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(54) Title of the Invention: A haircare appliance
Abstract Title: A haircare appliance

(57) A haircare appliance and attachment having an air inlet, air outlet, and an airflow generator for generating an airflow from the inlet to the outlet. The device has a hollow body defining a flow path between the air inlet 108 and the air outlet 110, and a curved surface 104 adjacent to and downstream of the air outlet. The curved surface extends outwardly from the hollow body. Through the coanda effect, the device can make the hair smooth. The central axis of curvature may be displaced from the central axis of the hollow body, and the curved surface may be smooth and solid, attached at one end with a second free end, and have a pair of guide wall edges 106, the device may be configured to push and pull the hair with different forces. There may also be a flat surface 112 extending rearwardly from the air outlet.

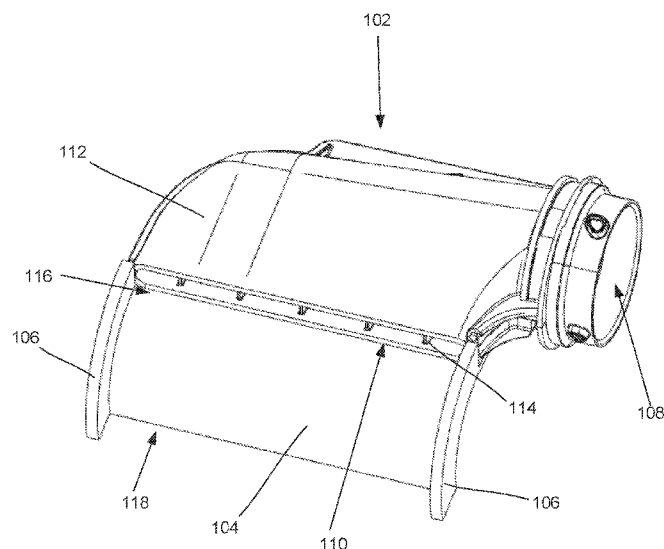


Fig. 3

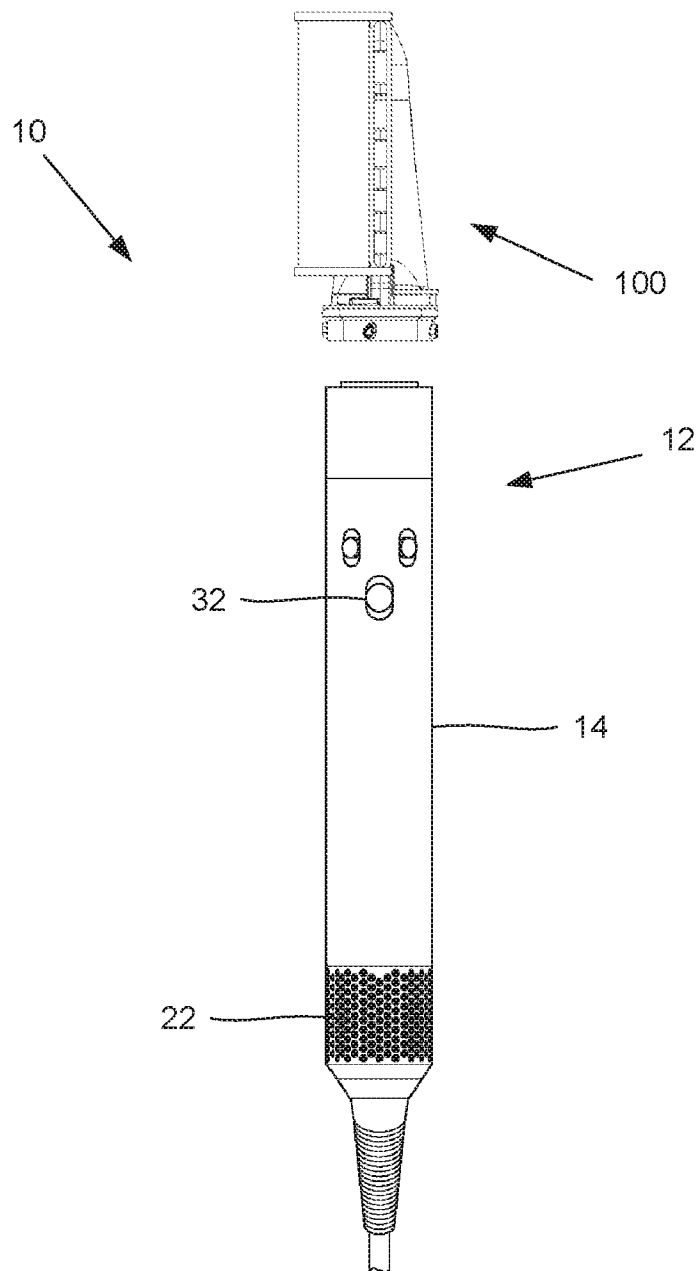


Fig. 1

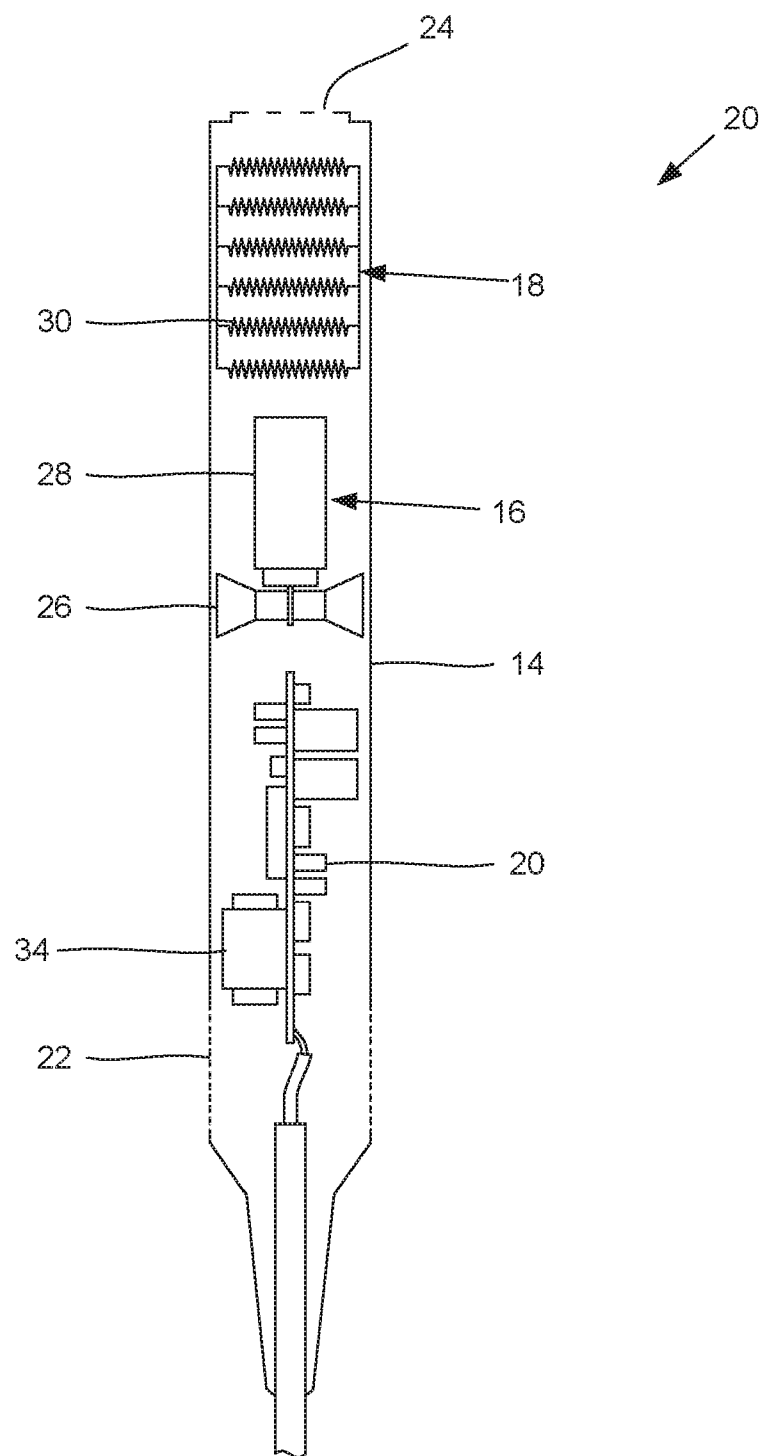


Fig. 2

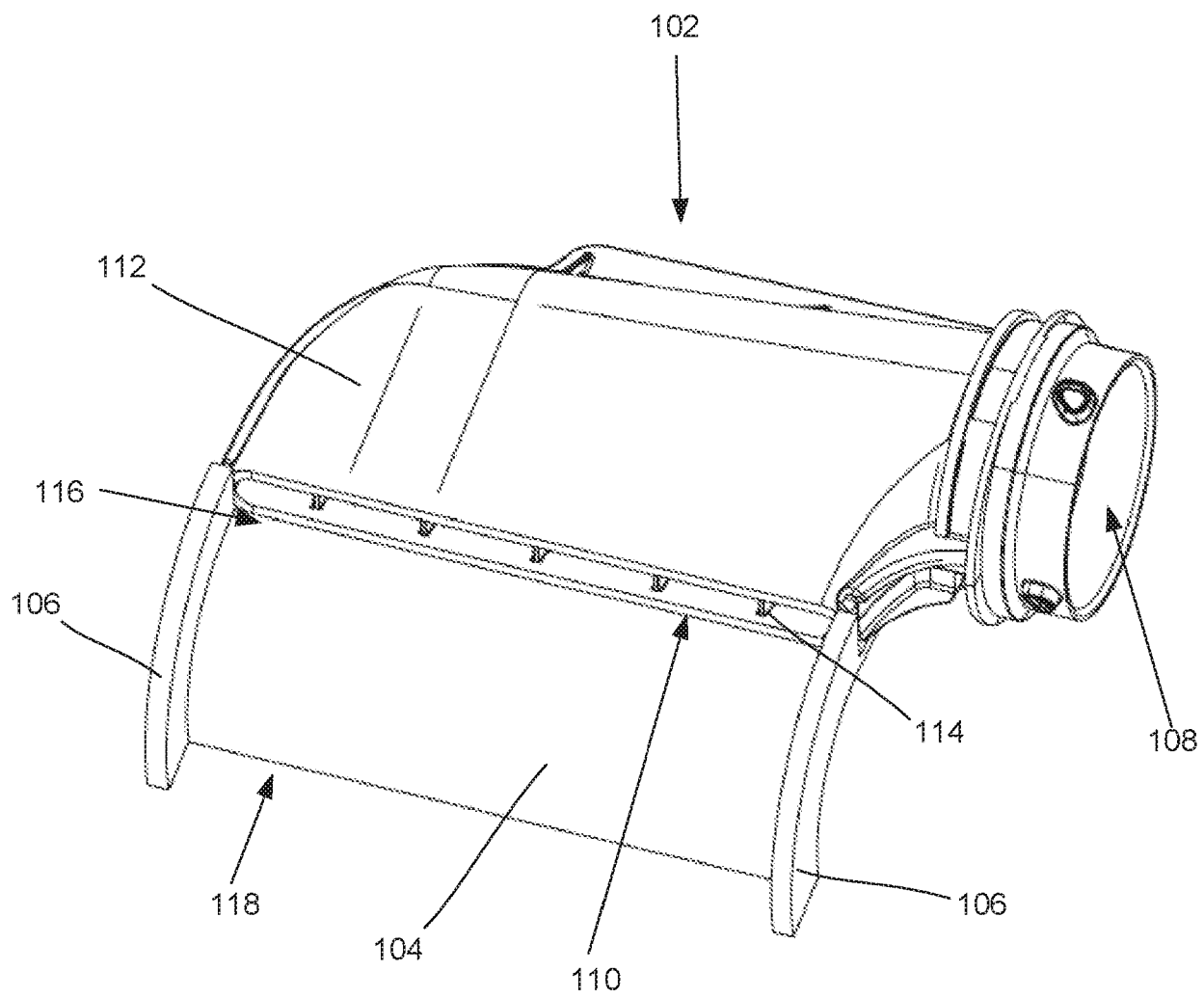


Fig. 3

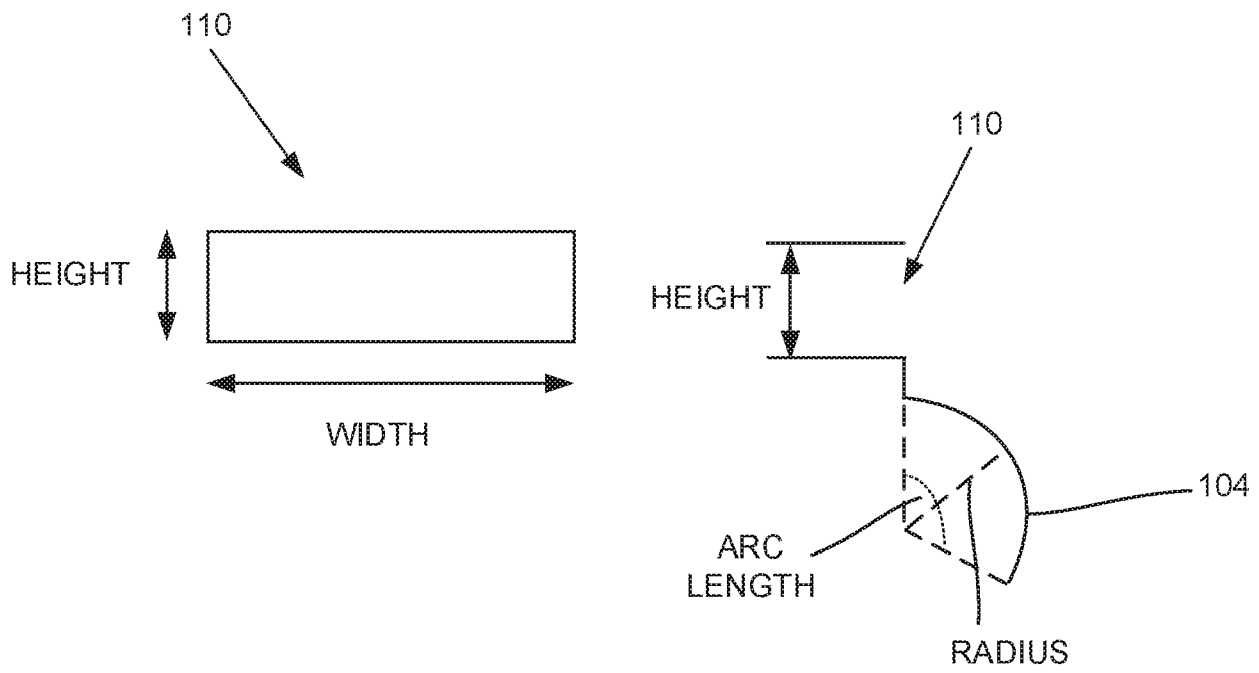


Fig. 4

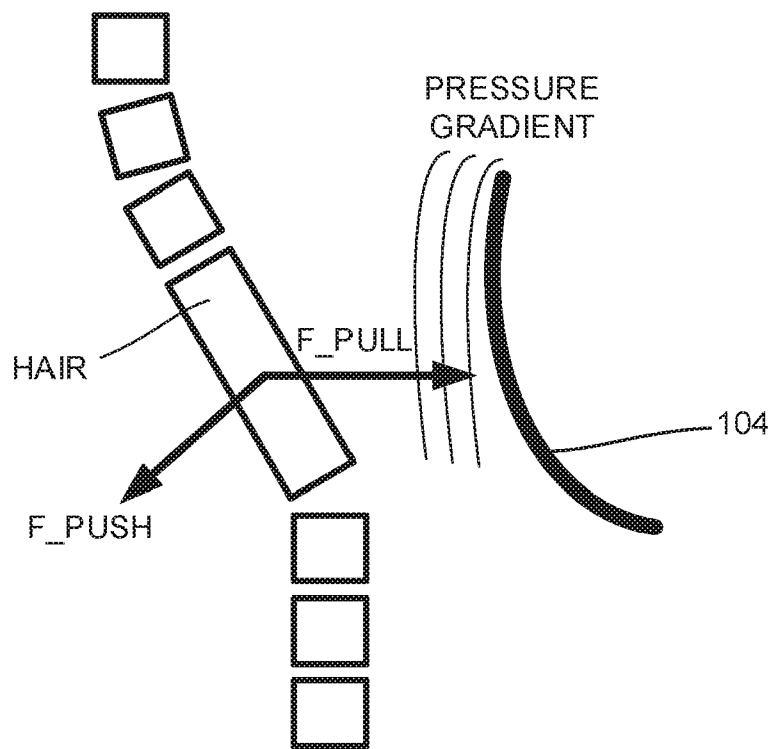


Fig. 5

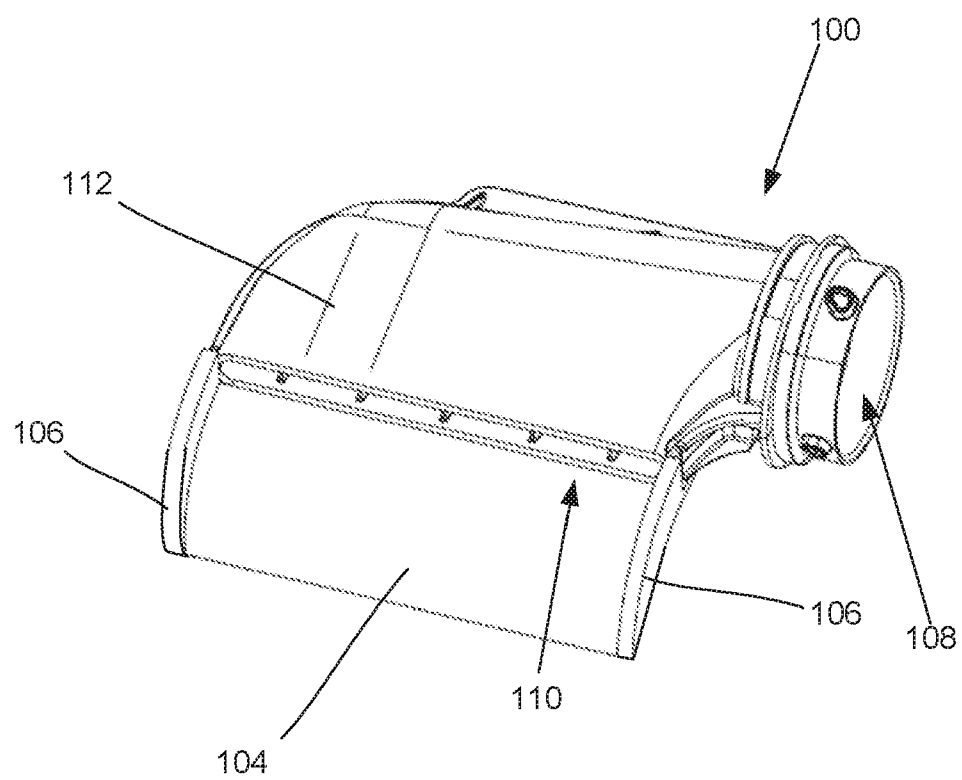


Fig. 6

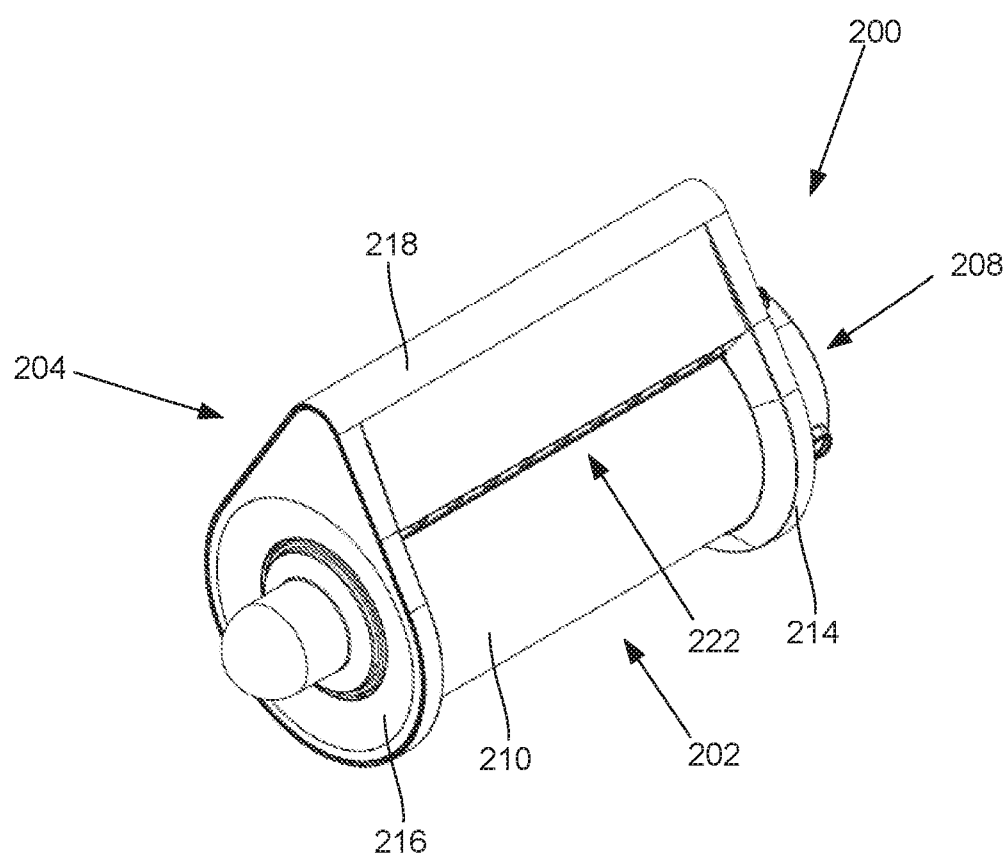


Fig. 7

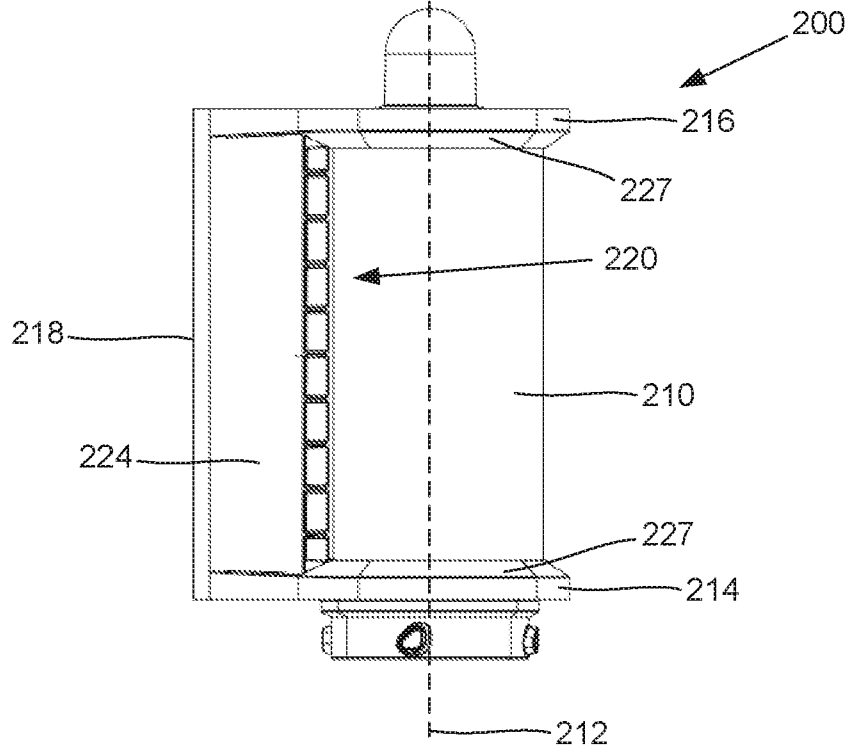


Fig. 8

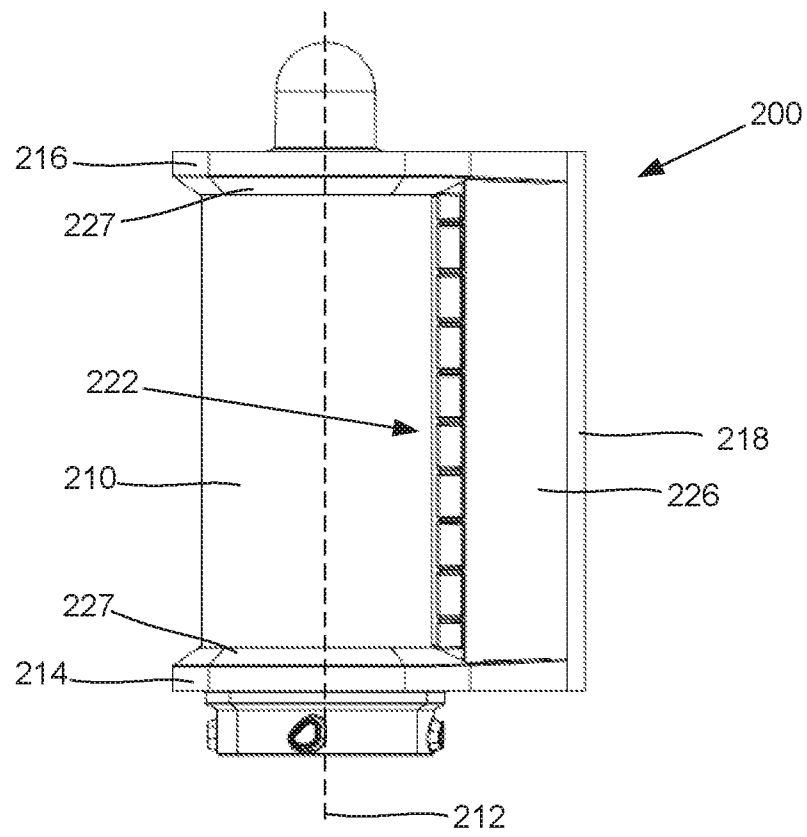


Fig. 9

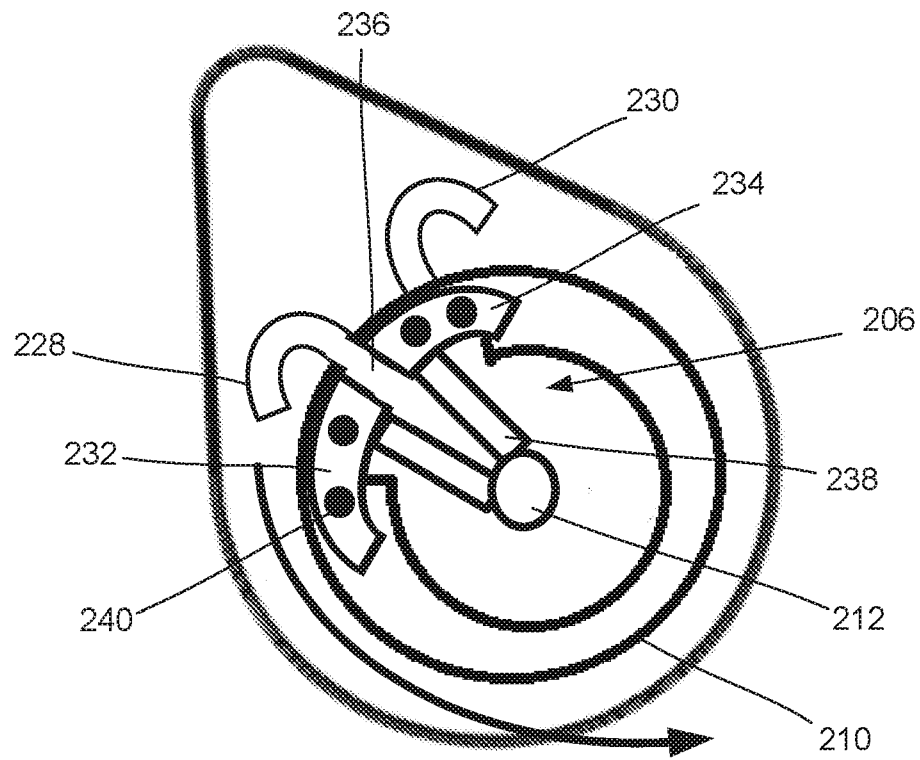


Fig. 10

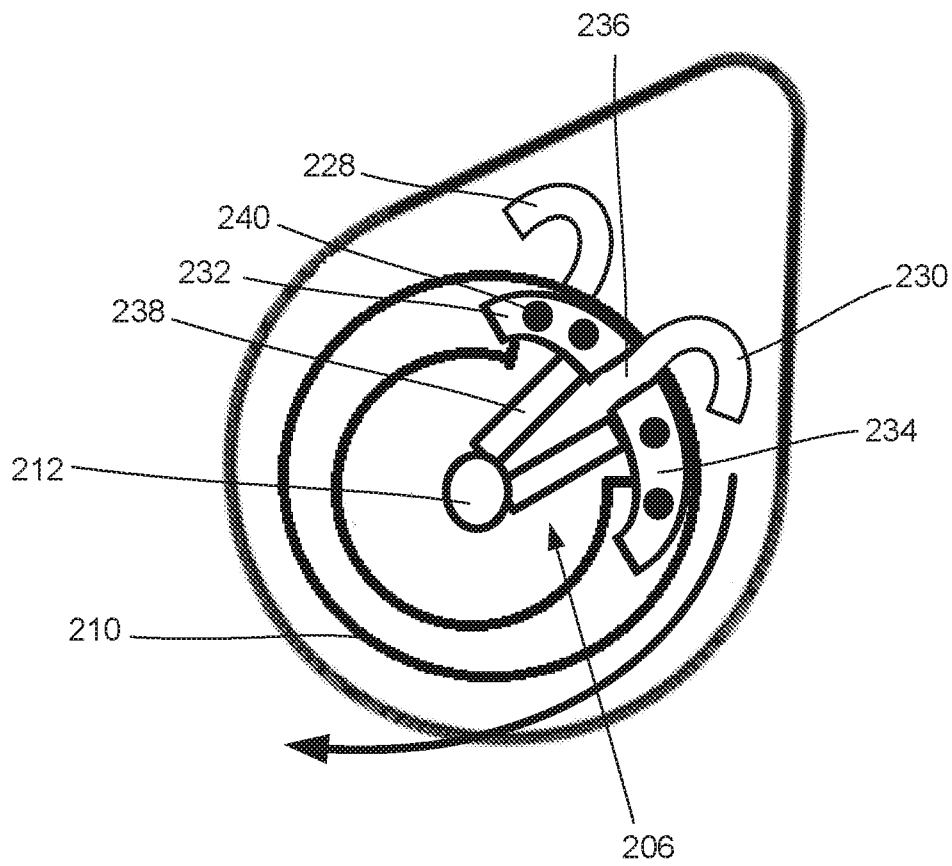


Fig. 11

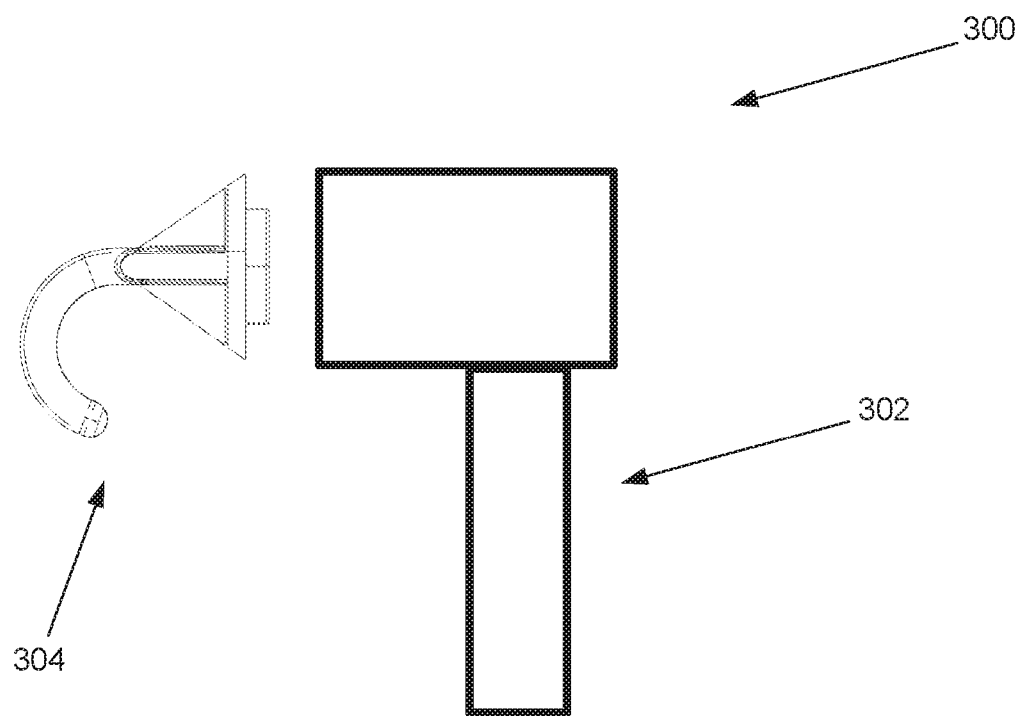


Fig. 12

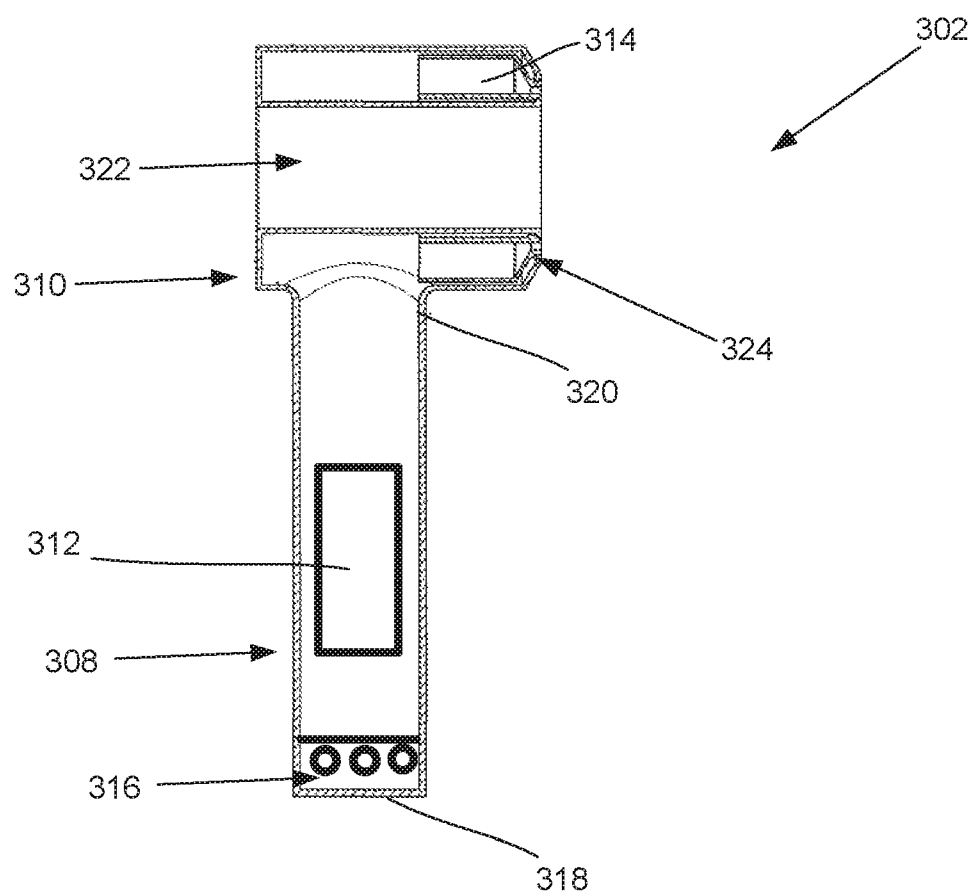


Fig. 13

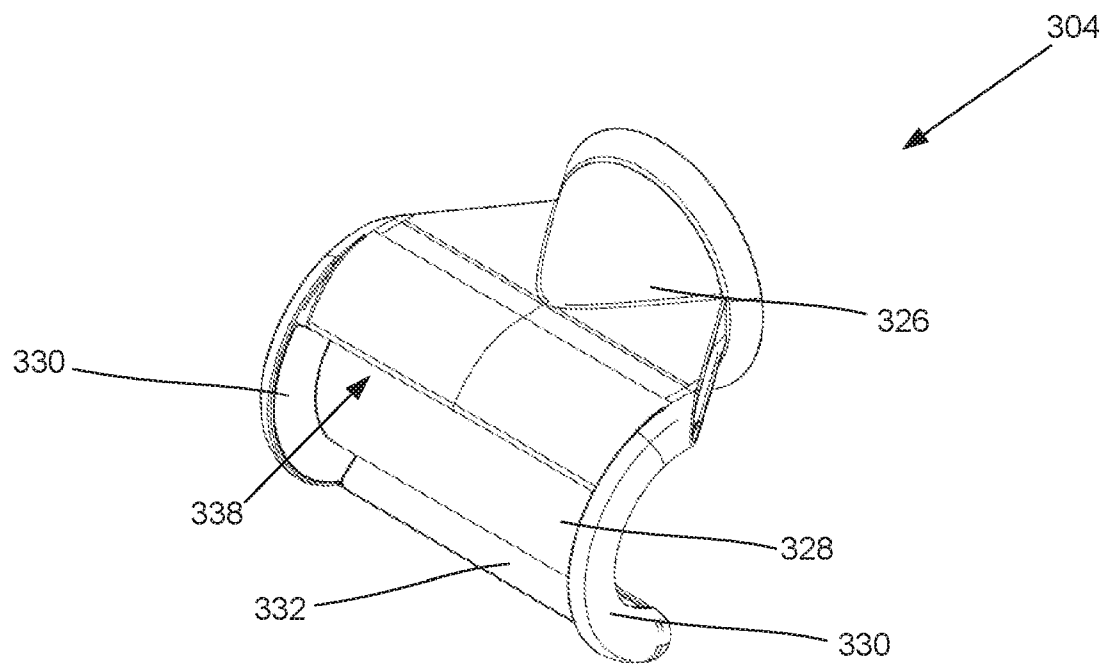


Fig. 14

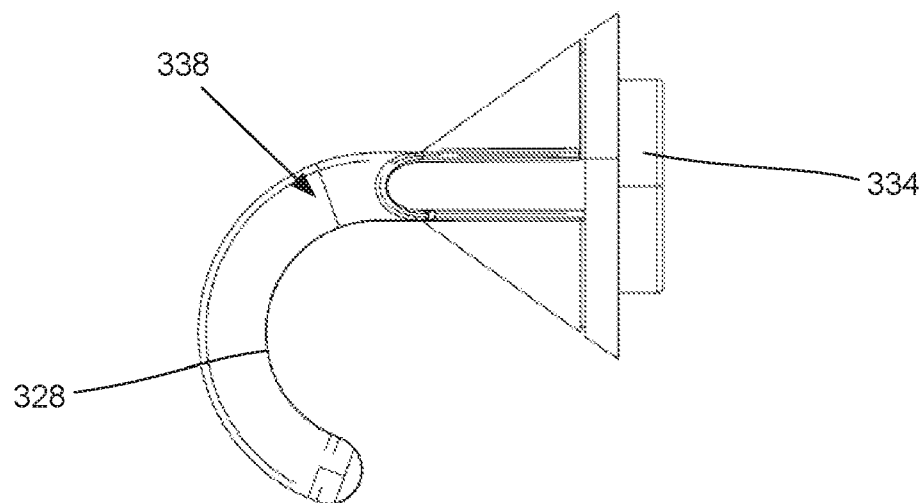


Fig. 15

A HAIRCARE APPLIANCE

Field of the Invention

- 5 The present invention relates to a haircare appliance, and an attachment for a haircare appliance.

Background of the Invention

- 10 Haircare appliances are typically used to dry and style hair. Where haircare appliances are used to style hair to create a smooth appearance, the presence of shorter or broken hairs, sometimes referred to as flyaways, may impact on the desired smooth appearance.

Summary of the Invention

- 15 According to a first aspect of the present invention there is provided a haircare appliance comprising an air inlet, an air outlet, an airflow generator for generating an airflow from the air inlet to the air outlet, a hollow body defining a flow path between the air inlet and the air outlet, and a curved surface adjacent to and downstream of the air outlet, the curved
20 surface extending outwardly from the hollow body.

- The haircare appliance according to the first aspect of the present invention may be advantageous as the haircare appliance comprises a hollow body defining a flow path between the air inlet and the air outlet, and a curved surface adjacent to and downstream
25 of the air outlet, the curved surface extending outwardly from the hollow body.

- In particular, the inventors of the present application have determined that providing a curved surface adjacent to and downstream of the air outlet may generate a negative pressure region adjacent to the curved surface which attracts long hairs toward the curved
30 surface, with the airflow interaction with hair also pushing shorter hairs away from the curved surface. This may result in shorter hairs being pushed through the longer hairs,

for example through the longer hairs toward the side of hair facing a user's head, such that a smooth finish is provided. As the curved surface extends outwardly from the hollow body, the hollow body and/or the remainder of the haircare appliance may be removed from the region of hair wrapped about the curved surface in use, and hence may be prevented from disrupting a styling process that takes place in the region of the curved surface.

A central axis of curvature of the curved surface may be displaced from a central axis of the hollow body, for example parallel to and displaced from a central axis of the hollow body, or orthogonal to and displaced from a central axis of the hollow body.

The curved surface may comprise a first end attached to the hollow body, and a second free end opposite to the first end, for example with the second free end not attached to the hollow body. The first end may be attached to the hollow body in a region of the air outlet, for example such that the curved surface extends outwardly of the air outlet. The curved surface may be generally arc-like in form.

The curved surface may be substantially smooth and uninterrupted in form. This may enable hair to wrap around the curved surface in use.

The curved surface may be integrally formed with the hollow body, for example such that the curved surface and the hollow body are formed as a single component. The air outlet may comprise a slot formed in the hollow body.

The haircare appliance may comprise an end wall located at an end of the curved surface. This may inhibit airflow from reaching a hand of a user holding the haircare appliance in use.

The haircare appliance may comprise a pair of guide walls for guiding airflow along the curved surface, the pair of guide walls upstanding from the curved surface. By providing a pair of guide walls extending outwardly from the curved surface ambient air may be

inhibited from impacting on a region of negative pressure generated by airflow flowing along the curved surface in use, and may result in increased attraction of hair toward the curved surface compared to, for example, a similar arrangement that does not utilise guide walls.

5

Each of the guide walls may be curved in form, for example with a curvature following a curvature of the curved surface. Guide walls of the pair of guide walls may oppose one another, for example such that a channel is defined therebetween, with the curved surface forming a bed of the channel. The pair of guide walls may be spaced apart along the curved surface from one another, for example spaced apart at opposing edges of the curved surface. A spacing between the guide walls may correspond substantially to a length of the air outlet. The curved surface may be substantially smooth and uninterrupted between the pair of guide walls. This may enable hair to wrap around the curved surface between the pair of guide walls in use.

15

The guide walls may project outwardly from the curved surface, for example with the guide walls and the curved surface integrally formed as a single component.

The pair of guide walls may extend along substantially an entire length of the curved surface. This may ensure that a negative pressure region is maintained along substantially the entire length of the curved surface.

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The pair of guide walls may comprise a height substantially equal to a height of the air outlet. This may ensure that a negative pressure region is maintained along substantially the entire height of a jet of air that exits the air outlet in use.

25

The pair of guide walls may comprise a height substantially equal to a height of the air outlet in a region adjacent to the air outlet. The inventors of the present application have found that maintaining a negative pressure region in the region adjacent to the air outlet benefits creation of airflow along the curved surface which results in a first force that is

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sufficient to attract relatively long hair toward the first surface whilst also generating a second force to push relatively short hair away from the curved surface.

The pair of guide walls may comprise a radius of curvature greater than a radius of curvature of the curved surface. The pair of guide walls may comprise a radius of curvature greater than a radius of curvature of the curved surface in a region adjacent to the air outlet. This may ensure that the pair of guide walls provide their functionality in the region adjacent to the air outlet in use.

The pair of guide walls may comprise a height that varies along a length of the guide wall. The inventors of the present application have found that the guide walls provide most impact in certain regions of the curved surface, for example in a region adjacent to the air outlet. The pair of guide walls may comprise a height that decreases in a direction away from the air outlet. By reducing a height of the guide walls in a direction away from the air outlet less material may be required to form the guide walls than, for example, guide walls of a constant height. The pair of guide walls may comprise a height that gradually decreases in a direction away from the air outlet, for example such that there are no step-changes in height. Guide walls of the pair of guide walls may each comprise the same height, and may be substantially symmetrical about an axis bisecting a space between the guide walls.

The pair of guide walls may comprise a constant height. This may provide certainty that a negative pressure region generated adjacent to the curved surface will not be impacted along the length of the curved surface.

The haircare appliance may be configured such that airflow exiting the air outlet generates a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface. This may achieve a smooth finish by attracting long hairs toward the curved surface whilst pushing short hairs away from the curved surface, through the long hairs, in the manner described above. The haircare appliance may be configured

such that a negative pressure region is generated in the vicinity of the curved surface in use.

5 The curved surface may comprise a Coanda surface, for example a convex surface along which airflow is attached as a result of the Coanda effect in use.

10 The haircare appliance may be configured such that airflow at the air outlet comprises a velocity in the region of 30m/s to 45m/s. The applicant has found that such a velocity may be particularly effective in generating an airflow along the curved surface that results in a first force that is sufficient to attract relatively long hair toward the first surface whilst also generating a second force to push relatively short hair away from the curved surface. The air outlet may be shaped and dimensioned such that airflow at the air outlet comprises a velocity in the region of 30m/s to 45m/s. The airflow generator may be configured to generate an airflow at a flow rate such that airflow at the air outlet comprises a velocity
15 in the region of 30m/s to 45m/s.

The airflow generator may be configured to generate airflow at a flow rate in the region of 8L/s to 14L/s. The applicant has found that such an airflow rate may be particularly effective in generating an airflow along the curved surface that results in a first force that
20 is sufficient to attract relatively long hair toward the first surface whilst also generating a second force to push relatively short hair away from the curved surface.

The air outlet may comprise an open cross-sectional area in the region of 140mm² to 540mm², for example in the region of 280mm² to 350mm². The applicant has found that
25 such an open cross-sectional area may be particularly effective in generating an airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

The air outlet may comprise a width in the region of 70mm to 90mm, for example in the
30 region of 75mm to 85mm. The air outlet may comprise a height in the region of 2mm to 5mm, for example in the region of 3.0mm to 4.5mm. The air outlet may be generally

rectangular in form, for example such that airflow leaving the air outlet has a generally laminar form.

The curved surface may comprise a radius of curvature in the region of 16mm to 60mm.

5 The applicant has found that such a radius of curvature may be particularly effective in generating an airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface. The curved surface may comprise a substantially constant radius of curvature.

10 The curved surface may comprise an arc length of at least 95 degrees from the air outlet. The applicant has found that such an arc length may be particularly effective in generating an airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

15 A ratio of flow rate of airflow generated by the airflow generator to an open cross-sectional area of the air outlet may be in the region of 0.01 to 0.10. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

20

A ratio of a radius of curvature of the curved surface to a velocity of airflow at the air outlet may be in the region of 0.33 to 2.00, for example in the range of 0.5 to 1.5. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

25

A ratio of a radius of curvature of the curved surface to an arc length of the curved surface may be in the region of 0.04 to 0.63. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

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A ratio of a velocity of airflow at the air outlet to a flow rate of airflow generated by the airflow generator may in the region of 2.14 to 5.63, for example in the range of 2.6 to 3.6. The applicant has found that such a ratio may be particularly effective in generating an
5 airflow along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

The haircare appliance may comprise a flat surface adjacent to and extending rearwardly from the air outlet. Where a non-flat surface is provided extending rearwardly from the
10 air outlet the smooth finish can be disturbed as the haircare appliance is moved relative to the hair in use, as may typically be the case during styling operations. Where a rough surface, for example a surface comprising projections such as bristles or the like, is provided extending rearwardly from the air outlet, such a rough surface may interrupt hair that has already been smoothed by airflow from the air outlet as the haircare appliance is
15 moved relative to the hair in use. By providing a curved surface adjacent to and downstream of the air outlet, and a flat surface adjacent to and extending rearwardly from the air outlet, a smooth hair finish may be created and maintained as the haircare appliance is moved relative to hair by a user in use.

20 The flat surface may also act as a guide surface to ensure that the haircare appliance is located correctly relative to a head of a user such that airflow exiting the air outlet is able to provide the functionality described above.

The flat surface may be substantially smooth and uninterrupted in form. The flat surface
25 may comprise a height in the region of 5mm to 20mm.

The haircare appliance may be configured such that the flat surface contacts hair extending rearwardly from the air outlet as the haircare appliance is moved relative to hair in use, for example as the haircare appliance is moved linearly in a direction along
30 the hair, from roots of the hair to tips of the hair in use.

The flat surface may comprise a generally planar surface. This may aid with retention of a smooth hair surface as the haircare appliance is moved relative to hair in use, and may ensure that hair extending rearwardly from the air outlet is supported by the surface.

- 5 The flat surface may be obliquely angled relative to a plane of the air outlet. This may ensure that hair extending rearwardly from the air outlet contacts the flat surface whilst hair downstream of the air outlet is attracted toward the curved surface in use. The flat surface may be obliquely angled relative to a plane tangential to the curved surface at a point of the curved surface immediately adjacent to the air outlet.

10

The air outlet may comprise a fixed air outlet, for example an air outlet of fixed cross-sectional area, length and/or width. This may ensure that airflow characteristics of the haircare appliance are constant for a given flow rate of airflow generated by the airflow generator, thereby ensuring that an airflow is generated along the curved surface that results in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface. This may also provide a simpler haircare appliance with fewer moving parts, and hence a reduced risk of failure, compared to a haircare appliance with a variable air outlet.

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- 20 The haircare appliance may comprise a single air outlet. This may ensure that there are no further air outlets to disrupt a smoothing process conducted using the haircare appliance, and may ensure that airflow leaving the air outlet has the required characteristics to result in a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.

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The curved surface may be displaced relative to an edge of the air outlet, for example such that the curved surface does not extend directly from an edge of the air outlet. The curved surface may be displaced by between 0.5mm and 1.5 mm from an edge of the air outlet. The curved surface may be displaced relative to an edge of the air outlet in a direction orthogonal to an edge of the air outlet, for example orthogonal to a lengthwise extending edge of the air outlet.

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The haircare appliance may comprise an internal baffle for turning airflow from the airflow generator toward the air outlet, for example turning airflow through around 90 degrees toward the air outlet. This may enable a main portion of the haircare appliance housing the airflow generator to extend orthogonally relative to the air outlet, which may provide greater flexibility in design, and better ergonomics, than, for example a haircare appliance where the air outlet is aligned with a main portion of the haircare appliance housing the airflow generator.

- 10 The haircare appliance may comprise a heater for heating the airflow. This may provide increased styling flexibility, and may, for example, enable the airflow to provide a drying function.

The haircare appliance may comprise a handle unit within which the airflow generator is housed, and an attachment releasably attachable to the handle unit, the attachment comprising the air outlet and the curved surface. Providing the air outlet and the curved surface as part of a removable attachment may allow the functionality described herein to be selectively provided by a user.

- 20 According to a second aspect of the present invention there is provided an attachment for a haircare appliance comprising an airflow generator, the attachment comprising an air inlet for receiving an airflow from the airflow generator, an air outlet for emitting airflow, a hollow body defining a flow path between the air inlet and the air outlet, and a curved surface adjacent to and downstream of the air outlet, the curved surface extending outwardly from the hollow body.

Optional features of aspects of the present invention may be equally applied to other aspects of the present invention, where appropriate.

- 30 Brief Description of the Drawings

Figure 1 is a schematic view illustrating a haircare appliance according to the present invention;

5 **Figure 2** is a schematic cross-sectional view through a handle unit of the haircare appliance of Figure 1;

Figure 3 is a schematic perspective view of a first embodiment of an attachment for the haircare appliance of Figure 1;

10 **Figure 4** is a schematic view illustrating geometry of the attachment of Figure 3;

Figure 5 is a schematic view illustrating forces created by airflow through the attachment of Figure 3 in use;

15 **Figure 6** is a schematic perspective view of a modified version of the attachment of Figure 3;

Figure 7 is a schematic perspective view of a second embodiment of an attachment for the haircare appliance of Figure 1;

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Figure 8 is a first side view of the attachment of Figure 7;

Figure 9 is a second side view of the attachment of Figure 7;

25 **Figure 10** is a schematic view illustrating the attachment of Figure 7 in a first configuration;

Figure 11 is a schematic view illustrating the attachment of Figure 7 in a second configuration;

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Figure 12 is a schematic perspective view of a further embodiment of a haircare appliance according to the present invention;

Figure 13 is a schematic cross-sectional view through a handle unit of the haircare appliance of Figure 12;

Figure 14 is a schematic perspective view of an attachment for the haircare appliance of Figure 12;

Figure 15 is a schematic cross-sectional view through the attachment of Figure 13.

Detailed Description of the Invention

A haircare appliance according to the present invention, generally designated 10, is shown schematically in Figure 1.

The haircare appliance 10 comprises a handle unit 12, and an attachment 100 removably attachable to the handle unit 12.

The handle unit 12 comprises a housing 14, an airflow generator 16, a heater 18, and a control unit 20, as can be seen schematically in Figure 2.

The housing 14 is tubular in shape, and comprises an air inlet 22 through which an airflow is drawn into the housing 14 by the airflow generator 16, and an air outlet 24 through which the airflow is discharged from the housing 14. The airflow generator 16 is housed within the housing 14, and comprises an impeller 26 driven by an electric motor 28. The airflow generator is configured to generate airflow at a flow rate in the region of 8 to 14 L/S, for example in the region of 10 to 13L/s. An appropriate airflow generator is the Dyson V9 Digital Motor, produced by Dyson Technology Limited. The heater 18 is also housed within the housing 14, and comprises heating elements 30 to optionally heat the airflow.

The control unit 20 comprises electronic circuitry for a user interface 32 and a control module 34. The user interface 32 is provided on an outer surface of the housing 14, and is used to power on and off the haircare appliance 10, to select a flow rate (for example high, medium and low), and to select an airflow temperature (for example hot, medium or cold). In the example of Figure 1, the user interface comprises a plurality of sliding switches, but other forms of user interface 32, for example buttons, dials or touchscreens, are also envisaged.

The control module 34 is responsible for controlling the airflow generator 16, and the heater 18 in response to inputs from the user interface 32. For example, in response to inputs from the user interface 32, the control module 34 may control the power or the speed of the airflow generator 16 in order to adjust the airflow rate of the airflow, and the power of the heater 18 in order to adjust the temperature of the airflow.

The attachment 100 is shown schematically in Figures 3 and 4.

The attachment 100 comprises a hollow body 102, a curved surface 104, and a pair of guide walls 106. The hollow body 102 comprises an air inlet 108, an air outlet 110, a flat surface 112, and a plurality of internal baffles 114.

The air inlet 108 comprises a generally circular aperture formed in the hollow body 102, and the air inlet 108 is configured to receive airflow from the air outlet 24 of the handle unit 12 when the attachment 100 is attached to the handle unit 12 in use. A periphery of the air inlet 108 comprises attaching features for releasably attaching the attachment 100 to the handle unit 12. The attaching features may take many forms, are not pertinent to the present invention, and so will not be described for the sake of brevity.

The air outlet 110 comprises a generally rectangular slot formed lengthwise along a side of the hollow body 110. The air outlet 110 has a width in the region of 70mm to 90mm, for example in the region of 75mm to 85mm, and a height in the region of 2mm to

5mm, for example in the region of 3.0mm to 4.5mm. This gives an overall open cross-sectional area of the air outlet 110 in the region of 140mm^2 to 450mm^2 , for example in the region of 225.0mm^2 to 382.5mm^2 .

- 5 In a presently preferred embodiment the width of the air outlet 110 is in the region of 77mm, and the height of the air outlet 110 is in the region of 4.5mm. The open cross-sectional area of the air outlet 110 is in the region of 346.5mm^2 . The inventors of the present application have found that such dimensions for the air outlet 110 may provide advantageous effects, as will be described hereafter.

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The plurality of internal baffles 114 are curved in form, and extend in a direction from the air inlet 108 to the air outlet 110. The plurality of internal baffles 114 are configured to turn airflow in a direction from the air inlet 108 to a direction toward the air outlet 110, such that airflow is turned through substantially 90 degrees from the air
 15 inlet 108 to the air outlet 110. This may enable the handle unit 12 to extend orthogonally relative to the air outlet 110, which may provide greater flexibility in design, and better ergonomics, than, for example a haircare appliance where the air outlet is aligned with a handle unit of the haircare appliance.

- 20 The flat surface 112 is located adjacent to and extends rearwardly from of the air outlet 110, such that the flat surface 112 extends rearwardly from an edge of the air outlet 110. The flat surface 112 is obliquely angled relative to a plane in which the air outlet 110 is disposed, for example at an angle in the range of 3-10 degrees. The flat surface 112 is generally planar in form, and is substantially smooth and uninterrupted, for example
 25 with no projections, recesses or apertures formed thereon. The flat surface 112 has a height in the region of 5mm to 20mm. The functionality of the flat surface 112 will be described hereafter.

- The curved surface 104 is illustrated schematically in Figure 4, and extends outwardly
 30 from the hollow body 102 in a region of the air outlet 110, for example with a first edge 116 of the curved surface 104 attached to the hollow body 102 adjacent to the air outlet

110. Thus the curved surface 104 is located adjacent to, and downstream of, the air outlet 110. A second edge 118 of the curved surface 102 is a free edge, such that the curved surface 104 is cantilevered relative to the hollow body 102. The first edge 116 of the curved surface 104 is displaced slightly from the air outlet 110, for example by a distance in the region of 0.5-1.5mm, such that there is a slight step down from the air outlet 110 to the curved surface 102. It will be appreciated that in some embodiments there may be no step down from the air outlet 110 to the curved surface 104.

The curved surface 102 is substantially smooth and uninterrupted in form, such that no projections, recesses or apertures are formed thereon. This may enhance the functionality of the attachment 100 which will be described hereafter. The curved surface 102 has a radius of curvature in the region of 16mm to 60mm, for example in the region of 20mm to 40mm, and has an arc length in the region of 95 to 360 degrees, for example in the region of 95 to 120 degrees. In a presently preferred embodiment, the curved surface 102 has a radius of curvature in the region of 20mm and an arc length in the region of 110 degrees. The inventors of the present application have found that such a geometry of the curved surface 102 may provide advantageous effects, as will be described hereafter.

The pair of guide walls 106 are disposed on opposing edges of the curved surface 102, with those edges orthogonal to the first 116 and second 118 edges of the curved surface 102 mentioned previously. The guide walls 106 are upstanding from the curved surface 102, and extend along the full arc length of the curved surface 102. The guide walls 106 have a height substantially corresponding to a height of the air outlet 110, and have a constant height along their length.

In use, the attachment 100 is attached to the handle unit 12. The airflow generator 16 generates an airflow from the air inlet 22 of the handle unit 12 to the air outlet 24 of the handle unit 12, such that airflow passes from the air outlet 24 of the handle unit to the air inlet 108 of the attachment 100. Airflow flows from the air inlet 108 of the attachment through the hollow body 102, and is turned by the plurality of internal

baffles 114 toward the air outlet 110 of the attachment 100. Airflow exits the hollow body 102 via the air outlet 110 and passes over the curved surface 102.

5 The inventors of the present application have found that airflow attaches to the curved surface 102 via the Coanda effect. When a tress of hair is brought into the vicinity of the attachment 100, long hairs of the tress are attracted to, and at least partially wrapped about, the curved surface 102 by a force F_{PULL} , as a result of a negative pressure region generated by the airflow over the curved surface 102. However, the pressure gradient across the tress also results in a force, F_{PUSH} , which causes some airflow to
10 pass directly through the tress. Due to the location of this force relative to the curved surface 102 and the rest of the tress, shorter hairs are only held loosely at this point compared to longer hairs which are held in place on the curved surface 102. The shorter hairs are blown through the tress toward a user's head, whilst the longer hairs remain in place on the outside of the tress, ie the portion of the tress facing away from the user's
15 head. This provides a smooth finish for hair following interaction with the haircare appliance 10.

The interaction of forces described above is illustrated schematically in Figure 5.

20 This effect can be optimised by appropriate modification of the geometries and parameters described herein. One such parameter that may provide increased effectiveness is the velocity of airflow at the air outlet 110 of the attachment 100. In particular, too great a velocity may result in shorter hairs sticking to the curved surface 102 and hence not being pushed away through longer hairs, whilst too low a velocity may
25 not be sufficient to attract longer hairs to the curved surface 102 in the first instance. The applicant has determined that a velocity in the region of 30m/s to 45m/s may be particularly effective in generating an airflow along the curved surface 102 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 102 whilst also generating a second force to push relatively short hair away from the curved
30 surface 102. In a presently preferred embodiment, the velocity of airflow at the air outlet 110 is in the region of 35m/s.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of the velocity of airflow at the air outlet 110 to a flow rate of airflow generated by the airflow generator 16. In the embodiment of
5 Figures 3 to 4, the ratio is in the region of 2.14 to 5.63, and in a particularly preferred embodiment the ratio is in the region of 2.89. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 102 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 102, whilst also generating a second force to push relatively short hair away
10 from the curved surface 102.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of flow rate of airflow generated by the airflow generator 16 to an open cross-sectional area of the air outlet 110. In the embodiment of
15 Figures 3 to 4, the ratio is in the region of 0.01 to 0.10, and in a particularly preferred embodiment the ratio is in the region of 0.04. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 102 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 102, whilst also generating a second force to push relatively short hair away
20 from the curved surface 102.

A further parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of a radius of curvature of the curved surface 102 to the velocity of airflow at the air outlet 110. In the embodiment of Figures 3 to 4, the
25 ratio is in the region of 0.33 to 2.00, and in a particularly preferred embodiment the ratio is in the region of 0.57. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 102 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 102, whilst also generating a second force to push relatively short hair away from the curved
30 surface 102.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of a radius of curvature of the curved surface 102 to an arc length of the curved surface 102. In the embodiment of Figures 3 to 4, the ratio is in the region of 0.04 to 0.63, and in a particularly preferred embodiment the ratio is in the region of 0.18. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 102 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 102, whilst also generating a second force to push relatively short hair away from the curved surface 102.

In use, the attachment 100 can be moved along a length of a tress of hair, for example in a direction from root to tip of hair of the tress. The flat surface 112 is positioned relative to the curved surface 102 such that the flat surface 112 contacts hair extending rearwardly from of the air outlet 110 whilst hair downstream of the air outlet 110 contacts the curved surface 102. As previously mentioned, the flat surface 112 is substantially smooth and uninterrupted in form, with no projections, recesses or apertures formed thereon. As the haircare appliance 10 is moved along a length of a tress of hair in use, the flat surface 112 passes across hair that has been smoothed via interaction with the curved surface 102. In view of the smooth and uninterrupted nature of the flat surface 112, the flat surface 112 does not disrupt hair that has already been smoothed, leading to a better finish than, for example, a corresponding haircare appliance that has bristles and/or further air outlets located rearwardly of the air outlet 110.

As mentioned above, the pair of guide walls 106 extend along opposing edges of the curved surface 102. This effectively creates an airflow channel, with the pair of guide walls 106 acting as walls of the channel, and the curved surface 102 acting as a bed of the channel. The guide walls 106 inhibit ambient air from interacting with airflow flowing along the curved surface 102 in use, which may maintain the negative pressure region created by airflow flowing along the curved surface 102.

Whilst depicted in Figures 3 to 4 as having guide walls 106 of constant height along the curved surface 102, it has been found that the guide walls 106 may be most effective in the region of the air outlet 110. In alternative embodiments, as illustrated schematically in Figure 6 the attachment 100 has guide walls 120 that decrease in height in a direction
5 away from the air outlet 110. Thus less material may be required to form the guide walls 120 than, for example, guide walls 106 of a constant height.

In the embodiment previously described, the attachment has a single fixed air outlet 110, which is effectively a slot formed in the hollow body 104.

10 An alternative embodiment of an attachment 200 with multiple air outlets is illustrated schematically in Figures 7 to 11.

The attachment 200 comprises an inlet barrel 202, an outlet body 204, and a flow guide
15 206. The inlet barrel 202 is substantially cylindrical in form, and comprises an air inlet 208 which is configured to receive airflow from the air outlet 24 of the handle unit 12 when the attachment 200 is attached to the handle unit 12 in use. A periphery of the air inlet 208 comprises attaching features for releasably attaching the attachment 200 to the handle unit 12. The attaching features may take many forms, are not pertinent to the
20 present invention, and so will not be described for the sake of brevity.

The inlet barrel 202 defines a curved surface 210. The curved surface 210 is substantially smooth and uninterrupted in form, such that no projections, recesses or apertures are formed thereon. This may enhance the functionality of the attachment 200
25 which will be described hereafter. The curved surface 210 has a radius of curvature in the region of 16mm to 60mm, for example in the region of 20mm to 40mm, and has an arc length in the region of 95 degrees to 360 degrees. In a presently preferred embodiment, the curved surface 210 has a radius of curvature in the region of 20mm and an arc length in the region of 296 degrees. The inventors of the present application
30 have found that such a geometry of the curved surface 210 may provide advantageous effects, as will be described hereafter.

The inlet barrel 202 comprises a central pivot axis 212 about which the flow guide 206 is pivotable, as will be described hereafter.

5 The outlet body 204 comprises a first end portion 214, a second end portion 216, and a connecting portion 218 extending between the first 214 and second 216 end portions. The first end portion 214 is generally teardrop shaped in form, and comprises an aperture (not shown) through which the inlet barrel 202 extends, such that at least a portion of the first end portion 214 extends annularly about the inlet barrel 202.

10

The second end portion 216 has generally the same teardrop form as the first end portion 214, but is substantially solid, and defines a cap for the inlet barrel 202.

15 The connection portion 218 extends between apexes of the first end portion 214 and the second end portion 216 along the curved surface 210 of the inlet barrel 202. The connecting portion 218 has the general form of a triangular prism.

20 The connecting portion 218 has a first air outlet 220, a second air outlet 222, a first flat surface 224, and a second flat surface 226. The first air outlet 220 and the second air outlet 222 are located on opposing sides of the connecting portion 218, such that the first 220 and second 222 air outlets are located on opposing sides of the inlet barrel 202, and hence opposing sides of the attachment 200. The curved surface 210 of the inlet barrel 202 is located adjacent to and downstream of each of the first 220 and second 222 air outlets, such that the curved surface 210 extends continuously between the first 220 and second 222 air outlets. The first 214 and second 216 end portions have dimensions that are slightly larger than those of the inlet barrel 202, such that guide walls 227 are formed about the periphery of the curved surface 210.

25 Each of the first 220 and second 222 air outlets is generally rectangular in overall form. 30 The first 220 and second 222 air outlets each have a width in the region of 70mm to 90mm, for example in the region of 75 mm to 85mm and a height in the region of 2mm

to 5mm, for example in the region of 3mm to 4.5mm. This gives an overall open cross-sectional area of each of the first 220 and second 222 air outlets in the region of 140mm^2 to 450mm^2 , for example in the region of 225mm^2 to 382.5mm^2 .

- 5 In a presently preferred embodiment the width of each of first 220 and second 222 air outlets is in the region of 77mm, and the height of each of the first 220 and second 222 air outlets is in the region of 4.5mm. The open cross-sectional area of each of the first 220 and second 222 air outlets is in the region of 346.5mm^2 . The inventors of the present application have found that such dimensions for each of the first 220 and second
10 222 air outlets may provide advantageous effects, as will be described hereafter. Each of the first 220 and second 222 air outlets in the embodiment of Figures 7 to 11 are split into smaller sub-outlets, but the overall dimensions of the first 220 and second 222 air outlets are those given above.
- 15 The first flat surface 224 is located adjacent to and extends rearwardly from of the first air outlet 220, whilst the second flat surface 226 is located adjacent to and extends rearwardly from the second air outlet 222. The first 224 and second 226 flat surfaces are located either side of an apex of the connecting portion, such that the first 224 and second 226 flat surfaces are located on opposing sides of the attachment 200. The first
20 224 and second 226 flat surfaces are generally planar in form, and are substantially smooth and uninterrupted, for example with no projections, recesses or apertures formed thereon. The first 224 and second 226 flat surfaces are obliquely angled relative to planes in which the respective first 220 and second 222 air outlets are formed.
- 25 The connecting portion 218 further comprises first 228 and second 230 airflow channels which can be selectively placed in fluid communication with the interior of the inlet barrel 202, as will be described hereafter.

The flow guide 206 comprises a first blocking surface 232, a second blocking surface
30 234, a flow slot 236, connecting arms 238 and a plurality of weights 240.

The first 232 and second 234 blocking surfaces are substantially solid in form, and selectively block the respective first 228 and second 230 airflow channels. The flow slot 236 is formed between the first 232 and second 234 blocking surfaces, and selectively provides fluid communication between the first 228 and second 230 airflow channels and the interior of the inlet barrel 202. The connecting arms 238 are located at upper and lower regions of the flow guide 206, and pivotally connect the flow guide 206 to the central pivot axis 212 of the inlet barrel 202. The first 232 and second 234 blocking surfaces are slidably received within channels 242 formed in the walls of the inlet barrel 202 to enable pivoting motion of the flow guide 206 relative to the inlet barrel 202. The plurality of weights 240 are embedded in the first 232 and second 234 blocking surfaces. The flow guide 206 also has a plurality of internal baffles 244 which turn airflow from the air inlet 208 toward the flow slot 236.

The flow guide 206 is movable within the attachment 200 between a first configuration illustrated in Figure 10 and a second configuration illustrated in Figure 11.

In the first configuration, ie a configuration in which the attachment 200 is held on a left-hand side of a head of a user with the first flat surface 224 in contact with hair, the plurality of weights 240 ensure that the flow slot 236 is aligned with the first airflow channel 228, whilst the second blocking surface 234 is aligned with the second airflow channel 230. Thus airflow can escape from the first air outlet 220 but not from the second air outlet 222 in the first configuration.

In the second configuration, ie a configuration in which the attachment 200 is held on a right-hand side of a head of a user with the second flat surface 226 in contact with hair, the plurality of weights 240 ensure that the flow slot 236 is aligned with the second airflow channel 230, whilst the first blocking surface 232 is aligned with the first airflow channel 228. Thus airflow can escape from the second air outlet 222 but not from the first air outlet 220 in the second configuration.

The attachment 200 can therefore be used on either side of a user's head with ease, with the plurality of weights 240 providing a switching mechanism that can automatically switch the flow guide 206 between the first and second configurations without need for user interaction.

5

Similar to the attachment 100 of Figures 3 and 4, in use, the attachment 200 is attached to the handle unit 12. The airflow generator 16 generates an airflow from the air inlet 22 of the handle unit 12 to the air outlet 24 of the handle unit 12, such that airflow passes from the air outlet 24 of the handle unit to the air inlet 208 of the attachment 200.

10 Airflow flows from the air inlet 208 of the attachment through the inlet barrel 202, and is turned by the plurality of internal baffles 244 toward the flow slot 236. Airflow exits the attachment via either the first 220 or second 222 air outlet, depending upon which of the first and second configurations the attachment is in, and passes over the curved surface 210.

15

The inventors of the present application have found that airflow attaches to the curved surface 210 via the Coanda effect. When a tress of hair is brought into the vicinity of the attachment 200, long hairs of the tress are attracted to, and at least partially wrapped about, the curved surface 210, as a result of a negative pressure region generated by the
20 airflow over the curved surface 210. However, the pressure gradient across the tress also results in a force which causes some airflow to pass directly through the tress. Due to the location of this force relative to the curved surface 210 and the rest of the tress, shorter hairs are only held loosely at this point compared to longer hairs which are held in place on the curved surface 210. The shorter hairs are blown through the tress toward
25 a user's head, whilst the longer hairs remain in place on the outside of the tress, ie the portion of the tress facing away from the user's head. This provides a smooth finish for hair following interaction with the haircare appliance 10.

This effect can be optimised by appropriate modification of the geometries and
30 parameters described herein. One such parameter that may provide increased effectiveness is the velocity of airflow at the air outlets 220,222 of the attachment 200.

In particular, too great a velocity may result in shorter hairs sticking to the curved surface 210 and hence not being pushed away through longer hairs, whilst too low a velocity may not be sufficient to attract longer hairs to the curved surface 210 in the first instance. The applicant has determined that a velocity in the region of 30 to 45m/s may be particularly effective in generating an airflow along the curved surface 210 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 210 whilst also generating a second force to push relatively short hair away from the curved surface 210. In a presently preferred embodiment, the velocity of airflow at the air outlets 220,222 is in the region of 35m/s.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of the velocity of airflow at the air outlets 220,222 to a flow rate of airflow generated by the airflow generator 16. In the embodiment of Figures 7 to 11, the ratio is in the region of 2.14 to 5.63, and in a particularly preferred embodiment the ratio is in the region of 2.89. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 210 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 210, whilst also generating a second force to push relatively short hair away from the curved surface 210.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of flow rate of airflow generated by the airflow generator 16 to an open cross-sectional area of one of the air outlets 220,222. In the embodiment of Figures 7 to 11, the ratio is in the region of 0.01 to 0.10, and in a particularly preferred embodiment the ratio is in the region of 0.04. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 210 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 210, whilst also generating a second force to push relatively short hair away from the curved surface 210.

A further parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of a radius of curvature of the curved surface 210 to the velocity of airflow at the air outlets 220,222. In the embodiment of Figures 7 to 11, the ratio is in the region of 0.33 to 2.00, and in a particularly preferred embodiment the ratio is in the region of 0.57. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 210 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 210, whilst also generating a second force to push relatively short hair away from the curved surface 210.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of a radius of curvature of the curved surface 210 to an arc length of the curved surface 210. In the embodiment of Figures 7 to 11, the ratio is in the region of 0.04 to 0.63, and in a particularly preferred embodiment the ratio is in the region of 0.07. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 210 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 210, whilst also generating a second force to push relatively short hair away from the curved surface 210.

In use, the attachment 200 can be moved along a length of a tress of hair, for example in a direction from root to tip of hair of the tress. The first and second flat surfaces 224,226 are positioned relative to the curved surface 210 such that the flat surfaces 224,226 contact hair extending rearwardly from of the air outlets 220,222 whilst hair downstream of the air outlets 220,222 contacts the curved surface 210. As previously mentioned, the flat surfaces 224,226 are substantially smooth and uninterrupted in form, with no projections, recesses or apertures formed thereon. As the haircare appliance 10 is moved along a length of a tress of hair in use, the flat surfaces 224,226 pass across hair that has been smoothed via interaction with the curved surface 210. In view of the smooth and uninterrupted nature of the flat surfaces 224,226, the flat surfaces 224,226 do not disrupt hair that has already been smoothed, leading to a better finish than, for example, a

corresponding haircare appliance that has bristles and/or further air outlets located rearwardly of the air outlets 220,222.

The guide walls 244 extend along opposing edges of the curved surface 210. This effectively creates an airflow channel, with the guide walls 244 acting as walls of the channel, and the curved surface 210 acting as a bed of the channel. The guide walls 244 inhibit ambient air from interacting with airflow flowing along the curved surface 210 in use, which may maintain the negative pressure region created by airflow flowing along the curved surface 210.

An alternative embodiment of a haircare appliance 300 is illustrated schematically in Figures 12 to 5.

The haircare appliance 300 comprises a handle unit 302 and an attachment 306. The handle unit 302 comprises a handle portion 308, a head portion 310, an airflow generator 312 and a heater 314.

The handle portion 308 is generally cylindrical and hollow in form, and houses the airflow generator 312. The handle portion 308 has an air inlet 316 in the form of a plurality of perforations at a first end 318 of the handle portion 308.

The head portion 310 is generally cylindrical and hollow in form, and is disposed at a second end 320 of the handle portion 308, with a central axis of the head portion 310 orthogonal to a central axis of the handle portion 308 such that the handle unit 302 is generally T-shaped in form. The head portion 310 houses the heater 314. The head portion 310 comprises a bore 322 through which air is entrained, and an air outlet 324. The air outlet 324 is generally annular in form about a periphery of the bore 322.

The attachment 304 is illustrated schematically in Figures 14 and 15.

The attachment 304 comprises an inlet body 326, a curved surface 328, guide walls 330 and an end wall 332. The inlet body 326 is generally hollow in form, and comprises a rearwardly extending projection 334 for insertion into the bore 322, and an annular inlet 336 extending about the rearwardly extending projection 334. The inlet body 326 acts
5 as a plenum for receiving airflow from the air outlet 324 of the handle unit 302. The inlet body 306 comprises an air outlet 338 which takes the form of a slot that has a height that varies along its width, with a peak in height at a central point of the width. The air outlet 338 has a width in the region of 81mm and a height that varies from a minimum of 3mm to a maximum of 4mm. The air outlet 338 has an overall open cross-
10 sectional area in the region of 292.7mm^2 .

The curved surface 328 extends outwardly from the inlet body 326 in a region of the air outlet 338. Thus the curved surface 328 is located adjacent to, and downstream of, the air outlet 338. The curved surface 328 is substantially smooth and uninterrupted in
15 form, such that no projections, recesses or apertures are formed thereon. This may enhance the functionality of the attachment 100 which will be described hereafter. The curved surface 328 has a radius of curvature in the region of 20mm, and has an arc length in the region of 110 degrees. The inventors of the present application have found that such a geometry of the curved surface 328 may provide advantageous effects, as
20 will be described hereafter.

The guide walls 330 are disposed on opposing edges of the curved surface 328. The guide walls 330 are upstanding from the curved surface 328, and extend along the full arc length of the curved surface 328. The guide walls 328 have a height substantially
25 corresponding to a height of the air outlet 338, and have a constant height along their length. The end wall 332 is located at an end of the curved surface 328 remote from the air outlet 338, and extends between the guide walls 330. The end wall 332 prevents airflow from travelling toward the handle portion 308 of the handle unit 302 when the attachment 304 is attached to the handle unit 302 in use.

In use, the attachment 304 is attached to the handle unit 302. The airflow generator 312 generates an airflow from the air inlet 316 of the handle unit 302 to the air outlet 324 of the handle unit 302, such that airflow passes from the air outlet 324 of the handle unit 302 to the air inlet 336 of the attachment 304. Airflow flows from the air inlet 336 of the attachment through the inlet body 326 toward the air outlet 338. Airflow exits the attachment 304 via the air outlet 338 and passes over the curved surface 328.

The inventors of the present application have found that airflow attaches to the curved surface 328 via the Coanda effect. When a tress of hair is brought into the vicinity of the attachment 304, long hairs of the tress are attracted to, and at least partially wrapped about, the curved surface 328, as a result of a negative pressure region generated by the airflow over the curved surface 328. However, the pressure gradient across the tress also results in a force which causes some airflow to pass directly through the tress. Due to the location of this force relative to the curved surface 328 and the rest of the tress, shorter hairs are only held loosely at this point compared to longer hairs which are held in place on the curved surface 328. The shorter hairs are blown through the tress toward a user's head, whilst the longer hairs remain in place on the outside of the tress, ie the portion of the tress facing away from the user's head. This provides a smooth finish for hair following interaction with the haircare appliance 300.

This effect can be optimised by appropriate modification of the geometries and parameters described herein. One such parameter that may provide increased effectiveness is the velocity of airflow at the air outlet 338 of the attachment 304. In particular, too great a velocity may result in shorter hairs sticking to the curved surface 328 and hence not being pushed away through longer hairs, whilst too low a velocity may not be sufficient to attract longer hairs to the curved surface 328 in the first instance. The applicant has determined that a velocity in the region of 30m/s to 45m/s may be particularly effective in generating an airflow along the curved surface 328 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 328 whilst also generating a second force to push relatively short hair away from the curved

surface 328. In a presently preferred embodiment, the velocity of airflow at the air outlet 338 is in the region of 43m/s.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of the velocity of airflow at the air outlet 338 to a flow rate of airflow generated by the airflow generator 312. In the embodiment of Figures 12 to 15, the ratio is in the region of 2.14-5.63, and in a particularly preferred embodiment the ratio is in the region of 3.14. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 328 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 328, whilst also generating a second force to push relatively short hair away from the curved surface 328.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of flow rate of airflow generated by the airflow generator 312 to an open cross-sectional area of the air outlet 338. In the embodiment of Figures 12 to 15, the ratio is in the region of 0.01 to 0.10, and in a particularly preferred embodiment the ratio is in the region of 0.04. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 328 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 328, whilst also generating a second force to push relatively short hair away from the curved surface 328.

A further parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of a radius of curvature of the curved surface 328 to the velocity of airflow at the air outlet 338. In the embodiment of Figures 13 to 15, the ratio is in the region of 0.33 to 2.00, and in a particularly preferred embodiment the ratio is in the region of 0.47. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 328 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 328,

whilst also generating a second force to push relatively short hair away from the curved surface 328.

Another parameter that may provide increased efficacy for smoothing hair in the manner described above is a ratio of a radius of curvature of the curved surface 328 to an arc length of the curved surface 328. In the embodiment of Figures 12 to 15, the ratio is in the region of 0.04 to 0.63, and in a particularly preferred embodiment the ratio is in the region of 0.18. The applicant has found that such a ratio may be particularly effective in generating an airflow along the curved surface 328 that results in a first force that is sufficient to attract relatively long hair toward the curved surface 328, whilst also generating a second force to push relatively short hair away from the curved surface 328.

The guide walls 330 extend along opposing edges of the curved surface 328. This effectively creates an airflow channel, with the guide walls 330 acting as walls of the channel, and the curved surface 210 acting as a bed of the channel. The guide walls 330 inhibit ambient air from interacting with airflow flowing along the curved surface 328 in use, which may maintain the negative pressure region created by airflow flowing along the curved surface 328.

Although described herein as embodiment with releasable attachments, embodiments are also envisaged where, rather than the haircare appliance comprising a handle unit and an attachment the haircare appliance is a single-piece unit, for example taking the form of the combined handle unit and attachment previously described.

Claims

1. A haircare appliance comprising an air inlet, an air outlet, an airflow generator for generating an airflow from the air inlet to the air outlet, a hollow body defining a flow path between the air inlet and the air outlet, and a curved surface adjacent to and downstream of the air outlet, the curved surface extending outwardly from the hollow body.
2. A haircare appliance as claimed in Claim 1, wherein a central axis of curvature of the curved surface is displaced from a central axis of the hollow body.
3. A haircare appliance as claimed in Claim 1 or Claim 2, wherein the curved surface has a first end attached to the hollow body, and a second free end opposite to the first end.
4. A haircare appliance as claimed in any preceding claim, wherein the curved surface is substantially smooth and uninterrupted in form.
5. A haircare appliance as claimed in any preceding claim, wherein the attachment comprises a pair of guide walls located at edges of the curved surface.
6. A haircare appliance as claimed in any preceding claim, wherein the haircare appliance is configured such that airflow exiting the air outlet generates a first force to attract hair toward the curved surface, and a second force to push hair away from the curved surface.
7. A haircare appliance as claimed in any preceding claim, wherein the haircare appliance is configured such that airflow at the air outlet comprises a velocity in the region of 30m/s to 45m/s.
8. A haircare appliance as claimed in any preceding claim, wherein the airflow generator is configured to generate airflow at a flow rate in the region of 8L/s to 14L/s.

9. A haircare appliance as claimed in any preceding claim, wherein the air outlet comprises an open cross-sectional area in the region of 140mm^2 to 450mm^2 .

5 10. A haircare appliance as claimed in any preceding claim, wherein the air outlet comprises a width in the region of 70mm to 90mm.

11. A haircare appliance as claimed in any preceding claim, wherein the air outlet comprises a height in the region of 2mm to 5mm.

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12. A haircare appliance as claimed in any preceding claim, wherein the curved surface comprises a radius of curvature in the region of 16mm to 60mm.

13. A haircare appliance as claimed in any preceding claim, wherein the curved
15 surface comprises an arc length of at least 95 degrees from the air outlet.

14. A haircare appliance as claimed in any preceding claim, wherein a ratio of flow rate of airflow generated by the airflow generator to an open cross-sectional area of the air outlet is in the region of 0.01 to 0.10.

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15. A haircare appliance as claimed in any preceding claim, wherein a ratio of a radius of curvature of the curved surface to a velocity of airflow at the air outlet is in the region of 0.33 to 2.00.

25 16. A haircare appliance as claimed in any preceding claim, wherein a ratio of a radius of curvature of the curved surface to an arc length of the curved surface is in the region of 0.04 to 0.63.

17. A haircare appliance as claimed in any preceding claim, wherein a ratio of a
30 velocity of airflow at the air outlet to a flow rate of airflow generated by the airflow generator is in the region of 2.14 to 5.63.

18. A haircare appliance as claimed in any preceding claim, wherein the haircare appliance comprises a flat surface adjacent to and extending rearwardly from the air outlet.

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19. A haircare appliance as claimed in any preceding claim, wherein the air outlet comprises a fixed air outlet.

20. A haircare appliance as claimed in any preceding claim, wherein the haircare appliance comprises a single air outlet.

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21. A haircare appliance as claimed in any preceding claim, wherein the haircare appliance comprises a handle unit within which the airflow generator is housed, and an attachment releasably attachable to the handle unit, the attachment comprising the air outlet and the curved surface.

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22. An attachment for a haircare appliance comprising an airflow generator, the attachment comprising an air inlet for receiving an airflow from the airflow generator, an air outlet for emitting airflow, a hollow body defining a flow path between the air inlet and the air outlet, and a curved surface adjacent to and downstream of the air outlet, the curved surface extending outwardly from the hollow body.

20



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Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 3, 4, 7-17, 19, 20, and 22	GB2503685 A (COURTNEY et al), see figures and abstract.
X	1-4, 7-19, 21, and 22	GB2548815 A (SIMMONS & LEGRAND), see figures, abstract, and description, especially page 23 lines 4-16.
X	1, 4, 5, 7-17, 19, 21, and 22	US2015/265024 A1 (MACLAINE), see figures, especially figures 1-9, abstract, and description, especially paragraph 92.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

A45D

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Patent Fulltext

International Classification:

Subclass	Subgroup	Valid From
A45D	0020/50	01/01/2006
A45D	0020/12	01/01/2006