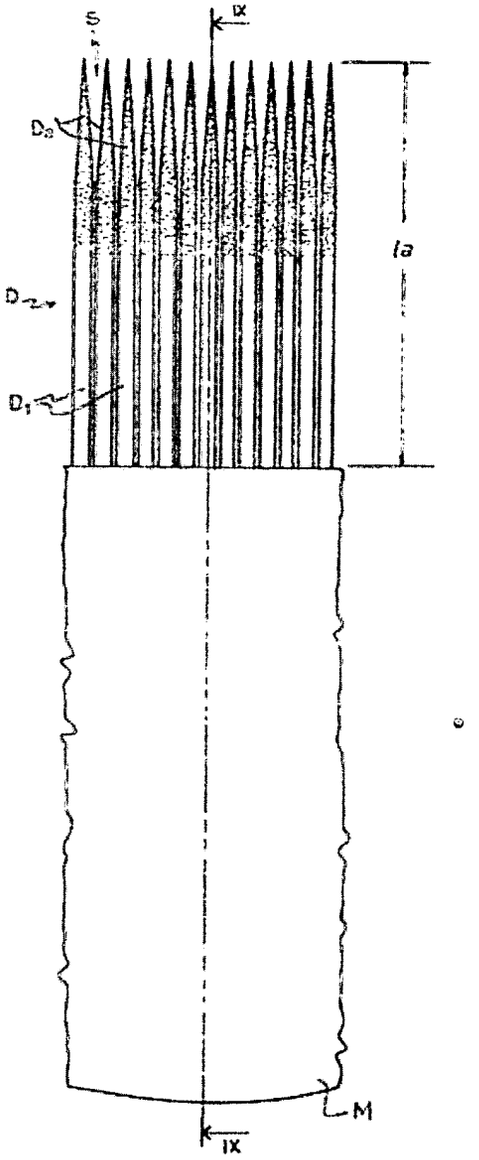


FIG. 10

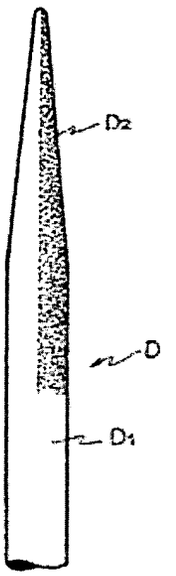


FIG. 11

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 38 0241

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 00/08969 A (JOHNSON & JOHNSON INDUSTRIA E COMERCIO LTDA; DE MADUREIRA, PAULO, ROBE) 24 February 2000 (2000-02-24) * page 4, line 1 - line 33 * * page 6, line 20 - page 7, line 33 * * page 8, line 25 - line 30; claims; figures *	1-12	A45D24/30
X	US 2002/078972 A1 (LEVANDOVSKY SILVIO FABIAN) 27 June 2002 (2002-06-27) * paragraphs [0002], [0023], [0028] - [0030]; claims; figures *	1-3,5,6, 9-12	
D,A	US 4 612 944 A (BACHRACH ET AL) 23 September 1986 (1986-09-23) * column 1, line 11 - line 45; claims; figures *	1-12	
A	US 5 191 907 A (HIRZEL ET AL) 9 March 1993 (1993-03-09) * column 3, lines 1-5 *	1-12	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	GB 157 652 A (JOHN SACKER) 27 January 1921 (1921-01-27) * the whole document *	1	A45D A01K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 July 2005	Acerbis, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 38 0241

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-07-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0008969 A	24-02-2000	BR 9803047 A	02-05-2000
		AU 6071999 A	06-03-2000
		WO 0008969 A2	24-02-2000
US 2002078972 A1	27-06-2002	NONE	
US 4612944 A	23-09-1986	NONE	
US 5191907 A	09-03-1993	GB 2259008 A ,B	03-03-1993
		JP 6038824 A	15-02-1994
GB 157652 A	27-01-1921	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82