



- (51) **International Patent Classification:**
A46B 9/02 (2006.01) *A46D 1/00* (2006.01)
- (21) **International Application Number:**
PCT/GB2015/051916
- (22) **International Filing Date:**
30 June 2015 (30.06.2015)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
1411577.8 30 June 2014 (30.06.2014) GB
1411583.6 30 June 2014 (30.06.2014) GB
- (71) **Applicant:** TANGLE TEEZER LIMITED [GB/GB];
143 Acre Lane, London SW2 5UA (GB).
- (72) **Inventors:** PULFREY, Shaun; 93 Arlington Lodge, Brixton Hill, London SW2 1RF (GB). TREEBY, Cameron Bruce William; Flat 8, Cruden House, 33 Vernon Road, Bow, London E3 5HE (GB).
- (74) **Agents:** ROBEY, James et al.; Blackfriars House, 5th Floor, The Parsonage, Manchester, Lancashire M3 2JA (GB).

- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) **Title:** HAIR BRUSH

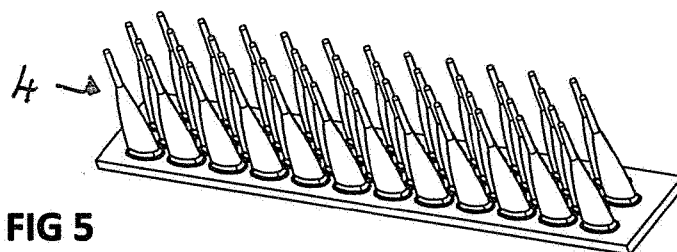


FIG 5

(57) **Abstract:** A hair brush with an array of bristles (4). Each bristle extends from a base to a free end. Some or all of the bristles have relatively wide first portion, towards the base of the bristle, and a relatively narrow second portion, towards the free end of the bristle. The bristles are arranged in offset rows and centre lines of the rows are spaced apart such that at least part of the first portion of bristles in one row extends between adjacent bristles in an adjacent row and/or, when viewed perpendicular to the rows, the width of the first portion of the bristles in one row is, over part of their length, the same or greater than the space between adjacent bristles in an adjacent row so as to partially occlude the space between bristles in an adjacent row. The bristles are sized and arranged so that the first portion of the bristles serves to easily penetrate and divide hair between the bristles and the second portion of the bristles enables tension to be applied to the hair when hair flows between the bristles.



HAIR BRUSHTechnical Field of the Invention

The present invention relates to a hair brush for styling hair.

Background to the Invention

5 When styling hair professional hairdressers routinely apply varying amounts of tension to the hair while heating with a hair dryer. This enables the hair to be straightened and then shaped and set with heat into a desired style.

Tension is applied with a hair brush. For shorter hair a round brush is used. Hair is wrapped onto the brush so that it is gripped by the bristles of the brush to enable tension
10 to be applied to the hair as it slides through the bristles of the brush. The more quickly the brush is moved through the hair the greater the tension applied to the hair. For longer hair a round brush with greater diameter, or a paddle brush, is used.

However, problems can arise when using this technique which can make it difficult for amateurs to employ, and for anyone styling their own hair. Bristles of a
15 hairbrush need to be dense so as to grip the hair and enable tension to be applied. It can be difficult to pick up the hair and direct it down into these bristles. Also, once hair is flowing through the bristles it often binds, leading to pulling of the hair which causes discomfort, stretched hair and hair loss. When tangles are present in hair, a hair brush used to apply tension to the hair will readily snag on the tangles.

20 Another hair styling technique is back combing. With this technique hair is held under tension extending away from a person's scalp, and then gradually brushed back towards the scalp. This approach teases a few strands of hair at a time out of the stylist's

grip and back towards the scalp, introducing tangles into the hair so as to build body. Following this step, the outer layer of the body of back combed hair is gently brushed to remove tangles and provide an attractive external appearance.

As with heating hair under tension, this technique also requires using a brush
5 which is able to grip the hair and so similar difficulties can be encountered. It also requires a second brush or comb for smoothing the outer layer following back combing.

Embodiments of the present invention have been made in consideration of these issues.

Summary of the Invention

10 According to an aspect of the present invention there is provided a hair brush for styling hair, the brush comprising: an array of bristles each extending from a base to a free end; at least some or all of the bristles comprising a first, relatively wide, portion which tapers from the base and a second, relatively narrow, portion which extends from the first portion to the free end; the bristles being arranged in two or more spaced apart,
15 offset, rows wherein centre lines of the rows are spaced apart such that at least part of the first portion of bristles in one row extends between adjacent bristles in an adjacent row; and/or, when viewed perpendicular to the rows, the width of the first portion of the bristles in one row is, over part of their length, the same or greater than the space between adjacent bristles in an adjacent row so as to partially occlude the space between bristles in
20 an adjacent row; and the bristles are sized and arranged so that, in use, the first portion serves to penetrate and divide hair between the bristles and the second portion of the bristles enables tension to be applied to the hair when hair flows between the bristles.

The first portion of the bristles helps to easily divide the hair, as well as helping remove tangles. It is also useful in smoothing the outer layer of back combed hair. By virtue of their greater width, and the arrangement of the bristles, the space between the second portions of the bristles is less than between the first portions. Consequently, as
5 hair flows between the second portions of the bristles there is greater friction between the bristles and hair, enabling tension to be applied to the hair.

The first and/or second portion of the bristles may be flexible and may be resiliently flexible. The second portion of the bristles may be more flexible than the first.

The first portion of the bristles may have a larger transverse cross-sectional area
10 then the second portion.

All, or a substantial proportion (such as at least half), of the bristles in the array, or of the brush, may be provided with first and second portions. All of these, or indeed all or substantially all the bristles in the array, or the brush, may be of substantially the same shape.

15 When viewed in the same direction, the width of the widest part of the first portion of the bristles having first and second portions may be at least twice, three or four times the width of any part of the second portion or the second portion at or near to its free end. When viewed in the same direction, the width of the widest part of the first portion of the bristles having first and second portions may be no more than twelve or
20 fifteen times the width of the bristle at any part of the second portion or at or near its free end. The length of the bristles having first and second portions may be no greater than seven, nine or ten times its maximum width. The length of the bristles having first and second portions may be no less than twice their maximum width.

In some preferred embodiments the ratio of width of the base of the bristle to that at or near its tip, or any part of the second portion, varies in the range four to ten, with a ratio of about six being particularly useful. The ratio of overall length to maximum width of the bristles may vary from 2 to 5 with a ratio of about 3 being particularly useful.

- 5 The various ranges mentioned above have been found to provide a satisfactory balance between the performance of the first and second portions of the bristles.

The width of the bristles may vary continuously or discontinuously between their base and free ends. Along part of its length, and preferably within the first portion of the bristles, the width of the bristles may taper at an angle greater than the angle of taper of a
10 uniformly tapered bristle having the same length and variation in width. This allows there to be significantly more space between the second portion of the bristles in the array than the first portion, as compared to uniformly tapered bristles. This enables the two portions of the bristles to perform their different functions without being unduly long.

Two opposed edges of the first portion of those bristles comprising first and
15 second portions may taper towards each other with a minimum average angle of at least 10 degrees between the opposed edges over the length of the first portion, and opposite sides of the second portion may taper towards each other with a maximum average angle of 5 degrees between opposed edges over the length of the second portion. Two opposed edges of the first portion may taper towards each other with a minimum average angle of
20 at least 15 or 18 degrees.

The angle between the opposed edges of the first portion may increase from the base of the bristle to the end of the first portion. The opposed edges of the first portion may be curved.

All opposed edges of the first portion may taper towards each other with a minimum average angle of at least 5 degrees between the opposed edges over the length of the first portion.

The degree of taper of the bristles may change abruptly at the interface between
5 the first and second portions of the bristles.

These features provide for a bristle with a wider first portion which tapers relatively abruptly over its length or a small proportion of its length to a second portion which has only a gradual taper.

The first portion may have a non-circular transverse cross-section over at least
10 part or substantially all of its length. The cross-section may be elongate in shape and may be substantially oval. The first portion may have a non circular cross-section at its base which gradually transitions to a substantially circular cross-section at the point where it meets the second section. The first portion of those bristles with first and second portions may terminate where the second portion begins. The bristles may consist only of the first
15 and second portions.

Where at least part of the first portion has an oval cross-section, edges of the first portion lying on a long axis of its oval cross-section may approach each other in a curved path over the length of the first section. Edges of the first portion lying on a short axis of its oval cross section may approach each other in a substantially straight path over the
20 length of the first section.

The second portion may have a substantially circular cross-section over all or substantially all of its length.

All opposed edges of the second portion may taper towards each other with a maximum average angle of 3 degrees between the opposed edges over the length of the second portion.

The length of the second portion may be at least one quarter of, or one half of, the
5 length of the first portion. The length of the second portion may be no greater than the length of, or twice the length of, the first portion.

The bristles may all be spaced apart from one another. This reduces the risk of hair binding to the brush.

According to another aspect of the invention there is provided a hair brush
10 comprising an array of bristles, at least some or all of the bristles having a transverse cross-section with an elongate shape over some or substantially all of their length and arranged in two or more spaced apart, offset, rows wherein centre lines of the rows are spaced apart such that at least part of the first portion of bristles in one row extends
15 between adjacent bristles in an adjacent row; and/or, when viewed perpendicular to the rows, the width of the bristles in one row is, over part of their length, the same or greater than the space between adjacent bristles in an adjacent row so as to partially occlude the space between bristles in an adjacent row.

The elongate shape may be substantially oval. Over all or part of the array the bristles may be of substantially the same shape.

20 The follow are optional features of both aspects of the invention.

Bases of adjacent bristles in each row may be spaced apart by a distance which is less than half the maximum width of the base of the bristles.

In one embodiment the bristles are spaced apart by a maximum of 2.5mm

The bases of bristles in one row may be spaced from the base of the nearest bristle in an adjacent row by a distance which is less than the space between adjacent bristles in the row.

- 5 In one embodiment the bases of bristles in one row are spaced from the base of the nearest bristle in an adjacent row by a maximum of 2mm.

The width and shape of bristles in one row may be such that it only partially occludes the space between bristles in the adjacent row.

- Each row of bristles may be substantially straight, or may be curved. The rows
10 may be generally parallel. The bristles in each row, or at least a number of adjacent rows, may all be evenly spaced apart by substantially the same distance.

Adjacent rows may be offset relative to each other so that the centre of each bristle in a row is substantially aligned with the midpoint between bristles in an adjacent row.

- 15 The bristles may be tapered, with their cross-section reducing from the base to the free end. With this arrangement the amount of space between bristles reduces towards their base. Therefore the more hair moves into the bristles the more it is gripped by the bristles, owing to the reduced space and a more complex path between bristles, enabling greater tension to be applied to the hair.

- 20 The degree of taper of the bristles may change abruptly at the interface between the first and second portions of the bristles

There may be at least three or four rows of bristles.

Bristles with a substantially oval cross-section may form an elongate rectangular array of bristles formed from generally parallel long rows and generally parallel short rows of bristles. In this arrangement a long axis of the oval cross-section of each bristle may be substantially aligned with the direction of the long row of which it forms a part.

- 5 The bristles may be moulded and may be moulded from a plastics material, particularly a resiliently flexible plastics material.

Detailed Description of the Invention

In order that the invention may be more clearly understood embodiments thereof will now be described, by way of example only, with reference to the accompanying
10 drawings, of which:

- Figure 1 is a plan view of a hair brush;
- Figure 2 is an end view the hair brush of figure 1;
- Figure 3 is a perspective view of the hair brush of figure 1 from its underside;
- Figure 4 is a perspective view of the hair brush of figure 1 from above;
- 15 Figure 5 is a perspective view of part of an array of bristles of the hair bush of figure 1;
- Figure 6 is a plan view of the array of bristles of figure 5;
- Figure 7 is an end elevation of the array of bristles of figure 5;
- Figure 8 is a side elevation of the array of bristles of figure 5;
- 20 Figure 9 is a cross-section taken along the line A-A of figure 6;
- Figure 10 is a perspective view of a cross-section taken along line B-B of figure 8;

- Figure 11 is an enlargement of the circled area of figure 10;
- Figure 12 is an enlarged cross-section of taken along the line C-C of figure 8;
- Figure 13 is a plan view of another hair brush;
- Figure 14 is a perspective view of the hair brush of figure 13 from above;
- 5 Figure 15 is a perspective view of the hair brush of figure 13 from below;
- Figure 16 is an end view the hair brush of figure 13;
- Figure 17 is a perspective view of another hair brush from above;
- Figure 18 is a plan view of the hair brush of figure 17;
- Figure 19 is an end view of the hair brush of figure 17;
- 10 Figure 20 is a perspective view of another hair brush;
- Figure 21 is a side elevation of the array of bristles of the hair brush of figure 20;
- Figure 22 is an end elevation of the array of bristles of figure 21;
- Figure 23 is a plan view of the array of bristles of figure 21;
- Figure 24 is cross-section taken along the line D-D of figure 21;
- 15 Figure 25 is a cross-section taken along the line E-E of figure 23; and
- Figure 26 is an enlarged view of the circled area of figure 25.

In the following the terms front, back, top, bottom and like terms refer to the articles in the orientation in which they are illustrated, but should not be taken as otherwise limiting.

Referring to the drawings, figures 1 to 4 show a hair brush. The hair brush is of a paddle type. It comprises a body 1 of generally rectangular outline moulded in one piece with an elongate handle 2 which extends generally perpendicularly from the approximate mid-point of one of the ends of the body, formed by one of the shorter sides of the rectangle. The body and handle extend in generally the same plane. The underside of the body has a generally convex surface which blends into the handle. The opposite, upper, side of the body defines a cavity into which an insert 3 is fitted.

The exposed surface of the insert, to the upper side of the brush, has a generally convex, part cylindrical, surface. The insert comprises, or supports, moulded bristles 4 which project generally perpendicularly from the exposed surface of the insert 3.

Each bristle 4 is substantially identical to each other bristle. All of the bristles are moulded together in one piece, together with a base (which may form all or part of the insert 3) from a resiliently flexible plastics material. Suitable materials are thermoplastic elastomers, such as copolyesters and aliphatic polyamides (nylons) and, in particular, the copolyester sold under the trade mark Hytrel by E. I. du Pont de Nemours and Company. Grades of Hytrel with hardness from 45 to 82 Shore D are particularly suitable.

Each bristle 4 has a base with a generally oval cross-section, having a long axis and a perpendicular short axis. As the bristle extends away from the base it tapers. Over a first portion of the length of the bristle the bristle tapers such that its cross-sectional shape changes from oval to substantially circular.

Figure 9 shows a cross-section through bristles 4 taken along the long axis of the oval cross-section of the bristles. As can be seen from this view, the edges of the bristle through which the long axis extends approach each other at an increasingly steep angle as

the bristle extends away from the base. The opposite edges approach each other in a curved path.

Figure 12 shows a cross-section through bristles 4 taken along the short axis of the oval cross-section of the bristles. The edges of the bristle through which the long axis
5 extends approach each other at a substantially constant angle, and the edges of the bristle are therefore substantially straight.

At the end of the first portion of the bristle its cross-section is substantially circular. At this point a second portion of the bristle begins. Over the second portion of the bristle the cross-section of the bristle remains substantially circular and the bristle
10 tapers towards a free end, with a domed surface. The degree of taper of the bristle over the second portion of the bristle is significantly less than over the first portion, and in particular compared to the degree of taper in the first portion immediately adjacent to the second portion. There is therefore a discontinuity in the shape of the surface of the bristle at the junction between the first and second portions.

15 The degree of taper of the second portion of the bristle is in effect the minimum consistent with being able to reliably remove the bristle from a mould tool. So far as the function of the second portion of the bristle is concerned it could have a substantially constant diameter.

In the illustrated embodiment the first portion 5 of the bristle extends about
20 12.0mm from the base, and the second portion 6 of the bristle extends about a further 6.4mm from the end of the first portion to the end of the bristle. The domed end of the bristle has a radius of curvature of about 0.4mm.

The widest part of the first portion of the bristle, measured at its base, along the long axis of its oval cross-section, has a width of about 4.95mm. The narrowest part of the base of the bristle, measured along the short axis of its oval cross-section, has a depth of about 2.2mm. The sides of the bristle along its short axis approach each other at an angle of about 6.2 degrees. The sides of the bristle along its long axis approach each other with a gradually increasing angle, forming a smooth curve. The average angle of taper between the two sides of the bristle is approximately 19 degrees, that is to say the angle of taper that would be required if the sides were straight rather than tapered.

At the end of the first part of the bristle it has a substantially circular cross-section with a diameter of about 1mm.

The sides of the bristle approach each other over the second portion of its length with an angle of about 2 degrees, resulting in a diameter of about 0.8mm at the free end of the bristle, not including the domed end.

Other dimensions are possible, as discussed elsewhere. In particular, the bristle could be sized so that the second portion of the bristle tapers to a diameter of about 1.2mm.

Each array is generally rectangular in shape, and is intended to be moved through hair in a direction generally perpendicular to the long sides of the rectangle.

Each bristle in the array forms a part of a long row of bristles and a short row of bristles which extends transversely to the long row.

Each of the long rows are very slightly curved (but could be substantially straight), substantially parallel and substantially evenly spaced apart. In each long row the bristles are substantially evenly spaced apart, with the long axes of the oval cross-

section of the first part of the bristles all lying substantially along the same straight line. The bristles are spaced apart by the same amount in each long row and adjacent long rows are off-set relative to one another so that the centre of the cross-section of the bristles in one row lies mid-way between adjacent bristles in the adjacent row.

- 5 Each of the short rows are substantially straight and substantially parallel. In each short row the bristles are substantially evenly spaced apart, with the short axes of the oval cross-section of the first part of the bristles lying along substantially the same line. The bristles are spaced apart by the same amount in each short row and the centre-lines of each short row are spaced apart so that the base of each bristle in each short row partially
10 extends between two adjacent bristles in the or each adjacent short row

In the illustrated embodiment each array comprises four long rows, two rows having 16 bristles and the other two having 15 bristles making 32 short rows. Of course, the number of rows and number of bristles in each row can be varied as desired and appropriate. A substantially square array is possible.

- 15 In the illustrated embodiment the bristles in each long row are spaced apart by about 2.1mm, and the centrelines of adjacent long rows are spaced apart by about 2.9mm. This results in the smallest gap between a bristle in one row and a bristle in an adjacent row being about 1.3mm. Other dimensions are possible, as discussed elsewhere.

- Although the bristles are moulded in a single piece from the same material,
20 owing to their different cross-section and shape, the first portions are significantly stiffer than the second. In practice, in use, the first portions are effectively substantially rigid, whereas the second portions are resiliently flexible. In practice, in an alternative

embodiment the second portions could also be rigid or at least relatively stiff, although having a resiliently flexible second portion is preferred.

The bases of the first portions of the bristles occupy a significant portion (greater than 50%) of the surface area over which the array extends, whereas the second portions
5 of the bristles occupy significantly less than 50% of the available surface area.

Because the width of the base of the first portions of the bristles, along the length of a long row of bristles, is greater than the space between adjacent bristles in the row each bristle occludes the gap between the base of adjacent bristles in adjacent rows when viewed in a direction perpendicular to that of the long rows of bristles. Owing to the
10 shape of the first portion of the bristles the gap between adjacent bristles is occluded over a little over half the length of that portion of the bristles over the base.

Figures 13 to 16 show an alternative hair brush. This hair brush is substantially the same as that shown in figures 1 to 4, and parts of the brush are denoted with the same reference numerals, except that each of the generally rectangular arrays of bristles
15 comprise three substantially parallel long rows of bristles. The two arrays at the respective outside edges of the brush consist of long rows of 13, 14 and 13 bristles thus forming 14 short rows of two bristles alternating with 13 single bristles. The two arrays positioned side by side in between the two outer arrays consist of long rows of 14, 13 and 14 bristles.

20 Figures 17 to 19 show another hair brush, in this case a so-called round brush. The brush comprises an elongate body 7. One end 8 of the body is substantially cylindrical, and the other end 9 is shaped to form a comfortable handle. The cylindrical end 8 of the body supports six generally rectangular arrays of radially extending bristles

4. Each array of bristles comprises three parallel long rows of 13, 12 and 13 bristles of the type shown in figures 5 to 12. The rows of bristles extend parallel to the long axis of the cylindrical part 8 of the body and are evenly spaced around the circumference of the body, the space between each array being greater than the space between individual rows
5 in each array.

Figure 20 shows yet another hair brush. This brush comprises an elongate body 11. At one end the body provides an elongate generally rectangular paddle 12 which supports a generally rectangular array of bristles 13 which are illustrated in greater detail in figures 23 to 26. The array of bristles is intended in use to be moved through hair in a
10 direction generally perpendicular to the long sides of the rectangle. At the opposite end the body is shaped to form a comfortable handle 14.

Each individual bristle in the array 13 is substantially identical to each other bristle. All of the bristles are moulded together in one piece, together with a base 15 from a resiliently flexible plastics material. Suitable materials are those discussed above in
15 relation to the bristles illustrated in figure 5 to 12.

Each bristle has a base with a generally oval cross-section, having a long axis and a perpendicular short axis. As the bristle extends away from the base 15 it tapers. Over a first portion 16 of the length of the bristle the bristle tapers such that its cross-sectional shape changes from oval to substantially circular.

20 Figure 21 shows a cross-section through bristles taken along the short axis of the oval cross-section of the bristles. The edges of the bristle through which the long axis extends approach each other at a substantially constant angle, and the edges of the bristle are therefore substantially straight.

Figure 22 shows a cross-section through bristles taken along the long axis of the oval cross-section of the bristles. As can be seen from this view, the edges of the bristle through which the long axis extends approach each other at an increasingly steep angle as the bristle extends away from the base. The opposite edges are approach each other in a curved path.

At the end of the first portion 16 of the bristle its cross-section is substantially circular. At this point a second portion 17 of the bristle begins. Over the second portion of the bristle the cross-section of the bristle remains substantially circular and the bristle tapers towards a free end, with a domed surface. The overall degree of taper of the bristle over the second portion of the bristle is significantly less than over the first portion, and in particular compared to the degree of taper in the first portion immediately adjacent to the second portion. There is therefore a discontinuity in the shape of the surface of the bristle at the junction between the first and second portions.

The degree of taper of the second portion of the bristle is in effect the minimum consistent with being able to reliably remove the bristle from a mould tool. So far as the function of the second portion of the bristle is concerned it could have a substantially constant diameter.

In the illustrated embodiment the first portion 16 of the bristle extends about 12.0mm from the base, and the second portion 17 of the bristle extends about a further 6.4mm from the end of the first portion to the end of the bristle. The domed end of the bristle has a radius of curvature of about 0.4mm.

The widest part of the first portion of the bristle, measured at its base, along the long axis of its oval cross-section, has a width of about 3.5 mm. The narrowest part of the

base of the bristle, measured along the short axis of its oval cross-section has a depth of about 1.5 mm. The sides of the bristle along its short axis approach each other at an angle of about 2.4 degrees. The sides of the bristle along its long axis approach each other with a gradually increasing angle, forming a smooth curve of gradually decreasing radius. The
5 initial angle of taper between the two sides of the bristle at its base is approximately 3.1 degrees.

At the end of the first part of the bristle it has a substantially circular cross-section with a diameter of about 1mm.

The sides of the bristle approach each other over the second section of its length
10 with an angle of about 2 degrees, resulting in a diameter of about 0.8mm at the free end of the bristle, not including the domed end.

Other dimensions are possible, as discussed elsewhere.

In the array, the bristles are arranged into two substantially straight, substantially parallel long rows. In each row the bristles are substantially evenly spaced apart, with the
15 short axes of the oval cross-section of the first part of the bristles all lying substantially along the same straight line. The bristles are spaced apart by the same amount in each row and adjacent rows are off-set relative to one another so that centre of the cross-section of the bristles in one row lies mid-way between adjacent bristles in the adjacent row. In the illustrated embodiment each row has 18 bristles. Of course, the number of
20 rows and the number of bristles in each row can be varied as desired and appropriate. Embodiments are possible with 3, 4 or more rows.

In the illustrated embodiment the bristles in each row are evenly spaced apart, with the centres of each bristle being spaced apart by about 2.4 mm, and the centrelines

of adjacent rows are spaced apart by about 2.9 mm. As a consequence, as viewed in a direction parallel to the rows of bristles, the two rows overlap each other at the base of the bristles, the base of the bristles in one row partially extending between two adjacent bristles in an adjacent row. Owing to the shape of the first portion of the bristles the gap
5 between adjacent bristles is occluded over a little over half the length of that portion of the bristles over the base, as best seen in figure 22. When viewed in a direction perpendicular to the rows of bristles there is a gap between adjacent bristles over the entire length of the bristles. This gap has a minimum width of 0.9mm at the base of the bristles.

10 Other dimensions are possible, as discussed elsewhere.

Although the bristles are moulded in a single piece from the same material, owing to their different cross-section and shape, the first portions are significantly stiffer than the second. In practice, in use, the first portions are effectively substantially rigid, whereas the second portions are resiliently flexible.

15 The bases of the first portions of the bristles occupy a significant portion (greater than 50%) of the surface area over which the array extends, whereas the second portions of the bristles occupy significantly less than 50% of the available surface area.

The paddle and round brushes illustrated in figures 1 to 19 are particularly suited to styling hair when blow drying, because they enable tension to be applied to hair. When
20 hair is brushed, it first meets the relatively thin, flexible, second portions of the bristles. These portions easily penetrate and divide the hair between the bristles. And, owing to their flexibility, they help to remove any tangles from the hair. As the brush is urged against the hair the hair is drawn into the bristles and moves into the increasingly narrow

spaces between the relatively stiff first portions of the bristles. The offset relationship of the long rows of bristles, which in use are drawn across hair in a direction generally perpendicular to the direction of the long rows, with no 'line of sight' over much of the height of the first portion of the bristles over the base, causes the hair to be forced into a complex path, weaving between bristles. Making the hair travel through this path, as well as forcing the hair into the increasingly narrow space between the bristles as the brush is urged against the hair, increases friction between the brush and the hair enabling tension to be applied to the hair without the need to wrap the hair around the brush several times. At the end of a brush stroke, the brush can be easily removed from the hair. Once pressure of the brush onto hair is released, the shape of the first portion of the bristles allows the hair to move easily off the bristles, into regions where there is more space between the bristles. This reduces the risk of hair binding onto the brush.

The brush illustrated in figures 20 to 26 is particularly suited for back combing hair. As with the other embodiments the relatively thin, flexible, second portions of the bristles easily penetrate and divide the hair between the bristles. This enables hair to be captured in the relatively narrow spaces between the first portion of the bristles. The narrow spaces increase friction between the hair and the brush, enabling the brush to effectively grab and tease hair, as required by the back combing technique. When sufficient body has been generated this way, the second portions of the bristles can be used to smooth the outer layer of hair to provide a neat finish. Not only is the brush more effective in teasing hair to build body, but it allows the subsequent smoothing step to be performed with the same brush, avoiding the need to use two different brushes or combs.

The above embodiments are described by way of example only. Many variations are possible without departing from the scope of the invention as defined in the appended claims.

CLAIMS

1. A hair brush for styling hair, the brush comprising: an array of bristles each extending from a base to a free end; at least some or all of the bristles comprising a first, relatively wide, portion which tapers from the base and a second,
5 relatively narrow, portion which extends from the first portion to the free end; the bristles being arranged in two or more spaced apart, offset, rows wherein centre lines of the rows are spaced apart such that at least part of the first portion of bristles in one row extends between adjacent bristles in an adjacent row; and/or, when viewed perpendicular to the rows, the width of the first portion of the
10 bristles in one row is, over part of their length, the same or greater than the space between adjacent bristles in an adjacent row so as to partially occlude the space between bristles in an adjacent row; and the bristles are sized and arranged so that, in use, the first portion serves to penetrate and divide hair between the
15 hair when hair flows between the bristles.
2. A hair brush as claimed in claim 1 wherein the first portion of the bristles is relatively stiff and the second portion of the bristles is relatively flexible.
3. A hair brush as claimed in either claim 1 or 2 wherein the first portion of the bristles has a larger cross-sectional area than the second portion of the bristles.
- 20 4. A hair brush as claimed in any of claims 1 to 3 wherein, when viewed in the same direction, the width of the widest part of the first portion of the bristles comprising first and second portions is at least twice, or three times, the width of the bristle in the second portion at or near to its free end.

5. A hair brush as claimed in any preceding claim wherein, when viewed in the same direction, the width of the widest part of the first portion of the bristles comprising first and second portions is no more than twelve, or fifteen, times the width of the bristle in the second portion at or near its free end.
- 5 6. A hair brush as claimed in any preceding claim wherein the length of the bristles having first and second portions is no greater than seven, or nine, times its maximum width.
7. A hair brush as claimed in any preceding claim wherein the length of the bristles having first and second portions is no less than twice its maximum width.
- 10 8. A hair brush as claimed in any preceding claim wherein two opposed edges of the first portion of those bristles having first and second portions taper towards each other with a minimum average angle of at least 10 degrees between the opposed edges over the length of the first portion, and opposite edges of the second portion taper towards each other with a maximum average angle of 5 degrees
15 between opposed edges over the length of the second portion.
9. A hair brush as claimed in claim 7 wherein two opposed edges of the first portion taper towards each other with a minimum average angle of at least 15 or 18 degrees.
10. A hair brush as claimed in either claim 8 or 9 wherein the angle between the
20 opposed edges of the first portion increases from the base of the bristle to the end of the first portion.
11. A hair brush as claimed in claim 10 wherein the opposed edges of the first portion are curved.

12. A hair brush as claimed in any preceding claim wherein all opposed edges of the first portion taper towards each other with a minimum average angle of at least 5 degrees between the opposed edges over the length of the first portion.
13. A hair brush as claimed in any preceding claim wherein, along part of the length
5 of the bristles, the width of the bristles tapers at an angle greater than the angle of taper of a uniformly tapered bristle having the same length and variation in width.
14. A hair brush as claimed in any preceding claim wherein the first portion of the bristles has a non-circular transverse cross-section over at least part of its length.
15. A hair brush as claimed in claim 14 wherein the transverse cross sectional shape
10 of the first portion of the bristles is elongate over at least part of its length.
16. A hair brush as claimed in claim 15 wherein the first portion of the bristles has a substantially oval transverse cross-section over at least part of its length.
17. A hair brush as claimed in claim 16 wherein edges of the first portion lying on a long axis of its oval cross-section approach each other in a curved path over the
15 length of the first portion and edges of the first portion lying on a short axis of its oval cross section approach each other in a substantially straight path over the length of the first portion.
18. A hair brush as claimed in any preceding claim wherein the first portion of the bristles has a non-circular transverse cross-section at its base which gradually
20 transitions to a substantially circular cross-section at which it meets the second portion.

19. A hair brush as claimed in any preceding claim wherein the second portion has a substantially circular cross-section over all or substantially all of its length.
20. A hair brush as claimed in any preceding claim wherein all opposed edges of the second portion taper towards each other with a maximum average angle of 3 degrees between the opposed edges over the length of the second portion.
21. A hair brush as claimed in any preceding claim wherein the length of the second portion is at least one quarter of, or one half of, the length of the first portion.
22. A hair brush as claimed in any preceding claim wherein the length of the second portion is no greater than the length of, or twice the length of, the first portion.
23. A hair brush comprising: an array of bristles, at least some or all of the bristles having a transverse cross-section with an elongate shape over some or substantially all of their length and arranged in two or more spaced apart, offset, rows wherein centre lines of the rows are spaced apart such that at least part of the first portion of bristles in one row extends between adjacent bristles in an adjacent row; and/or, when viewed perpendicular to the rows, the width of the bristles in one row is, over part of their length, the same or greater than the space between adjacent bristles in an adjacent row so as to partially occlude the space between bristles in an adjacent row.
24. A hair brush as claimed in claim 23 wherein the elongate shape of the transverse cross-section of the bristles is substantially oval.
25. A hair brush as claimed in either claim 23 or 24 wherein over all or a part of the array the bristles are all of substantially the same shape.

26. A hair brush as claimed in any preceding claim wherein bases of adjacent bristles in each row are spaced apart by a distance which is less than half the maximum width of the base of the bristles.
27. A hair brush as claimed in claim 26 wherein the bristles are spaced apart by a maximum of 2.5mm
28. A hair brush as claimed in either claim 26 or 27 wherein the bases of bristles in one row are spaced from the base of the nearest bristle in an adjacent row by a distance which is less than the space between adjacent bristles in the row.
29. A hair brush as claimed in claim 28 where the bases of bristles in one row are spaced from the base of the nearest bristle in an adjacent row by a maximum of 2mm.
30. A hair brush as claimed in any preceding claim wherein each row of bristles is substantially straight.
31. A hair brush as claimed in any of claims 1 to 29 wherein each row of bristles is curved.
32. A hairbrush as claimed in any preceding claim wherein each row of bristles is generally parallel.
33. A hair brush as claimed in any preceding claim wherein the bristles in each row are all evenly spaced apart by substantially the same distance.
34. A hair brush as claimed in any preceding claim wherein the bristles are tapered, with their cross-section reducing from the base to the free end.

35. A hair brush as claimed in claim 34 wherein the degree of taper of the bristles changes abruptly at the interface between the first and second portions of the bristles
36. A hair brush as claimed in any preceding claim where there are at least three or
5 four rows of bristles.
37. A hair brush as claimed in either claim 16 or 24 wherein bristles with a substantially oval cross-section form an elongate rectangular array of bristles formed from generally parallel long rows and generally parallel short rows of bristles.
- 10 38. A hair brush as claimed in claim 37 wherein a long axis of the oval cross-section of each bristle is substantially aligned with the direction of the long row of which it forms a part.

1/6

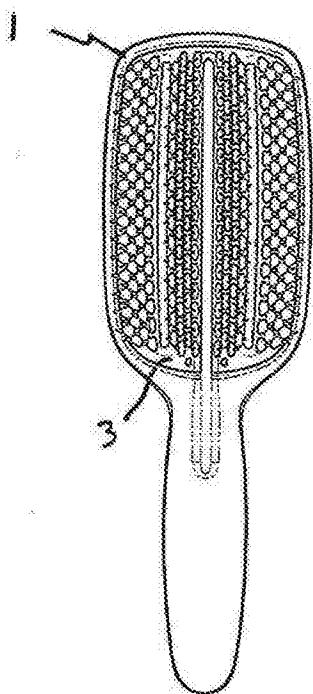


FIG 1

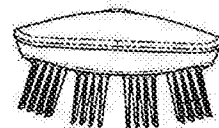


FIG 2

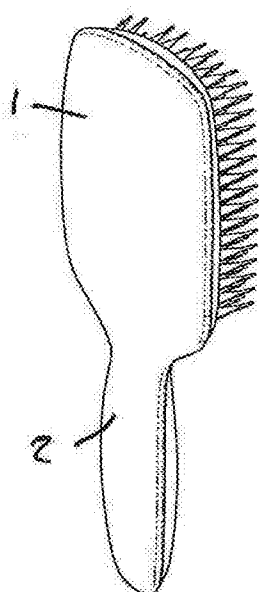


FIG 3

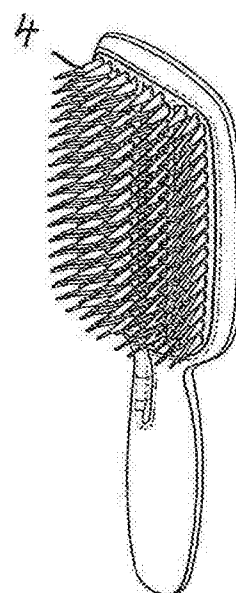


FIG 4

2/6

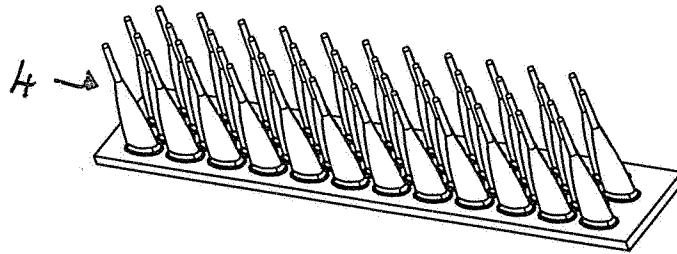


FIG 5

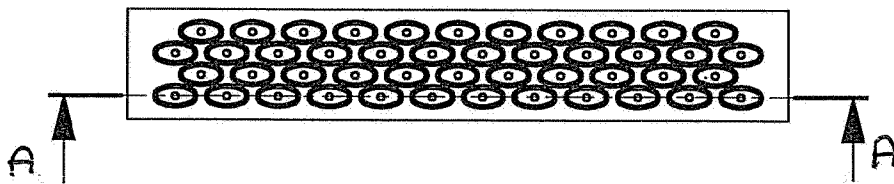


FIG 6

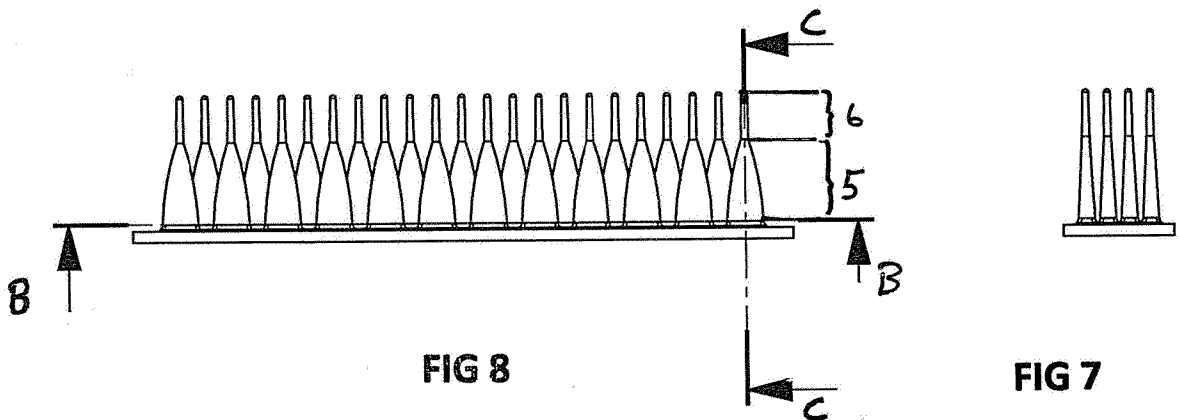


FIG 8

FIG 7

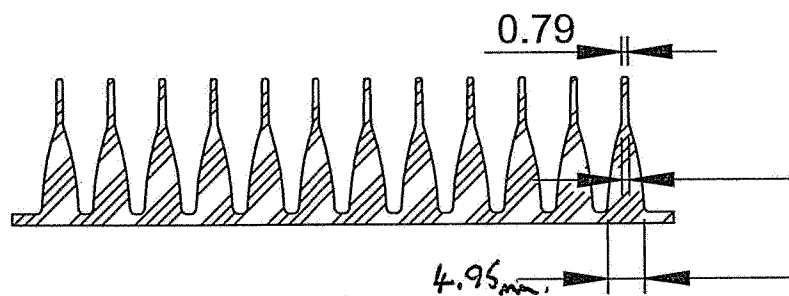


FIG 9

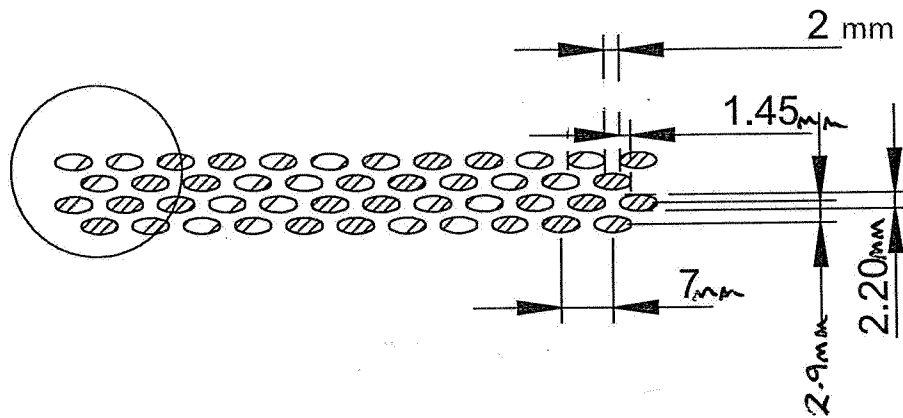


FIG 10

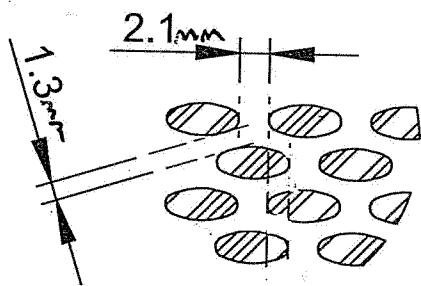


FIG 11

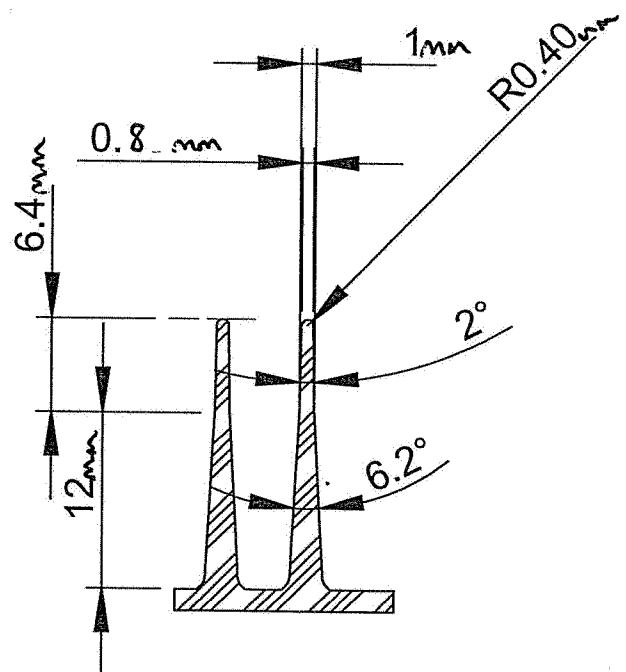


FIG 12

4/6

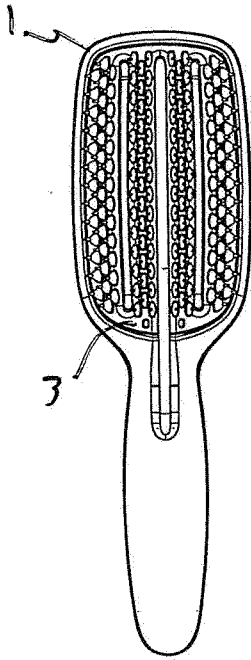


FIG 13

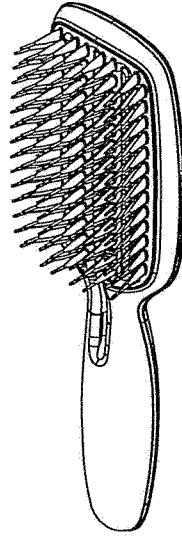


FIG 14

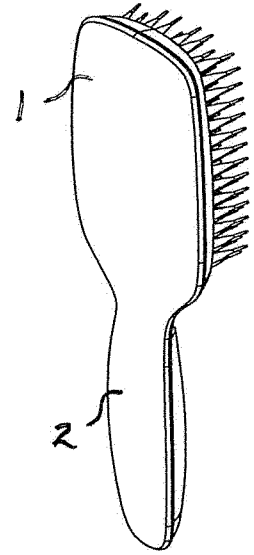


FIG 15

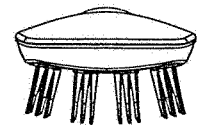


FIG 16

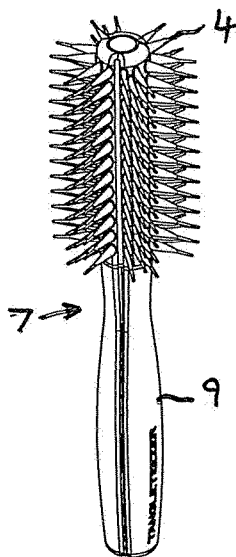


FIG 17

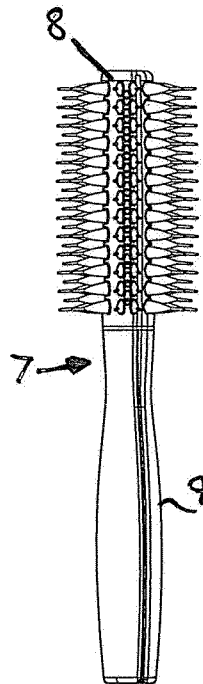


FIG 18

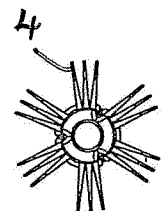


FIG 19

5/6

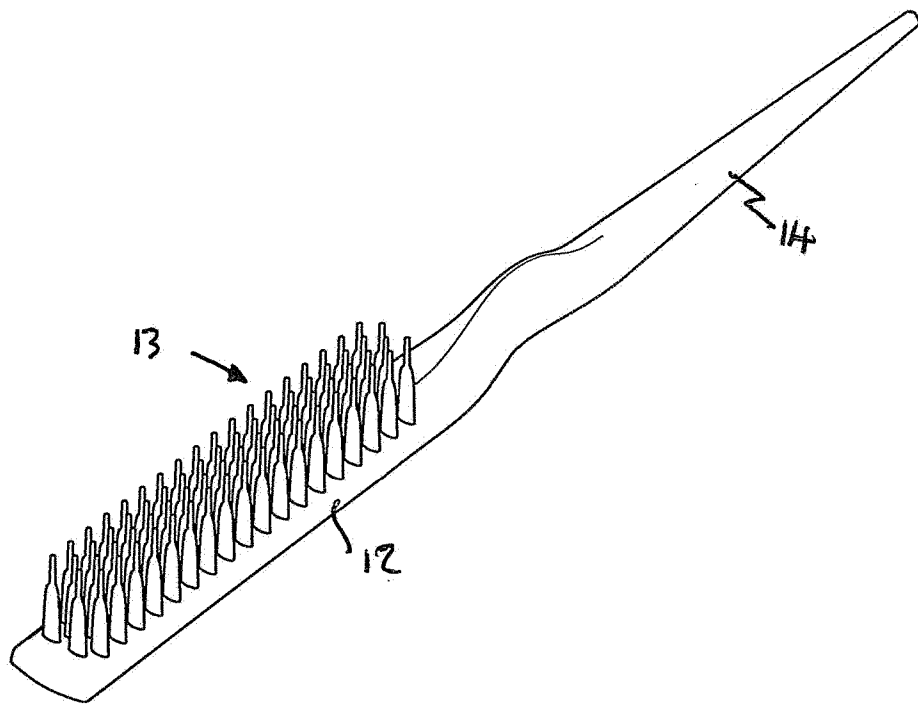
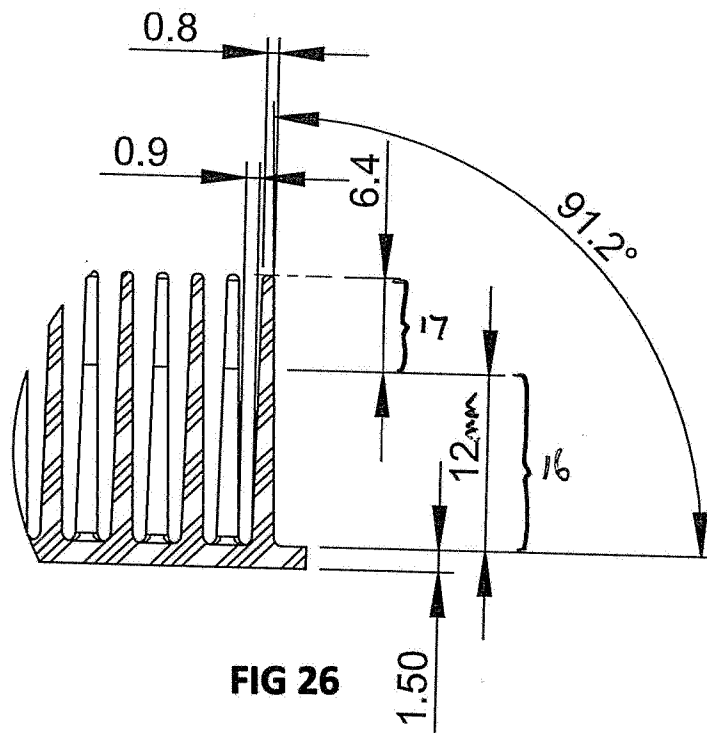
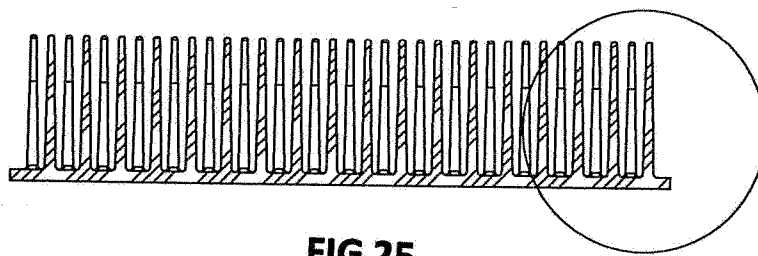
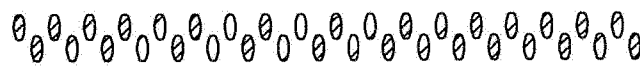
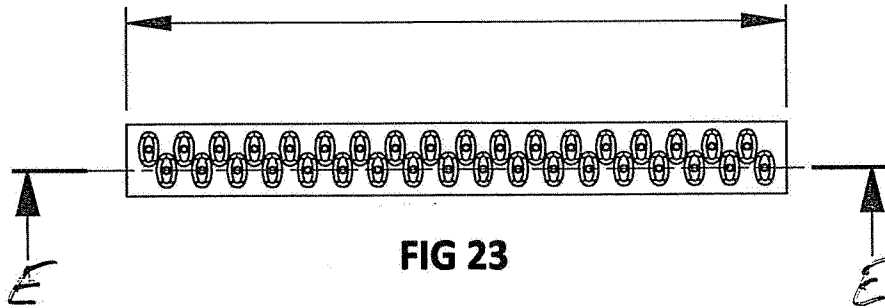
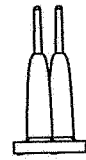
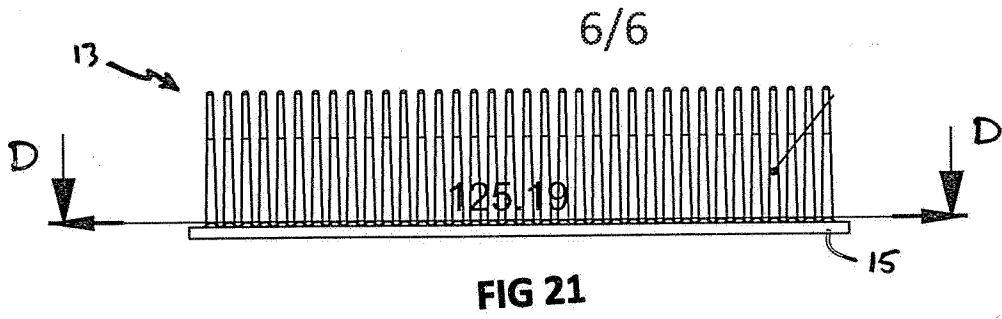


Fig 20



INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2015/051916

A. CLASSIFICATION OF SUBJECT MATTER
INV. A46B9/02 A46D1/00
ADD.

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)
A46B A46D

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 447 692 A (PULFREY) 24 September 2008 (2008-09-24) page 3, line 18 - page 4, line 2 page 5, lines 4-5 page 6, line 23 - page 7, line 7 claims 16,18.19; figures 3,4 -----	1-38
A	US 2005/015909 A1 (SPITALE ET AL) 27 January 2005 (2005-01-27) figures 3,5 -----	1,23
A	JP 2003 199621 A (KAO CORP) 15 July 2003 (2003-07-15) abstract; figures 1,2 -----	16,17



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

6 October 2015

Date of mailing of the international search report

14/10/2015

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Raybould, Bruce

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2015/051916

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2447692	A	24-09-2008	AT 536760 T 15-12-2011
		AU 2008231617 A1	02-10-2008
		BR PI0809158 A2	17-12-2013
		CA 2681318 A1	02-10-2008
		CN 101677664 A	24-03-2010
		DK 2124668 T3	12-03-2012
		EP 2124668 A1	02-12-2009
		ES 2379488 T3	26-04-2012
		GB 2447692 A	24-09-2008
		HK 1123692 A1	03-08-2012
		HR P20120164 T1	31-03-2012
		IL 201022 A	31-05-2015
		JP 5415293 B2	12-02-2014
		JP 2010522006 A	01-07-2010
		NZ 579612 A	26-08-2011
		PT 2124668 E	29-02-2012
		SI 2124668 T1	30-04-2012
		US 2010101594 A1	29-04-2010
		WO 2008117009 A1	02-10-2008
US 2005015909	A1	27-01-2005	CA 2502126 A1 24-09-2005
			GB 2412303 A 28-09-2005
			US 2005015909 A1 27-01-2005
			US 2008315670 A1 25-12-2008
JP 2003199621	A	15-07-2003	NONE