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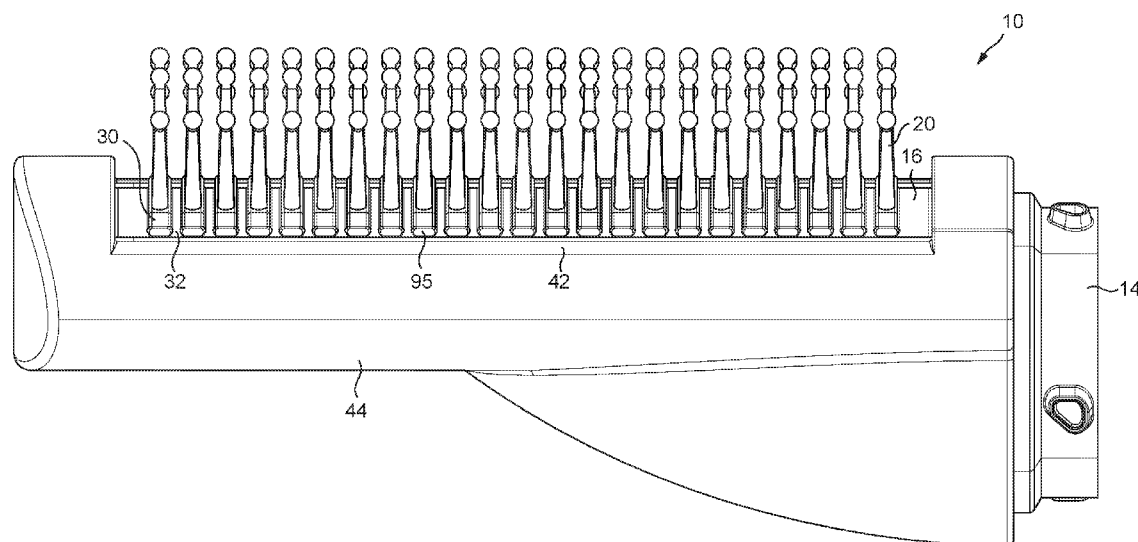


FIG. 2

(57) Abstract: An attachment includes a casing having an air inlet for receiving airflow from a hair styling apparatus, a hair engaging member supported by the casing, an airflow outlet between the casing and the hair engaging member and shaped to direct air over an external surface of the hair engaging member and airflow guiding means extending over the external surface of the hair engaging member wherein the air flow guiding means comprises a further airflow outlet.



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ATTACHMENT FOR A HANDHELD APPLIANCE**FIELD OF THE INVENTION**

The present invention relates to an attachment for a handheld appliance, in particular a hair care appliance such as a hot air styling device.

BACKGROUND OF THE INVENTION

In a conventional hot air styling device, air is drawn into an inlet by a fan unit and directed towards the hair by an attachment or head. Depending on the style desired, the air may or may not be heated. The attachment often includes bristles onto which hair is wrapped and held for styling. The air is generally blown out of the attachment normal to the longitudinal surface of the attachment.

SUMMARY OF THE INVENTION

In a first aspect, the present invention provides an attachment for a hair styling apparatus comprising: a casing having an air inlet for receiving airflow from a hair styling apparatus; a hair engaging member supported by the casing, an airflow outlet between the casing and the hair engaging member and shaped to direct air over an external surface of the hair engaging member; and airflow guiding means extending over the external surface of the hair engaging member wherein the air flow guiding means comprises a further airflow outlet. Preferably, the airflow outlet is defined by a side face of the hair engaging member and a side wall of the casing.

Preferably, the hair engaging member has a first side and a second side, the airflow outlet is disposed at a first side and the further airflow outlet is disposed at the second side. Airflow from the further airflow outlet attracts air exiting the airflow outlet towards the hair engaging member and the external surface of the attachment. It increases the Coanda effect over the external surface and this assists in drying hair and smoothing and aligning the hair follicles.

The hair engaging member is preferably elongate in shape, and the airflow outlet extends substantially the length of the hair engaging member.

5 Preferably, the airflow guiding means comprises a series of ribs. Each rib in the series of ribs is preferably positioned parallel to an adjacent rib and a channel is defined therebetween. Each rib within the series of ribs preferably extends substantially perpendicular to the direction of the length of the hair engaging member. Preferably, the ribs within the series of ribs have a uniform rib width. Each channel in the series of ribs preferably has a uniform channel width, and the channel width is preferably greater than
10 a width of a rib. In a preferred embodiment, the width of each channel is in the range from 2mm to 4mm.

Advantageously, the channels between adjacent ribs act to guide the airflow over the surface of the moveable members and consequently, even, parallel airstreams are blown
15 down the shaft of the user's hair.

Preferably, the further airflow outlet comprises a plurality of isolated apertures. Preferably, the further airflow outlet comprises a plurality of isolated apertures and each of the plurality of apertures is accommodated within a rib.
20

Preferably, each rib comprises an end wall adjacent the airflow outlet. Preferably, the end wall is perpendicular to the direction of the length of the hair engaging member. Preferably, each one of the plurality of apertures is located within an end wall of a rib.

25 Preferably, the hair engaging member is moveable with respect to the casing. Preferably, the hair engaging member comprises first and second airflow outlets and first and second further airflow outlets so air can flow in either direction along the hair engaging member.

30 The hair engaging member, is adapted to move relative to the casing between a first position and a second position, wherein a first airflow outlet formed is between the

casing and the hair engaging member when the hair engaging member is in the first position; and a second airflow outlet, spaced from the first airflow outlet, formed between the casing and the hair engaging member when the hair engaging member is in the second position; and wherein the first airflow outlet is open and the second airflow outlet is closed when the hair engaging member is in the first position; and the first airflow outlet is closed and the second airflow outlet is open when the hair engaging member is in the second position. Likewise, the first further airflow outlet is open and the second further airflow outlet is closed when the hair engaging member is in one position; and the first further airflow outlet is closed and the second further airflow outlet is open when the hair engaging member is in the other position.

Preferably, each rib has a first end wall adjacent the first airflow outlet and a second end wall adjacent the second airflow outlet. Preferably, the first end wall and the second end wall both comprise one of the first further airflow outlet and second further airflow outlet. The first end wall comprises a first further airflow outlet and the second end wall comprises a second further airflow outlet.

When the first airflow outlet is open, the hair engaging member is in a first position and the first end wall is recessed into the casing and the first further airflow outlet is also recessed within the casing. In this position, the second further airflow outlet is exposed and air flows through both the first airflow outlet and the second further airflow outlet. Conversely, when the second airflow outlet is open, the hair engaging member is in a second position and the second end wall is recessed into the casing and the second further airflow outlet is also recessed within the casing. In this position, the first further airflow outlet is exposed and air flows through both the second airflow outlet and the first further airflow outlet.

In effect, one of each of the airflow outlet and further airflow outlets is open and the other one of each of the airflow outlet and further airflow outlets is closed when the bristles are under tension, for example by being pulled through hair.

The first and the second further airflow outlets are provided to encourage air to stick to the external surface of the hair engaging member using the Coanda effect for the whole length of the hair engaging member. The first and the second further airflow outlets provide a further advantage that they reduce the pressure within the attachment so noise produced by exiting air is reduced.

The hair engaging member is preferably adapted to move in a rocking movement, relative to the casing. Preferably, the hair engaging member is pivotably supported within the casing and through a central axis of the hair engaging member. It is preferred that the hair engaging member is pivotably supported by pivot pins which mount the hair engaging member within the casing. The hair engaging member preferably has an angle of movement which is in the range from 5° to 30° .

Preferably, the hair engaging member moves into the first position when the attachment is drawn through a user's hair in a first direction and the hair engaging member moves into the second position when the attachment is drawn through the user's hair in a second direction opposing the first direction.

Preferably, each of the first airflow outlet and the second airflow outlet are defined by a respective side face of the hair engaging member and a respective part of the casing. Each of the first airflow outlet and the second airflow outlet is preferably a slot shape. Preferably, the hair engaging member has an elongate form and each of the first airflow outlet and the second airflow outlet preferably extends substantially the length of the hair engaging member.

Preferably, the casing comprises an inner wall, and a ledge of the inner wall forms part of the outer surface adjacent the hair engaging member. In a first configuration of the attachment a hair engaging member is preferably in the first position defining a first airflow outlet with the ledge. In a second configuration of the attachment, the hair engaging member is preferably in the second position defining another airflow outlet with the casing.

Furthermore, the attachment preferably moves between the first configuration and the second configuration under the action of an over centre mechanism. In a preferred embodiment the over centre mechanism is a torsion spring connected between the first
5 hair engaging member and the second hair engaging member. The biasing function of the torsion spring may be realized in several alternative ways. For example, a magnetic latch or weighted moveable members or integrated ball bearings in a detent mechanism may be used.

10 Advantage is found in the over-centre mechanism for movement of the moveable members which functions to bias the movement of the moveable member in a direction opposing the current orientation of the moveable member, ensuring that the moveable member can tilt in the opposing direction without hindrance.

15 The term “airflow directing means” refers to vanes, baffles, ribs or any other arrangement which guides airflow along an airflow path.

In a preferred embodiment, the internal airflow directing means comprises a plurality of vanes. The internal airflow directing means preferably comprises a plurality of casing
20 vanes connected to the casing. Furthermore, the plurality of casing vanes comprises; a first series of casing vanes located on a first side wall of the casing and adjacent to the first airflow outlet; and a second series of casing vanes located on a second side wall of the casing and adjacent to the second airflow outlet. Each vane in the first series of casing vanes is preferably orientated approximately perpendicular to an edge of the first
25 side wall of the casing which defines the first airflow outlet, and each vane in the second series of casing vanes is orientated approximately perpendicular to an edge of the second side wall of the casing which defines the second airflow outlet. Preferably, the vanes in the first series of casing vanes and second series of the casing vanes are approximately evenly spaced.

The hair engaging member preferably has an elongate form, and each of the first airflow outlet and the second airflow outlet preferably extends substantially the length of the hair engaging member.

- 5 Advantageously, turbulent airflow is minimized within the attachment and consequently the audible volume of the hot air styling device with attachment is reduced in use.

- 10 Preferably, the external surface of the hair engaging member has a generally arc profile perpendicular to the direction of the length of the hair engaging member.

Preferably, the casing comprises an array of bristles protruding from an outer surface of the casing. The array preferably comprises bristles arranged in parallel rows. Each bristle preferably has a bristle ball at the distal end.

- 15 Features described above in connection with the first aspect of the invention are equally applicable to each of the other aspects of the invention, and vice versa.

BRIEF DESCRIPTION OF THE DRAWINGS

- 20 Preferred features of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an attachment;

- 25 Figure 2 is a side view of the attachment;

Figure 3a is a cross-sectional view of the attachment;

Figure 3b is an enlarged view of a portion of the cross-sectional view in Figure 3a;

- 30 Figure 4 is an alternative cross-sectional view of the attachment;

Figure 5 is a side view of an example of a hot air styling device to which the attachment may be connected.

5 **DETAILED DESCRIPTION OF THE INVENTION**

Figure 1 is an external view of an attachment 10. The attachment 10 comprises an air inlet 12 for receiving an airflow from an air outlet end of a hot air styling device or similar apparatus. With reference also to Figures 2, 3a, 3b and 4, the air inlet 12 is defined by a casing 44, the air inlet 12 is generally circular in shape, to enable an air-tight connection with a generally annular outlet end of the hot air styling device. An annular collar section 14 forms a smooth edge from an external surface of the hot air styling device to the casing 44 of the attachment 10.

The attachment comprises a hair engaging member for engaging hair during the use of the hot air styling device. The hair engaging member comprises a moveable member and a set of bristles supported by the moveable member. In this example, the moveable member 16 is elongate in form. A first end of the moveable member is positioned towards the air inlet end of the attachment 10 and a second end of the moveable member is positioned towards a distal end of the attachment 10. The moveable member 16 is positioned in the casing 44 supported at the distal end of the attachment via fixing plate 62 for movement relative to the casing. At the distal end of the attachment is an end portion 24, housing a movement mechanism for moving the moveable member relative to the casing.

25 The moveable member has a curved outer surface. A plurality of parallel ribs 30 are positioned on the outer surface and the ribs 30 run perpendicular to the length of the moveable member. Two adjacent ribs 30 form a channel 32 therebetween. A total area of ribs 30 on each moveable member has a rectangular form which is surrounded by a smooth peripheral surface. Each rib 30 supports a respective row of bristles 20.

In this embodiment, the width of each channel 32 is preferably equal to or less than the height of the ribs 30. In an alternative embodiment, the width of each channel 32 is wider than the width of a rib 30.

5 The moveable member 16 has a first side face 34 adjacent to a first side wall 40 and a second side face 46 adjacent to a side wall 42 of the casing 44. Casing 44 is provided with a channel 90 and an inner wall 54, the channel 90 between them which functions as an insulated coolwall cavity. An internal support 52 is provided, and this support 52 is also attached to a base 53 of the inner wall 54. A series of side vanes 56 is positioned
10 internally on each side wall 40, 42 of the casing 44. The side vanes 56 help direct flow from the inlet 12 where the flow is parallel to a longitudinal axis of the attachment to a perpendicular direction for exit out of any of the airflow outlets.

In further reference to Figure 3a, components located at the distal end of the attachment
15 10 primarily function to enable a pivoting mechanism for the movement of the moveable member 16 relative to the casing 44. Specifically, a pivot pin 58 extends from an end face of the second end 38 of the moveable member. This pivot pin 58 passes into a fixing plate 62 which is attached to the end portion 24 via an arm 68 which extends from the casing 44 through an aperture 66 in the fixing plate 62. The moveable member
20 has an angle of movement which is in the range from 5° to 30°. In a preferred embodiment, the angle of movement is 12°.

A torsion spring pin (not shown) is located within the end portion 24 and functions as an over-centre mechanism between a stable first position and a stable second position,
25 ensuring that the moveable member 16 can tilt between stable first position and a stable second position without hindrance. A person skilled in the art will readily understand this feature and it is additionally described in published UK Patent Application number GB2548822A.

Figure 1 is a perspective view of the attachment 10 shown from the air inlet end 12. The collar 14 has four regularly spaced protrusions 84 which form a snap-fit feature by which the attachment 10 is fitted to the hot air styling device.

5 A “see-saw movement” of the moveable member will now be described with reference to Figure 4. Figure 4 shows a cross-sectional view through the attachment when the moveable member is in a first configuration relative to the casing. In use, the action of the user drawing the attachment through the hair creates a tension in the bristles 20 in the opposing direction. The tension in the bristles is consequently present in the
10 moveable member, which moves in compliance with the direction of the tension force, so that the moveable member adopts either the first configuration or the second configuration during use of the attachment 10.

Figure 4 shows the position of the moveable member in the first configuration when the
15 attachment 10 is moved, in use, in a left to right direction as indicated by an arrow 88, through the hair of a user. The moveable member 16 is in a first position relative to the casing 44. The inner wall 54 includes a ledge 54a which extends beyond the casing 44, forming part of the external surface of the attachment at each of the first side 34 and second side 46 of the moveable member. At the airflow outlet, on the first side 34 of the
20 moveable member the inner side face 34a of first moveable member 16 is positioned below, and vertically overlapping with, the ledge 54a. A first, air outlet 94 is formed between the ledge 54a and the inner side face 34a of the first moveable member 16.

At the second side 46 of the moveable member, the ledge 54b is in flush, air-tight
25 contact with the movable member. However a further airflow outlet 95 is provided which is formed within an end wall 30a of the plurality of ribs 30. This further airflow outlet 95 is coincident with the ledge 54b and enables air to exit from a plurality of apertures formed one in each of the ribs 30 to form the further airflow outlet 95. Air from both the airflow outlet 94 and the further airflow outlet 95 flows in the same
30 direction as indicated by arrows 78.

Side vanes 56 function to direct airflow towards the open outer air outlet 94. An airflow channel 96 is an internal channel when the moveable member is in this first configuration but when the moveable member is in the second position this internal channel becomes a further airflow outlet. Whilst it is an internal channel 96, some air can flow through it but the curve of the moveable member 16 encourages the air to stick to this outer surface so any negative impact from recirculation for example is small.

When the direction of the brushing action by the user is reversed and equally the direction of the tension force in the bristles 20 is reversed, then the moveable member moves into its' opposite position. In this case, the air flow outlet 94 is blocked by the movement of the movable member 16 and a second airflow outlet opens up adjacent ledge 54b. The further airflow outlet 95 becomes an internal channel similar to internal channel 96 which also becomes the second further airflow outlet. The movable member 16 being the mirror image of what is shown in the Figure in this other configuration.

In use, the attachment 10 is connected to the airflow outlet end of a hot air styling device. The airflow passes from the hot air styling device through the air inlet 12 and into the attachment 10.

Ambient airflow is drawn into this surface air flow as a consequence of the dimensions of the airflow outlet and the profile of each moveable member. Therefore, the airflow through the channels 32 and along the length of the user's hair is augmented by ambient airflow. Furthermore, the form and dimensions of the channels 32 enhance flow attachment as the airflow moves over the surface of the moveable member.

With reference to Figure 4, when the attachment 10 is moved, in use, in a left to right direction as indicated by the arrow 88 at the top of the figure, then airflow over the surface of each moveable member is in the opposing direction, as indicated by the smaller airflow arrows. When the direction of use of the attachment 10 is reversed, then the direction of airflow across the surface of each moveable member is also reversed.

The bristles 20 for the attachment are formed in rows. The base end of the bristle 20 (located adjacent the moveable member 16) is broader than near the tip 102 of the bristle which is topped by a bristle ball 99. The cross-section through bristle 20 is circular. In a preferred embodiment, the bristles 20 are able to flex and may be approximately 15mm in length. The bristles 20 may be formed with or without the bristle ball 99.

With reference to Figure 1, the upper surface of each moveable member has an arc form and therefore, the ribs 30 describe the same arc form. Consequently, the vertical alignment of bristles 20 held within a single rib 30 is not parallel.

Figure 8 shows an example of a hot air styling device 104 to which the attachment 10 may be connected. The hot air styling device comprises a generally tubular handle 106 having an air inlet 108 and an air outlet 110 at opposing ends. At the air inlet end of the handle, an array of apertures extending around and partially along the handle 106, provides an air inlet 108. A fan unit within the handle 106 comprises a fan and a motor. In use, the motor drives the fan and air is drawn in through the air inlet, along an air flow path which extends through the length of the handle 106. The air is optionally heated by a heater before exiting the hot air styling device at the air outlet 110.

It will be apparent to the skilled person that the biasing function of the torsion spring may be realized in several alternative ways. For example, a magnetic latch or weighted moveable members or integrated ball bearings in a detent mechanism may be used.

The attachment may be fabricated from any suitable heat resistant materials, and in a preferred embodiment the casing and moveable members are fabricated from glass-filled nylon. The highest preferred operating temperature of such an attachment connected to a hot air styling device is approximately 130°C.

In the present example of an attachment 10, as illustrated in the accompanying figures, five rows of bristles 20 are shown on the moveable member. However, it is clear to the skilled person that the number of rows of bristles on each moveable member may be greater or smaller than five. In particular, advantage is found in an attachment without
5 bristles, so that the user may benefit from the hair smoothing effects of the airflow path without the harsher effect of the bristles through the hair. Alternatively, bristles 20 may be positioned on the outer casing section 44, instead of, or in addition to, bristles 20 on each moveable member. Further, embodiments which have more than one moveable member may not have bristles positioned on each moveable member.

10

The invention is not limited to the detailed description given above. Variations will be apparent to the person skilled in the art.

15

CLAIMS

1. An attachment for a hair styling apparatus comprising:

5 a casing having an air inlet for receiving airflow from a hair styling apparatus;

a hair engaging member supported by the casing,

an airflow outlet between the casing and the hair engaging member and shaped to direct air over an external surface of the hair engaging member;

10 and

airflow guiding means extending over the external surface of the hair engaging member wherein

the air flow guiding means comprises a further airflow outlet .

15 2. An attachment according to any preceding claim, wherein the hair engaging member is elongate in shape, and the airflow outlet extends substantially the length of the hair engaging member.

20 3. An attachment according to any preceding claim, wherein the airflow guiding means comprises a series of ribs.

4. An attachment according to any of claim 4, wherein each rib in the series of ribs is positioned parallel to an adjacent rib and a channel is defined
25 therebetween.

5. An attachment according to claim 4 or claim 5, wherein each rib within the series of ribs extends substantially perpendicular to the direction of the length of the hair engaging member.

6. An attachment according to any preceding claim, wherein the further airflow outlet comprises a plurality of isolated apertures.

7. An attachment according to any of claims 3 to 5, wherein the further airflow outlet comprises a plurality of isolated apertures and each of the plurality of apertures is accommodated within a rib.

8. An attachment according to claim 7, wherein each rib comprises an end wall adjacent the airflow outlet.

9. An attachment according to claim 8, wherein the end wall is perpendicular to the direction of the length of the hair engaging member.

10. An attachment according to any of claims 7 to 9, wherein each one of the plurality of apertures is located within an end wall of a rib.

11. An attachment according to any preceding claim wherein the hair engaging member is moveable with respect to the casing.

12. An attachment according to claim 11, wherein the a hair engaging member, is moveable between a first position and a second position casing comprises an outer casing section and an inner casing section, and a ledge of the inner casing section is located between the hair engaging members.

13. An attachment according to any of claims 11 to 13, comprising a further airflow outlet between the casing and a second hair engaging member and wherein the further airflow outlet is shaped to direct air over an external surface of the second hair engaging member.

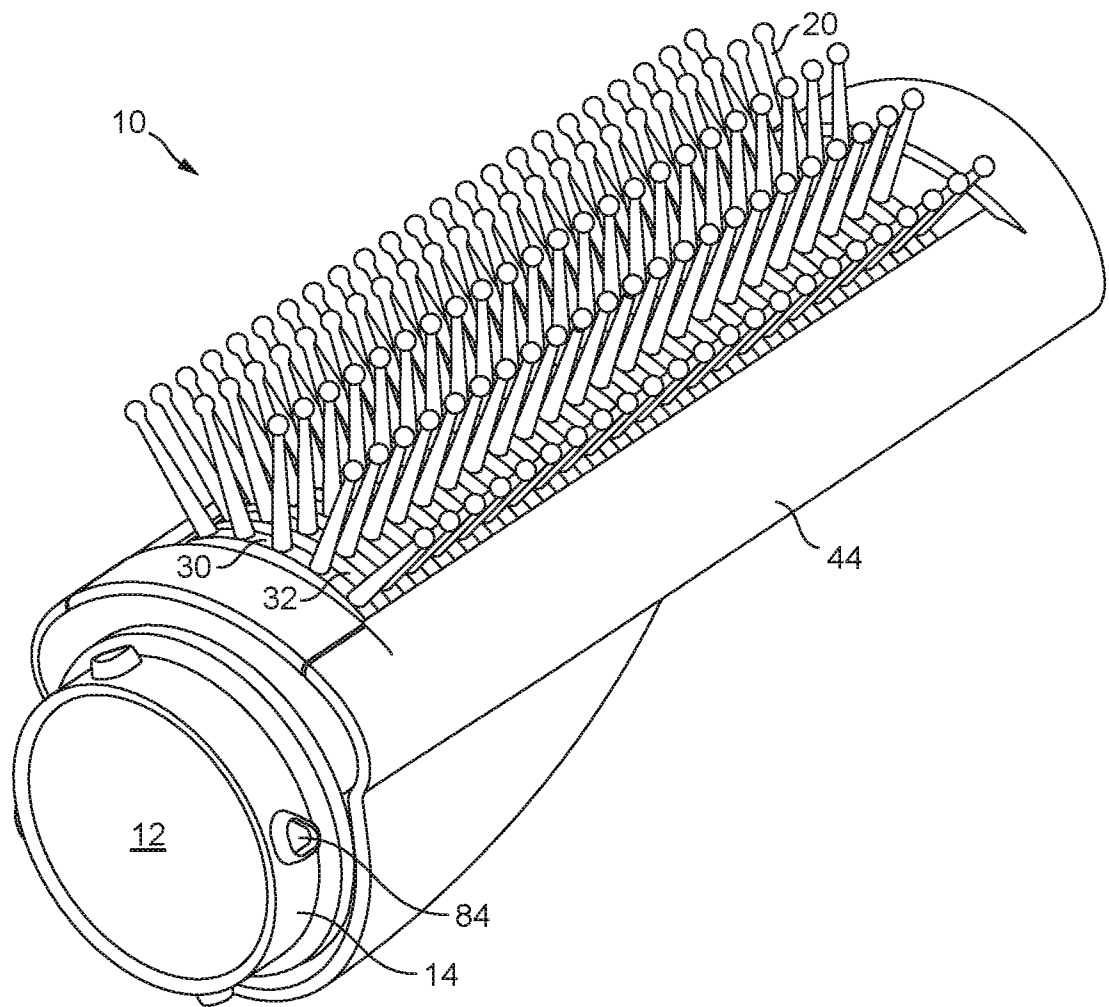


FIG. 1

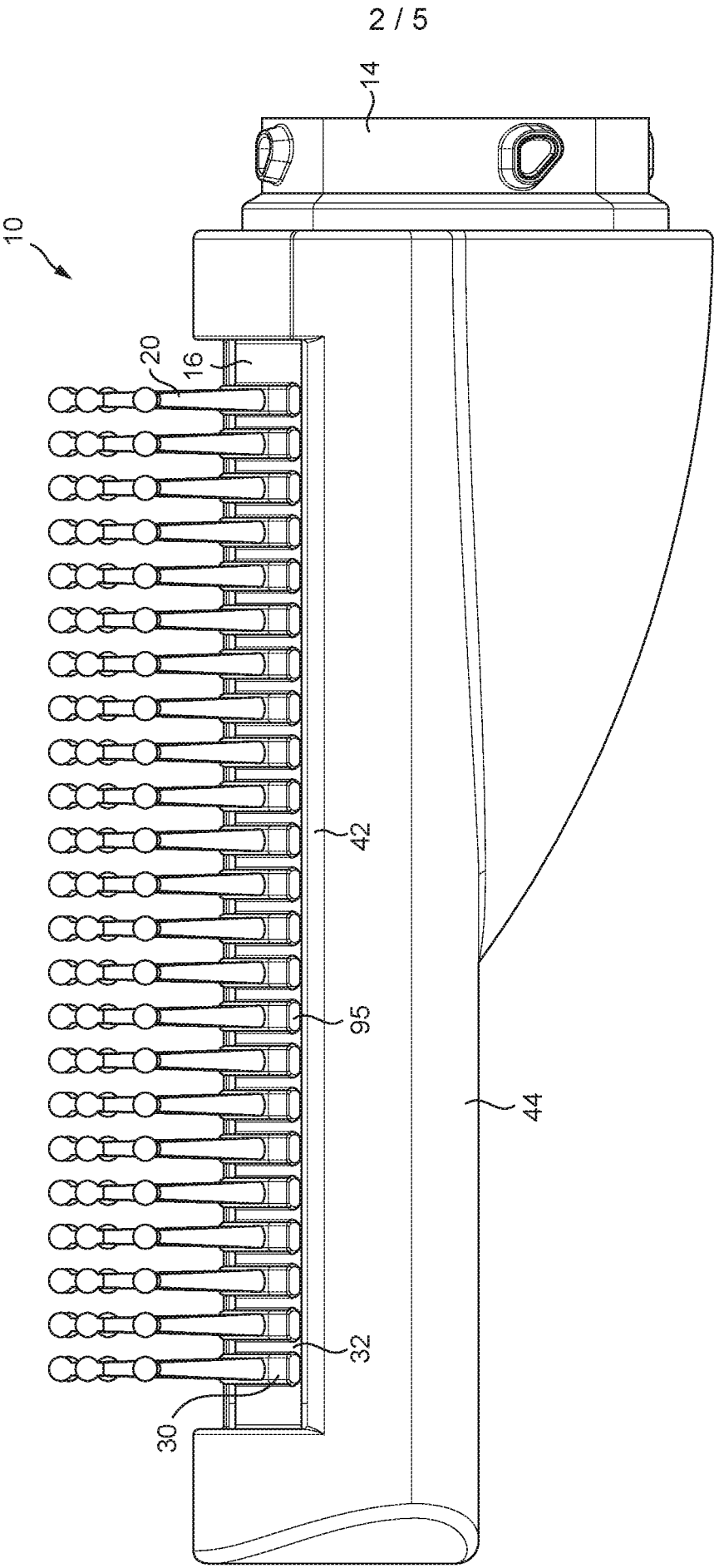


FIG. 2

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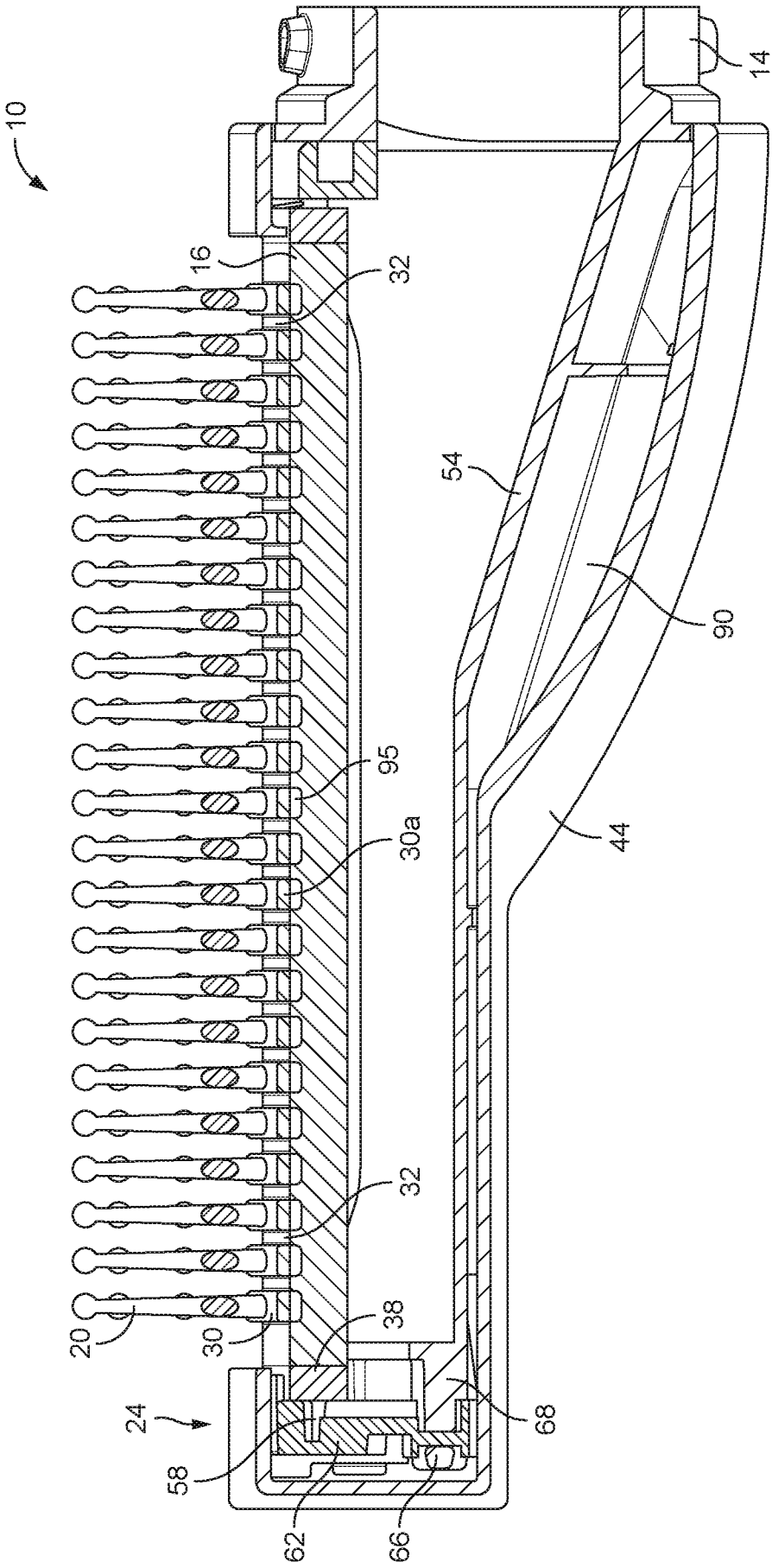


FIG. 3A

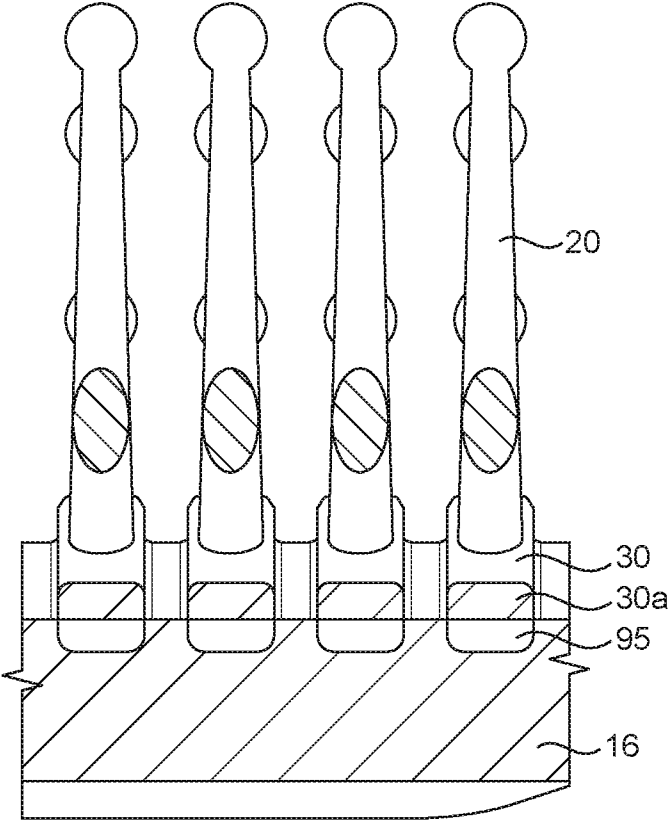


FIG. 3B

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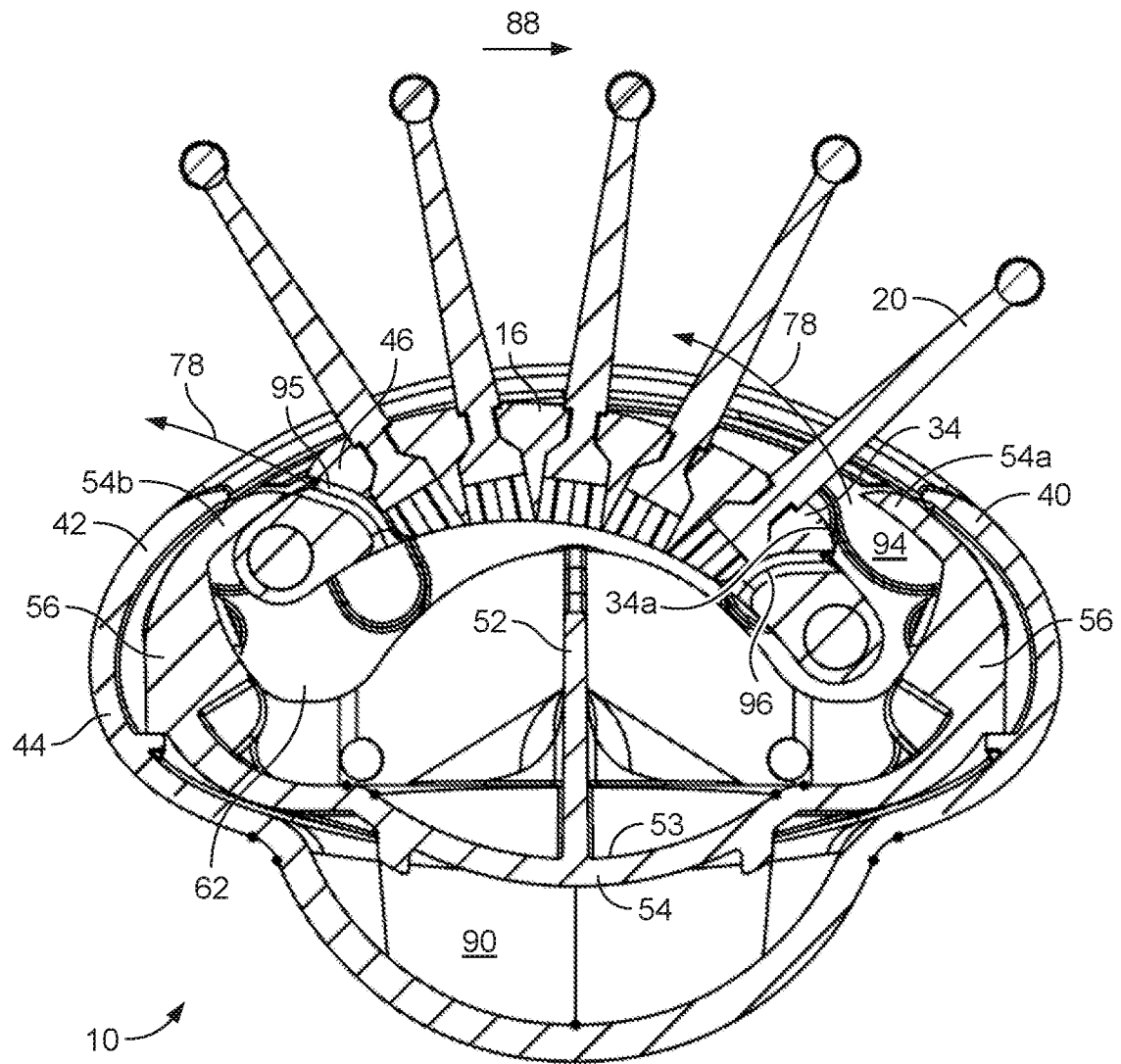


FIG. 4

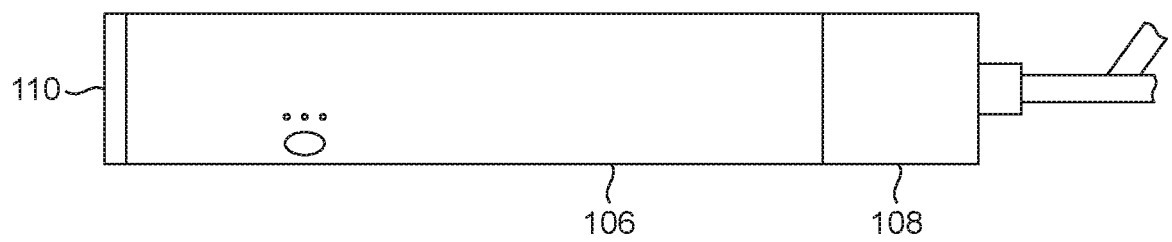


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2019/053165

A. CLASSIFICATION OF SUBJECT MATTER
INV. A45D20/12
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)
A45D

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	US 2017/273428 A1 (NICOLSON ANNMARIE RITA [GB] ET AL) 28 September 2017 (2017-09-28) the whole document	1-13
X	GB 2 539 431 A (DYSON TECHNOLOGY LTD [GB]) 21 December 2016 (2016-12-21) the whole document	1,6



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

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"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

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Date of the actual completion of the international search

17 December 2019

Date of mailing of the international search report

03/01/2020

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2019/053165

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