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(54) **NOZZLE**

(57) An attachment for a hair styling apparatus comprises an air inlet for receiving airflow from a hair styling apparatus, an air outlet, a duct for conveying air from the air inlet to the air outlet, at least one aperture in a wall of the duct, and a guiding wall within the duct and in proximity to the at least one aperture, wherein the guiding

wall forms a barrier at an upstream side of the at least one aperture. Cool ambient air is entrained through each aperture into the attachment by the heated airflow from the hair styling apparatus. The entrained airflow passes internally along the wall of the duct and functions to minimize the temperature of the wall.

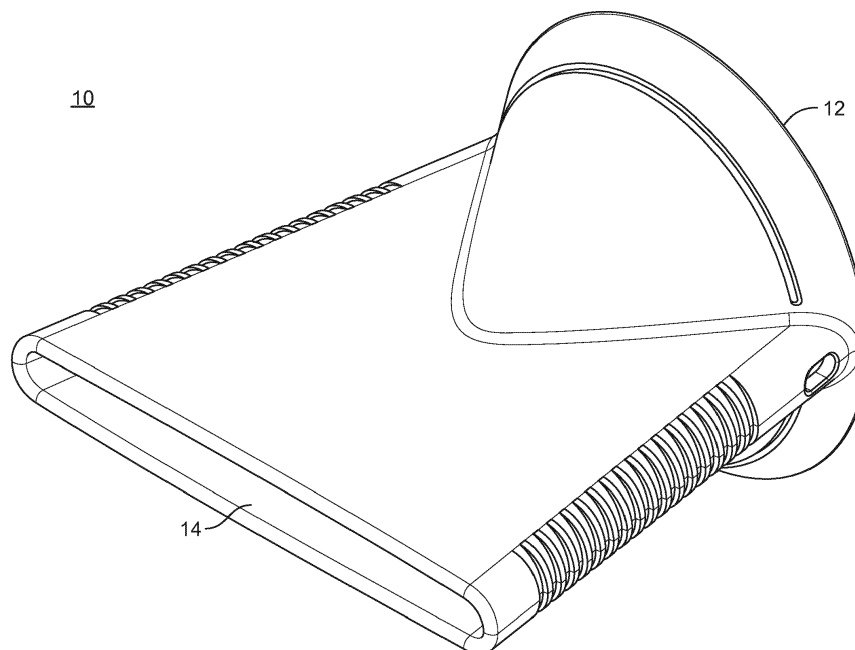


FIG. 1

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Description

[0001] The present invention relates to a nozzle for a hair dryer.

[0002] It is known to provide a hair dryer with one or more nozzles for selective attachment to the airflow outlet end of the hair dryer to modify the profile of the airflow emitted from the hair dryer. One form of nozzle, or attachment, is a concentrator, which serves to concentrate the airflow towards a selected portion of the user's hair for localized styling or drying. In general, a concentrator has a main body with a circular air inlet for receiving the airflow from the hair dryer, and a slot-shaped air outlet for emitting the airflow.

[0003] In a first aspect, the present invention provides an attachment for a hair styling apparatus comprising an air inlet for receiving airflow from a hair styling apparatus, an air outlet, a duct for conveying air from the air inlet to the air outlet, at least one aperture in a wall of the duct, and a guiding wall within the duct and in proximity to the at least one aperture, wherein the guiding wall forms a barrier at an upstream side of the at least one aperture.

[0004] Ambient air is entrained through each aperture into the attachment by the airflow from the hair styling apparatus. Where the airflow received from the hair styling apparatus is heated, the entrained airflow will be comparatively cool. Therefore, in use, the guiding wall divides a heated airflow passing along one side and a comparatively cool airflow passing along the other side.

[0005] Preferably, the air outlet is an elongate slot. The duct may further comprise a side wall extending from each end of the elongate air outlet slot towards the air inlet.

[0006] If the air outlet slot were inadvertently blocked or restricted during use of the attachment when attached to the hairdryer, then heated airflow can escape through the aperture(s), thereby reducing the build up of heat within the nozzle and, in particular, at the outlet slot. Therefore, the apertures may also be referred to as "bleed holes".

[0007] Each aperture is preferably positioned in each side wall and may have a rounded rectangular shape. Preferably, the aperture is approximately 3mm by 5mm.

[0008] The aperture may be a slot extending partially or wholly around the external surface of the duct. Preferably, the guiding wall extends downstream of the or each aperture for a distance of at least 5mm.

[0009] It is preferred that the elongate air outlet slot has dimensions of length, L, to height, H, in a ratio in the range of 13:1 to 15:1, and more preferably still, in a ratio of 14:1.

[0010] In a second aspect, the present invention provides an attachment for a hair styling apparatus comprising an air inlet for receiving airflow from the hair styling apparatus, an air outlet, and a duct for conveying air from the air inlet to the air outlet, wherein at least part of an external surface of the duct comprises an arrangement of tactile protrusions.

[0011] It is preferred that the air outlet is an elongate slot. The internal surfaces of the body are preferably shaped to form a slot-shaped opening at the air outlet end of the body to allow a user to direct the airflow emitted from the nozzle towards a selected portion of hair, for example a portion of hair wrapped around a brush for styling.

[0012] Preferably, the arrangement of tactile protrusions comprises a series of parallel, elongate ribs, each rib having a height, h, and a width, w, and a distance, d, between adjacent ribs.

[0013] The ribbed external surface of the nozzle provides a visual guide to the user as to where they should place their fingers when grasping the nozzle. Additionally, the series of protrusions provides thermal insulation consequent to the ambient air present in the ridges and the additional depth of the plastics material present in protrusions.

[0014] The height, h, of each rib is preferably in the range of 0.5mm to 2.5mm, and more preferably still in the range of 0.8mm to 1.2mm. The distance, d, between each rib is preferably in the range of 0.5mm to 2.5mm, and more preferably still in the range of 1.3mm to 1.7mm. The width, w, of each rib is preferably in the range of 0.5mm to 2.0mm, and more preferably still in the range of 0.8mm to 1.2mm.

[0015] Preferably, the attachment further comprises a side wall on each narrow edge of the duct, wherein each side wall extends from an end of the air outlet slot towards the air inlet. The arrangement of tactile protrusions may be disposed on an external surface of the side wall.

[0016] It is preferred that the air inlet is generally circular in shape. Further, the air inlet may comprise at least one slot and said slot may be annular.

[0017] 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 front perspective view, from above, of a nozzle;

Figure 2 is a rear perspective, from above, of the nozzle;

Figure 3a is a top view of the nozzle;

Figure 3b schematically shows an enlarged portion of the top view of the nozzle shown in Figure 3a;

Figure 4 is a side view of the nozzle;

Figure 5 is a front view of the nozzle;

Figure 6 is a rear view of the nozzle;

Figure 7 schematically shows a cross-section through axis A-A of the nozzle as indicated in Figure 4;

Figure 8 schematically shows an enlarged portion of the cross-section shown in Figure 7, indicating air flow paths;

Figure 9 schematically shows a cross-section through axis B-B of the nozzle as indicated in Figure 4;

Figure 10 schematically shows an annular magnet of the nozzle; and

Figure 11 is a front perspective view of an example of a hair dryer to which the nozzle may be connected.

Figures 1 to 6 are external views of a nozzle 10. The nozzle 10 comprises an air inlet 12 for receiving an airflow from an airflow outlet end of a hairdryer, and an air outlet 14 for emitting the airflow. The air inlet 12 is generally annular in shape, and is in the form of an annular slot 16 located at one end of the nozzle 10. The air outlet 14 is in the form of an elongate slot 18 located at the opposing end of the nozzle 10.

[0018] The nozzle comprises a body 20, and a bung 22 located partially within the body 20. The body 20 has a first portion 24 comprising the air inlet 12, and a second portion 26 comprising the air outlet. The first portion 24 is substantially conical in shape, and the second portion 26 has a flattened form and a cross-section which increases in area towards the air outlet 14. The first portion 24 and second portion 26 together comprise a single component without seams or joins. The air inlet end of the first portion 24 is generally circular in shape. The bung 22 has a generally cylindrical upstream section 28 and a generally conical downstream section 30, as illustrated in Figure 7. The generally conical downstream section 30 is located within the generally conical first portion 24 of the body, both orientated about the same longitudinal axis, X. Consequently, the air inlet 12 of the nozzle has an annular form and an annular airflow path extending between the first portion 24 of the body and the bung 22.

[0019] The second portion 26 of the body 20 comprises a first wall 32, and a second wall 34 opposing the first wall. Both the first wall 32 and the second wall 34 are generally planar and the distance between the first wall 32 and the second wall 34 is constant. Two smoothly curving minor walls 36, 38 join the first wall 32 and the second wall 34. With reference to Figure 3, the minor walls 36, 38 taper from the air inlet end 12 of the nozzle, outwardly, to the air outlet end 14 of the nozzle.

[0020] The second portion 26 of the body has an approximately rectangular cross-section. The elongate slot form of the air outlet has a length, L, of between 50mm and 90mm and preferably around 70mm, and a height, H, of between 3mm and 7mm and preferably around 5mm. The cross-sectional area of the second portion 26 is greatest at the air outlet 18 of the second portion 26. The cross-section of the air outlet 18 of the second portion

26 of the body 20 has a length (L) to height (H) ratio of between 13:1 to 15:1, and preferably 14:1.

[0021] An external face of each minor wall 36, 38 has a series of ribs extending partially along the length of each minor wall. Each rib 40 is approximately 0.5mm to 2.0mm in width, w, and preferably approximately 1mm in width. A gap between each rib is approximately 0.5mm to 2.5mm in distance, d, and preferably approximately 1.5mm in distance. Each rib 40 is approximately 0.5mm to 3mm in height, h, and preferably approximately 1mm in height. A profile of the series of ribs along each of the minor walls, as shown in Figures 3a and 3b, is castellated. The profile of each rib may be squared or rounded. Each rib 40 has a length of similar dimension to the external height of the minor wall upon which it is disposed and each rib may taper in height, h, towards each end of said rib 40.

[0022] An aperture 42 is located in each minor wall 36, 38 in proximity to the air inlet 12. In the illustrated embodiment, the aperture 42 has a generally rounded rectangle shape and is approximately 5mm by 3mm. The longer dimension of the aperture is parallel to the length of the minor walls. As shown in Figures 7, an internal guiding wall 44 is disposed in proximity to each aperture 42 within the body 20. Each guiding wall 44 extends between the first wall 32 and the second wall 34 of the second portion 26 of the body, and extends for approximately 10mm to 15mm downstream from each aperture 42.

[0023] Referring to Figure 7, the bung 22 may comprise at least one fin 46 extending from the external surface of the bung 22 such that the at least one fin 46 is in a common orientation with the flattened second portion 26 of the body. Such a fin directs airflow towards the airflow outlet and minimises turbulence of the airflow at the junction between the first portion 24 of the body 20 and the second portion 26 of the body 20. The at least one fin 46 may have an aerofoil form 48 in cross-section tapering to a planar distal section 50, as shown in Figure 5. In the embodiment illustrated, the fin 46 is divided in two sections.

[0024] The outer surface of the downstream section 30 of the bung 22, whilst having a generally conical profile, may have minor concave or convex variations. The outer surface of the downstream section 30 of the bung 22 may have the same profile as the inner surface of the first portion 24 of the body. The external surface of the body may not have the same profile as the inner surface of the body, in particular around the interface between the first portion and second portion of the body. For example, the inner surface of the body may have a blended curve profile at the junction between the first portion of the body and the second portion of the body 20, rather than the angular junction of the external surface. Such a blended curve profile of the inner surface of the body minimises any turbulence or recirculation of the airflow within the nozzle 10.

[0025] As seen in Figure 7, a retainer 52 is positioned approximately centrally within the body 20, at the apex

of the first portion 24 of the body. The retainer 52 is part of the moulding of the body 20. During assembly, a fastener 54, such as a screw, passes through a pre-formed hole in the axis of the bung 22 and into the retainer 52, thereby fixing the bung securely and centrally within the first portion 24 of the body 20. Furthermore, at least one strut 56 projects from an internal surface of the first portion 24 of the body 20 in order to connect with the outer surface of the bung 22. This connection functions to support the bung within the body in the correct position and may be secured via ultrasonic welding or an adhesive. Where a receiving slot 58 is formed in the external surface of the bung 22 to receive each strut 56, stability of the bung within the body is further increased. Two struts 56 projecting from opposing sides of the internal surface of the body 20 can be seen in Figures 6 and 9.

[0026] In the embodiment of the nozzle illustrated in Figures 1 to 9, an upstream end of the bung 22 protrudes from the first section 24 of the body. The circular upstream end of the first section 24 of the body comprises a planar face 60. The planar face 60 comprises an attachment means for attaching the nozzle 10 to a hairdryer. Such attachment means may comprise, for example, magnetic components or a push-fit arrangement.

[0027] In use, airflow emitted from the hairdryer passes into the air inlet 12 of the nozzle 10 and through the flow path between the bung and the first portion of the body. The airflow subsequently passes through the second portion of the nozzle 10 and is emitted at the air outlet 14. Where the airflow emitted from the hairdryer is hot, heat transfer causes the temperature of the nozzle to increase, potentially making the external surface of the nozzle uncomfortably hot to the touch for the user. By placing their fingers on the series of ribs on each of the minor walls of the body, the temperature experienced by the user is minimised. Firstly, this is consequent to the series of protrusions providing thermal insulation via the ambient air present in the ridges and the additional depth of the plastics material present in each protrusion 40. Secondly, airflow emitted from the hairdryer and passing through the nozzle 10, entrains cool ambient air through the aperture 42 in each minor wall 36, 38. Consequently, as illustrated schematically in Figure 8, an internal airflow path 62 of entrained air extends from each aperture 42 to the air outlet 14. The guiding wall 44 separates the entrained airflow 62 from the heated airflow 64 in proximity to the aperture 42, and directs the entrained airflow along the internal surface of the respective minor wall. This airflow reduces the temperature of the nozzle along each minor wall, thereby making the nozzle more comfortable for the user to grasp by the external surface of the minor walls 36, 38.

[0028] A further noted effect of the entrained airflow 62 is that the heated airflow 64 is urged to exit the elongate outlet slot 18 at an angle of divergence which is greater than the exit angle in the absence of the entrained airflow 62. Furthermore, positioning the aperture 42 in a wall (such as the minor walls 36, 38 in the present embodi-

ment) which forms at least part of a restricted duct, advantageously channels the cool, entrained airflow within the restricted duct.

[0029] The attachment means for attaching the nozzle 10 to a hairdryer may use attractive magnetic forces and Figure 10 schematically illustrates an annular magnetic component 66 that is located in the upstream end face of the nozzle. The magnetic component 66 is charged with regularly spaced, alternating magnetic poles. In a preferred embodiment, 24 alternating poles are used; 12 positive and 12 negative. In use, this functions to increase the strength of the attachment between the hairdryer and the nozzle. It is also envisaged that other numbers of alternating poles may be used and that the poles may be irregularly spaced.

[0030] An example of a hair dryer 68 to which the nozzle may be attached is illustrated in Figure 11. Such a hair dryer is described in WO2015/001306, the contents of which are incorporated herein by reference, in which a hot airflow is emitted from an annular slot 70 located at the air outlet end of the hair dryer. The annular slot extends around a bore 72 of the hair dryer. The emitted hot airflow passes through the annular air inlet of the nozzle to enter the body of the nozzle.

[0031] In an alternative embodiment, a nozzle comprises a circular upstream end for attaching to a hairdryer and does not comprise a bung. Such a nozzle may be attached to a hairdryer comprising a circular air outlet.

[0032] As an alternative to providing an air inlet in the form of an annular slot, the nozzle may comprise a plurality of curved, slot-shaped air inlets, or a plurality of circular air inlets, arranged in a circular pattern in the air inlet end of the nozzle.

[0033] In an alternative embodiment, the external face of each of the minor walls may have a pattern of insulating protrusions of various forms, such as, circular, triangular, or ring shaped. The pattern of insulating protrusions may extend at least partially or completely along the length of each minor wall, downstream of each aperture.

[0034] The aperture(s) may be positioned upstream of any portion of the nozzle requiring a reduction in temperature. The aperture may be a slot which extends partially or substantially around an entire circumference of the first portion or second portion of the body. The aperture could alternatively extend along the V-shaped interface between the first portion and second portion of the body. A guiding wall is located upstream of, and in proximity to, the aperture, serving to block airflow upstream of the slot and to guide airflow downstream of the aperture. Where the aperture is a slot extending substantially around the nozzle, structural integrity of the nozzle may be maintained by the guiding wall or regularly positioned joins across the aperture.

[0035] Where the aperture is a slot extending substantially around the nozzle, a pattern of insulating protrusions on the external surface of the body may also extend around the nozzle, downstream of the slot.

[0036] In an alternative embodiment, the magnetic

component in the upstream terminal end of the nozzle may be composed of magnetisable material, and the co-operating magnetic component in the outlet end of the hairdryer may comprise one or magnets in an annular form.

[0037] The invention is not limited to the detailed description given above. Variations will be apparent to the person skilled in the art.

10. An attachment according to claim 9, wherein the elongate air outlet slot has dimensions of length, L, to height, H, in a ratio of 14:1.

Claims

1. An attachment for a hair styling apparatus comprising:
 - an air inlet for receiving airflow from a hair styling apparatus;
 - an air outlet;
 - a duct for conveying air from the air inlet to the air outlet;
 - at least one aperture in a wall of the duct and located proximal to the air inlet; and
 - a guiding wall within the duct and in proximity to the at least one aperture,
 - wherein the guiding wall forms a barrier at an upstream side of the at least one aperture and extends downstream of the aperture for a distance in the range of 5mm to 15mm.
2. An attachment according to claim 1, wherein the air outlet is an elongate slot.
3. An attachment according to claim 2, further comprising a side wall of the duct extending from each end of the elongate air outlet slot towards the air inlet.
4. An attachment according to claim 3, wherein the aperture is positioned in each side wall.
5. An attachment according to any preceding claim, wherein the aperture has a rounded rectangular shape.
6. An attachment according to claim 5, wherein the aperture is approximately 3mm by 5mm.
7. An attachment according to either of claims 1 or 2, wherein the aperture is a slot extending partially around the external surface of the duct.
8. An attachment according to either of claims 1 or 2, wherein the aperture is a slot extending around the external surface of the duct.
9. An attachment according to claim 1, wherein the elongate air outlet slot has dimensions of length, L, to height, H, in a ratio in the range of 13:1 to 15:1.

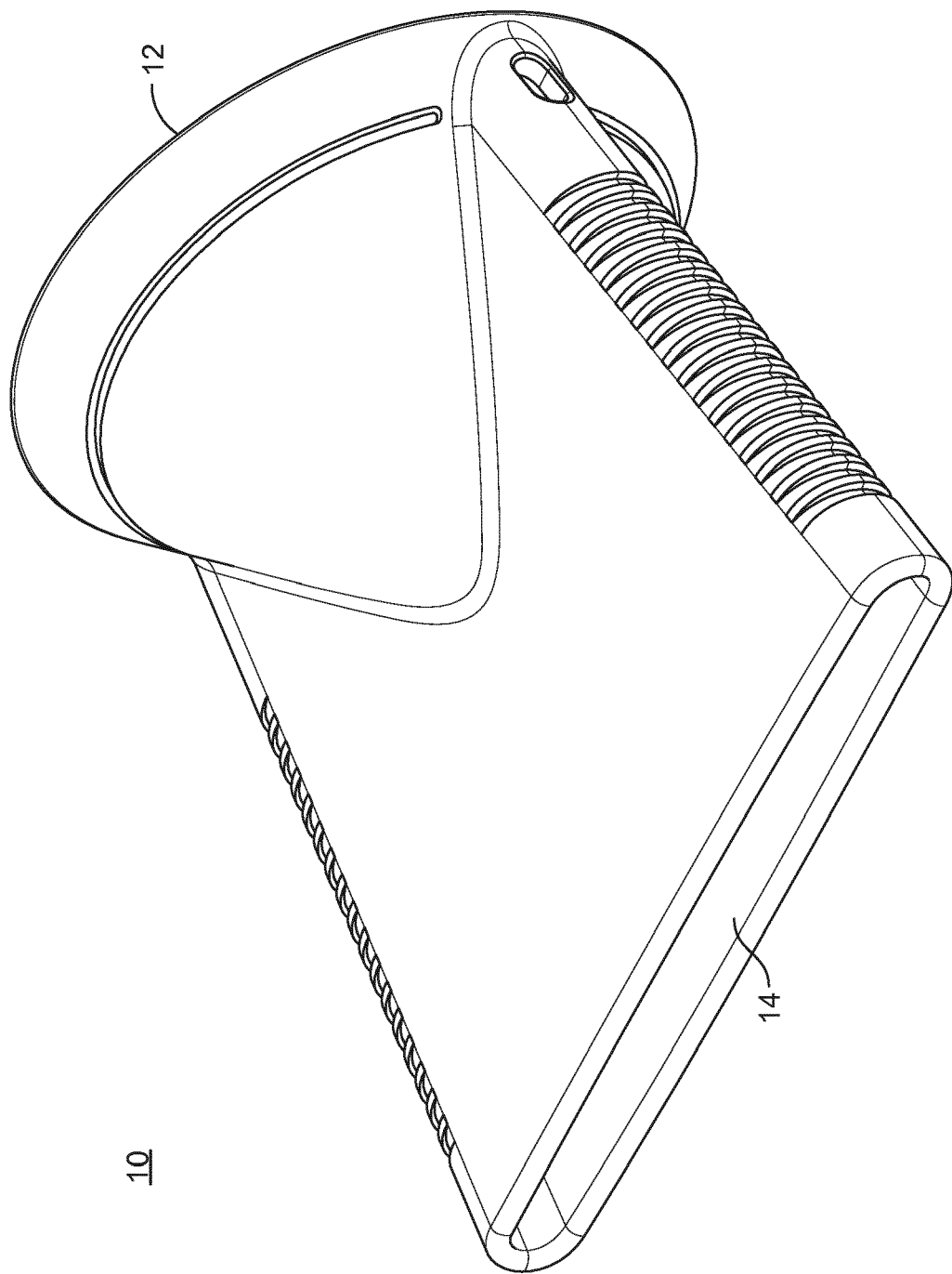


FIG. 1

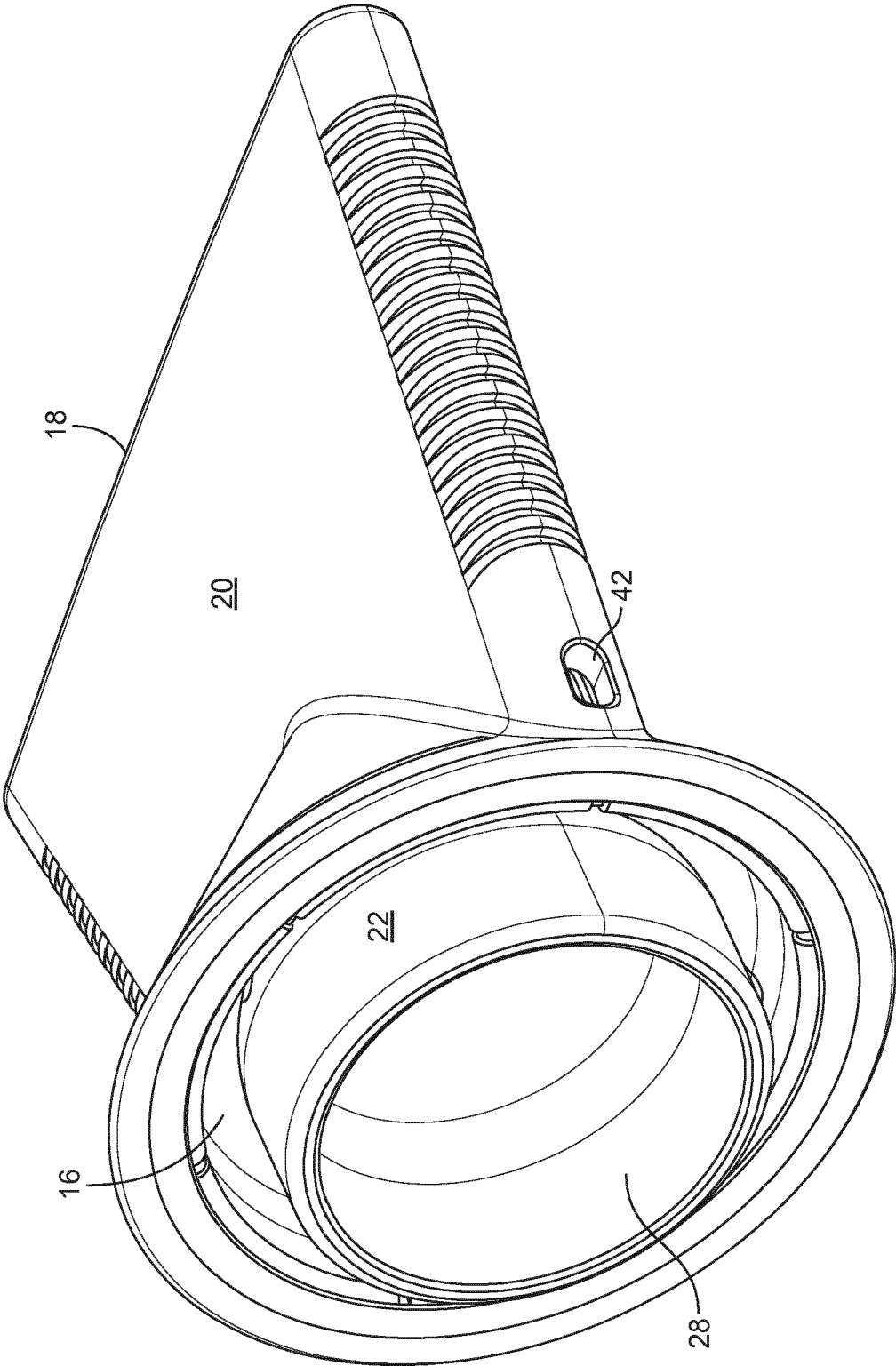
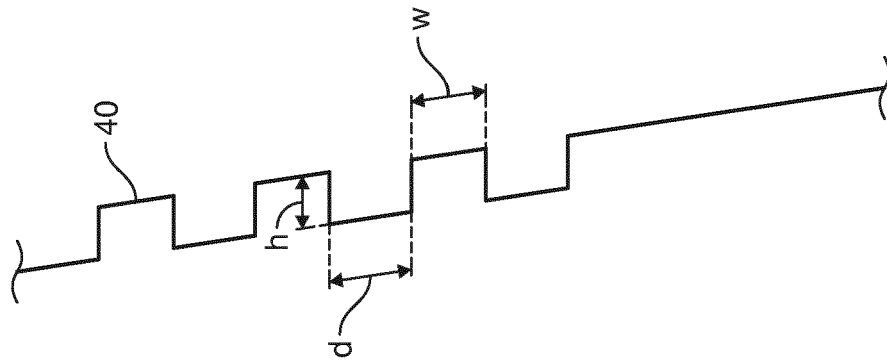
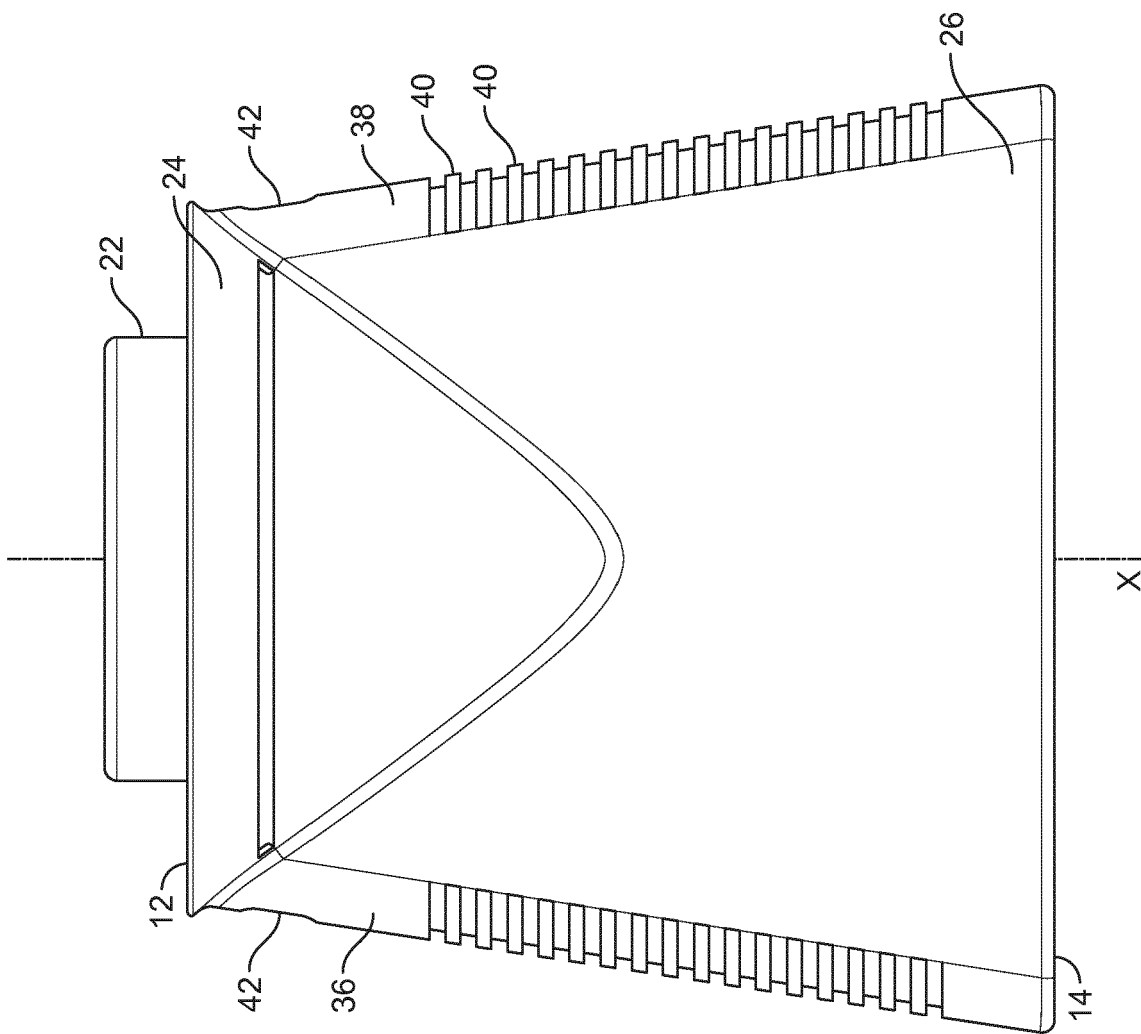


FIG. 2



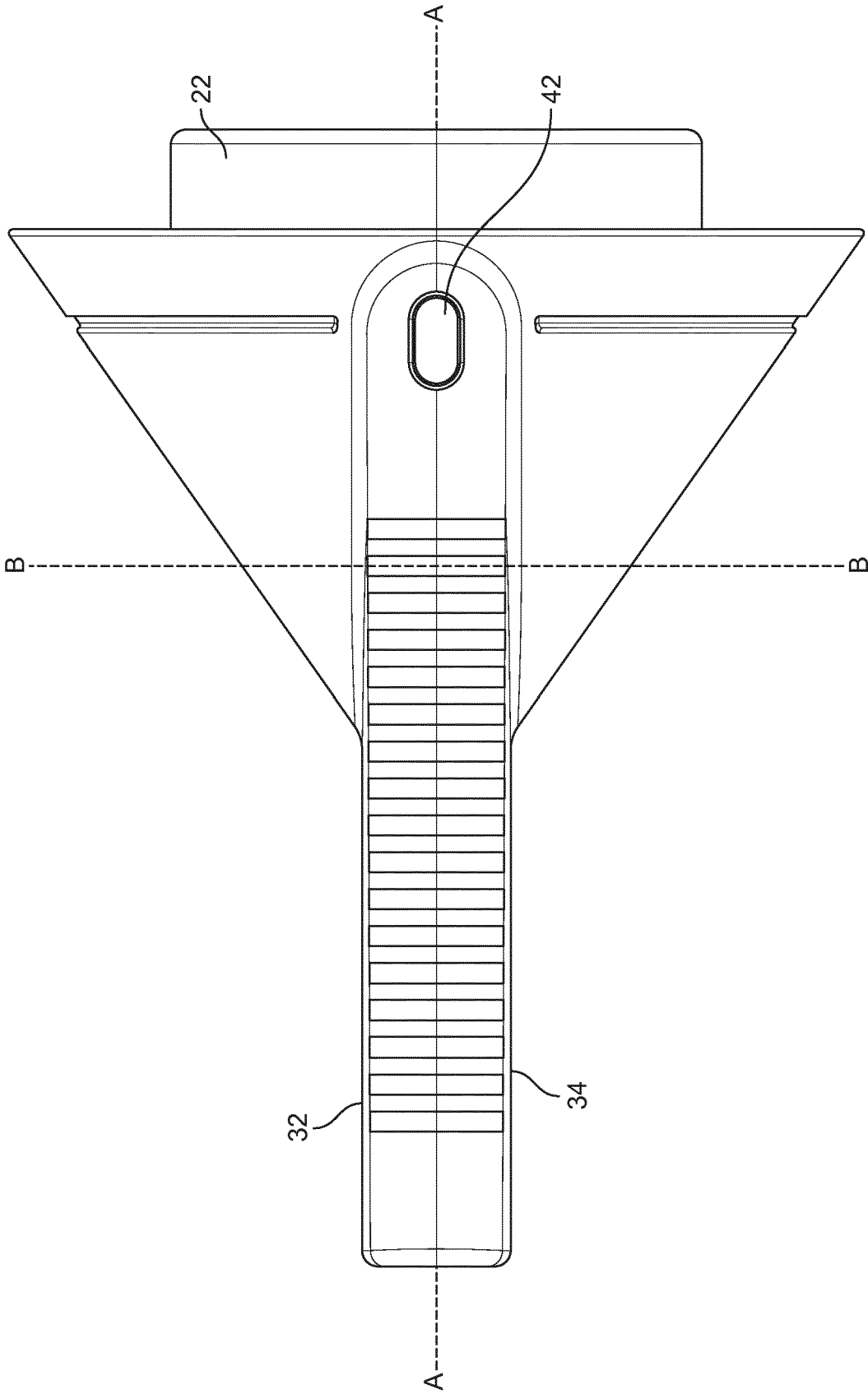


FIG. 4

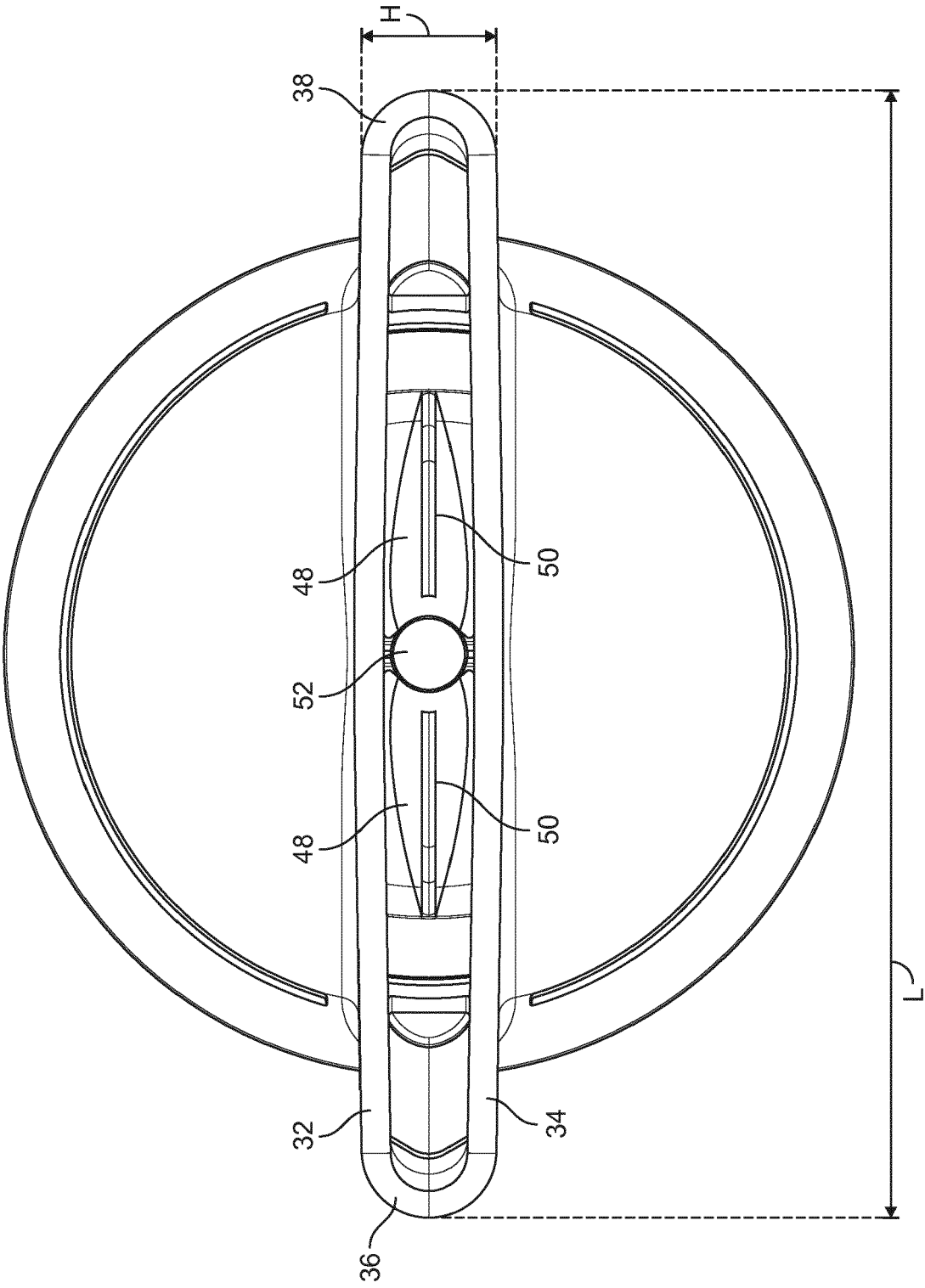


FIG. 5

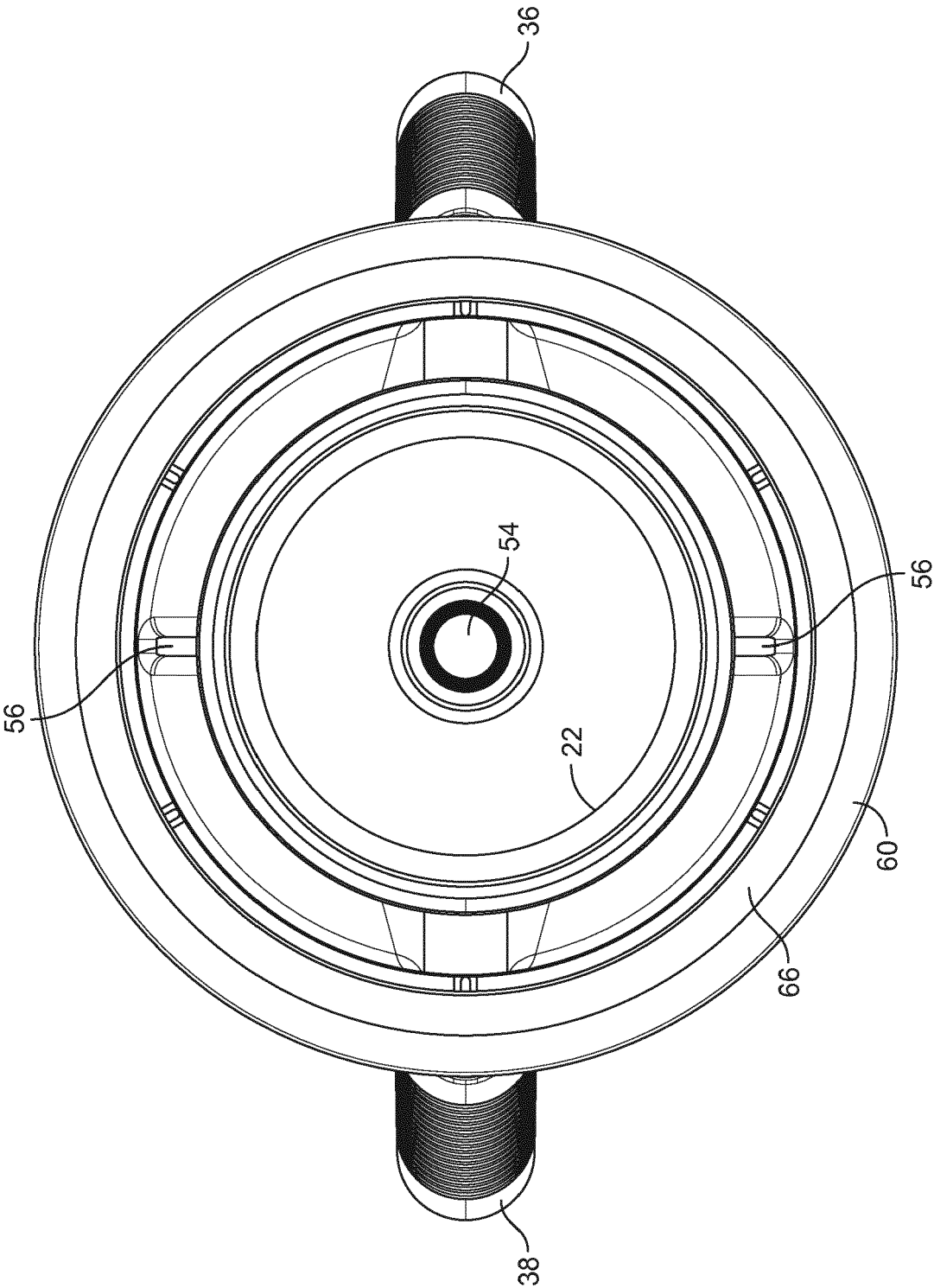


FIG. 6

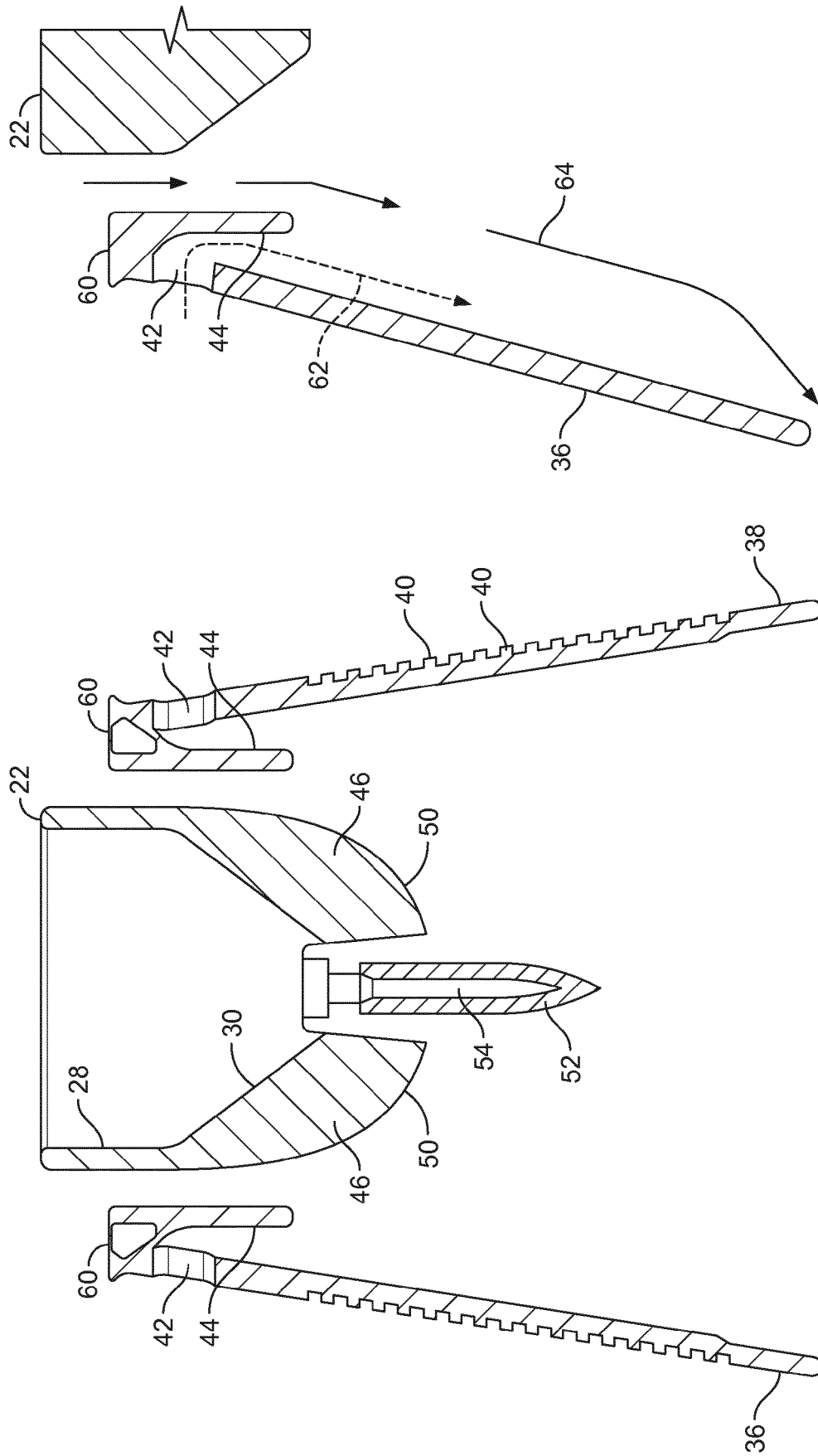


FIG. 8

FIG. 7

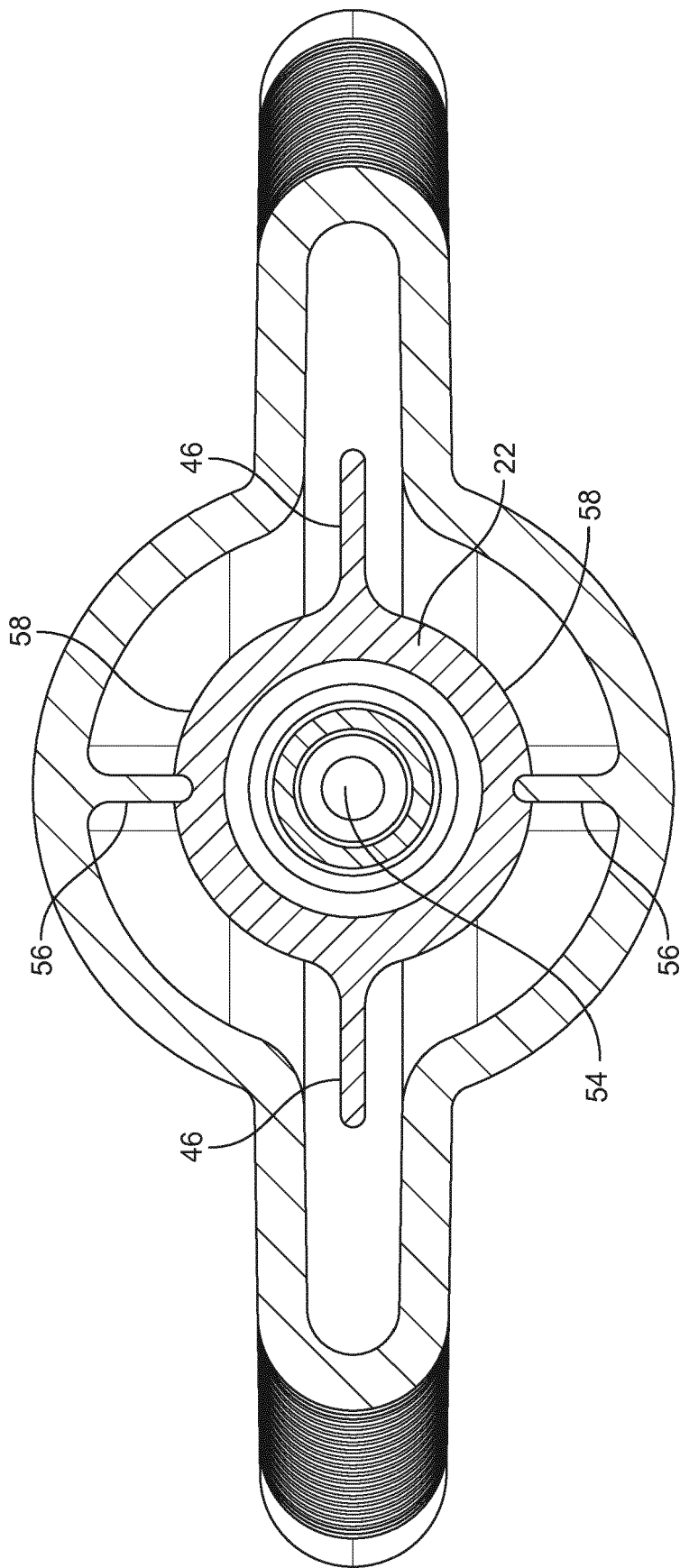


FIG. 9

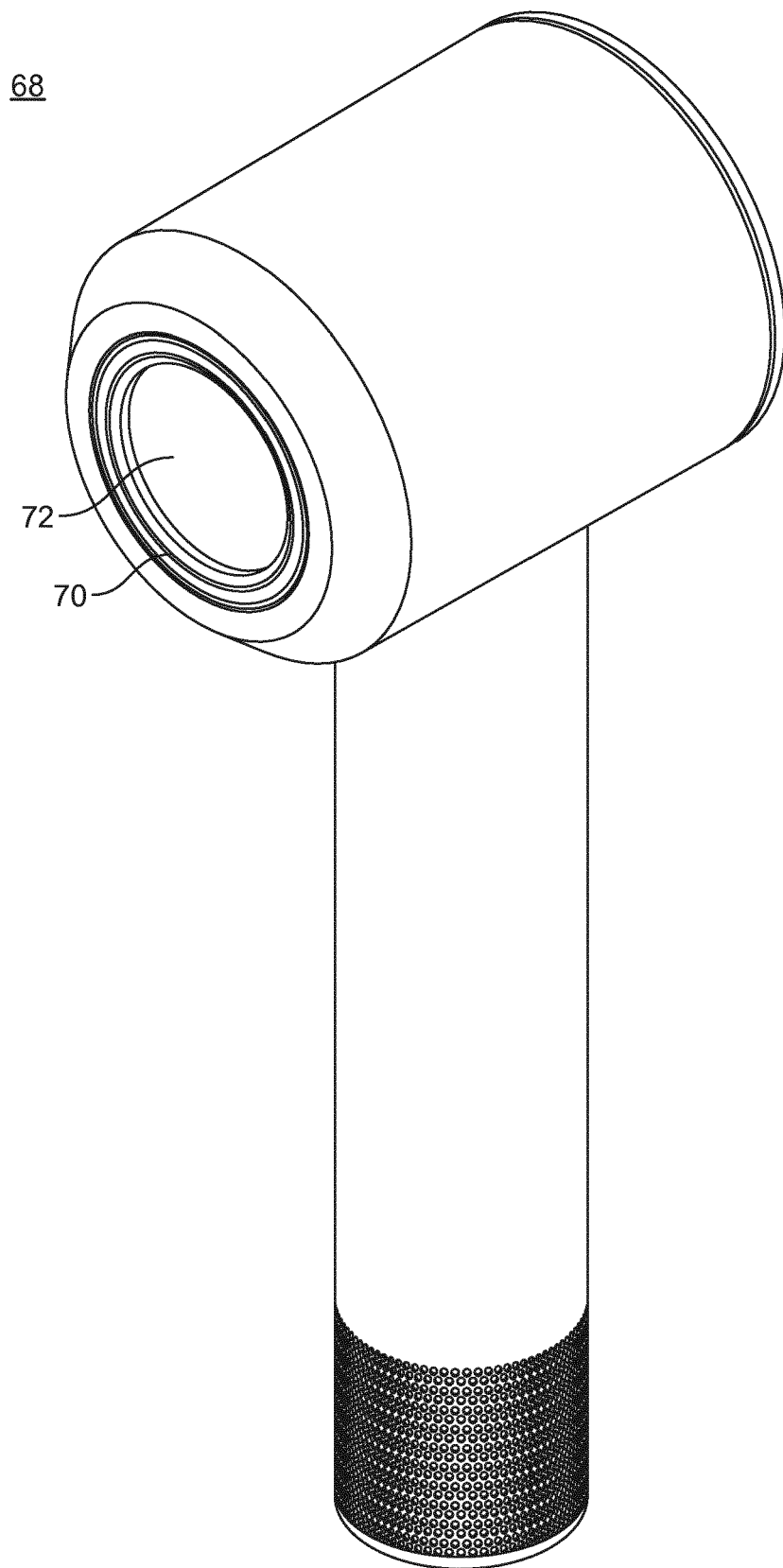


FIG. 11



EUROPEAN SEARCH REPORT

Application Number
EP 18 19 0006

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X	US 2004/163274 A1 (ANDREW MICHAEL A [US] ET AL) 26 August 2004 (2004-08-26) * paragraphs [0036] - [0044]; figures 1-7 *	1-10	INV. A45D20/12
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 January 2019	Examiner Ionescu, C
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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