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(30) Priority: 09.05.2005 US 124813	
(71) Applicant: Wahl Clipper Corporation Sterling, IL 61081 (US)	

(54) **Hair dryer attachment with axial and radial flow**

(57) A hair dryer attachment (30) is provided for use with a hand held hair dryer (10) having a barrel (20) with an outlet (22). The attachment has a substantially tubular body (50) with a perforated sidewall (52) having a generally uniform diameter. A first end of the attachment is

configured for receiving the barrel (40), and a second end having an outlet (58) is configured for dispensing air flow from the dryer. There are a plurality of openings (54) along the length of said sidewall which are configured for permitting the radial ingress and egress of air flow to and from the attachment.

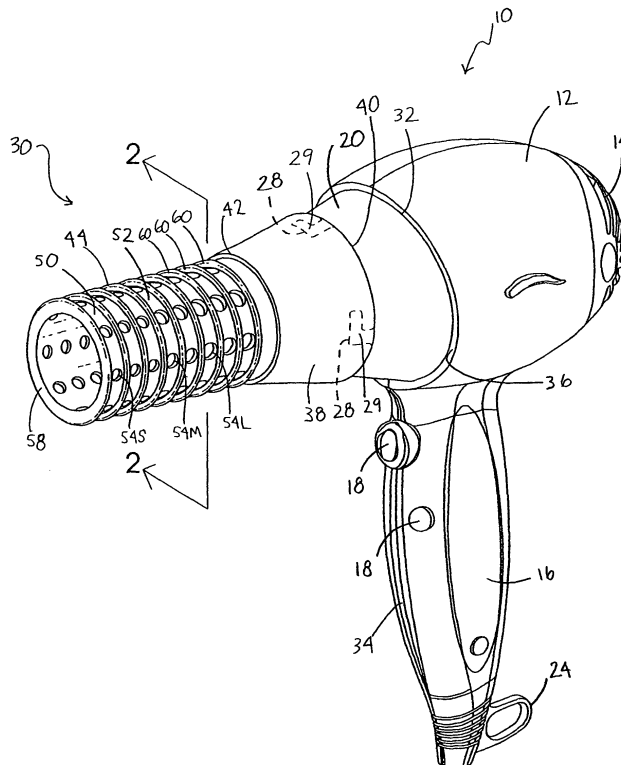


Fig.1

Description

[0001] The present invention relates to hair styling devices, and particularly to hand held hair dryers of the type designed for use with attachments for altering the flow of air from the barrel of a hand held dryer.

[0002] Hand held dryers are well known for use in styling hair and are commonly used by both individuals and professional hair stylists. It is common for such dryers to be provided with styling attachments, such as, but not limited to, combs for combing the hair while drying, diffusers for diffusing or dissipating the flow of air from the dryer barrel outlet to reduce the velocity of the dryer outlet air and spread the air over a larger surface area, and concentrators for concentrating and/or increasing the velocity of the air dispensed from the dryer barrel outlet.

[0003] When the user or stylist desires to employ an attachment, the attachment is typically pressed onto the end of the dryer barrel and temporarily held there with a friction fit, or clipped onto the end of the barrel. U.S. Patent No. 6,775,922 to Langley et al., incorporated by reference herein, discloses a fastening mechanism providing engagement formations on the barrel and complementary formations on the apron of the attachment.

[0004] Once the attachment is secured onto the hand held dryer, the dryer can be turned on and air flows from the dryer, through the attachment, and out the outlet. When the flow of air at the outlet of the attachment is impeded or blocked, such as when the outlet is positioned adjacent the scalp, the hand held dryer can overheat causing the motor to cut out. Dryer overheating occurs when insufficient air flow escapes the attachment and backpressure builds up inside the dryer.

[0005] In the diffuser attachment disclosed in U.S. Patent No. 4,848,007 to Montagnino, to prevent dryer overheating, exhaust slots are provided for dispensing hot air when the diffuser is turned off and for introducing cool air when the diffuser is turned on. However, although the slots are used to prevent overheating of the dryer, air flow into the slots and out of the slots is not utilized for hair drying purposes. The ingress and egress of air is concentrated at a small portion of the diffuser. That is, the air ingress and egress at the slots is uneven along the sidewall and is not utilized for radial, even drying of hair, but merely for introducing cooler air into the hot diffuser, or exhausting hot air when the diffuser is off.

[0006] In a known aeration barrel disclosed in U.S. Patent No. 6,775,922 to Langley et al., the attachment has a plurality of holes and a blocked outlet end. While the holes of the aeration barrel allow the air to escape the attachment during operation of the dryer, which prevents the dryer from overheating, the radial air flow dispensed through the holes is too powerful for even drying of the hair when the attachment is used with a professional model dryer. Although the configuration provides air flow over the length of the attachment, the large amount of air emitted from the holes can significantly disturb the hairstyle.

[0007] Thus, there is a need for an attachment for a hand held hair dryer which prevents dryer overheating when air flow is impeded at the outlet, but which preferably also enables even drying of the hair at locations along the length of the attachment.

[0008] Accordingly, in a first aspect of the present invention, a hair dryer attachment for use with a hand held hair dryer having a barrel with an outlet is provided. The attachment has a substantially tubular body with a perforated sidewall having a generally uniform diameter. A first end of the attachment is configured for receiving the barrel, and a second end has an outlet configured for dispensing air flow from the dryer. There are preferably a plurality of openings along the length of the sidewall which are configured for permitting the radial ingress and egress of air flow to and from the attachment depending on if there is a low pressure differential or a high pressure differential in the attachment, respectively.

[0009] In a second aspect of the present invention, an aeration barrel attachment for use with a hand held hair dryer having a barrel with an outlet is provided, wherein the attachment has a substantially tubular body. The tubular body has a perforated sidewall having a generally uniform diameter with openings. A first end of the attachment is configured to receive the barrel, and an outlet is configured for dispensing of air flow. The attachment is configured such that when the outlet is substantially impeded, at least a portion of the air flowing into the attachment from the hand held dryer flows radially outward through the openings, and when the outlet is not substantially impeded, air flows radially inward through the openings and out the outlet.

[0010] A third aspect of the present invention is a combination of a hand held hair dryer and an attachment. The hair dryer includes a housing and a generally tapered barrel with an outlet, the barrel being provided with at least one engagement formation for retaining the attachment thereto. On the attachment, at least one complementary formation is provided for releasably engaging the corresponding engagement formation for releasably locking the attachment to the barrel. In the preferred embodiment, complementary formation is disposed on an apron of the corresponding attachment, and the apron is generally flared and configured for being supported by the barrel between the at least one engagement formation and the outlet. The engagement formation is enclosed by an enclosure structure.

[0011] The invention will now be described in more detail by way of example only with reference to the accompanying drawings, wherein:

FIG. 1 is a top perspective view of a hair dryer provided with the present attachment;

FIG. 2 is a vertical section taken along the line 2-2 of FIG. 1 and in the direction indicated;

FIG. 3 is a top perspective view of the barrel attachment of FIG. 1; and

FIG. 4 is a side view of the attachment of FIG. 1 used

in an axial orientation towards a user's head;

[0012] Referring now to FIGs. 1 and 2, a hand held hair dryer suitable for use with the present attachment is generally designated 10, and includes a housing 12 with an air intake 14, a handle 16, at least one switch 18 for controlling heat and/or fan speed as is known in the art, and a barrel 20 having an outlet 22. It is contemplated that the number and disposition of the switches 18 may vary to suit the application as is known in the art. Also, the barrel 20 is contemplated as preferably being generally cylindrical or ovate when viewed head on, and/or slightly tapered as is common in the art. Other barrel shapes are contemplated depending on the application. If desired, a hanging loop 24 may be provided for suspending the dryer 10 when not in use. Also, it is to be understood that the dryer 10 is provided with a fan, heating element, wiring and other internal components typically found in such products.

[0013] The dryer 10 is provided with an aeration barrel attachment, generally designated 30. The attachment 30 is releasably attachable to the barrel 20 and has a releasable locking arrangement which positively locates the attachment on the barrel to provide adequate support and to prevent unwanted disengagement of the attachment from the dryer 10. The releasable locking arrangement is disclosed in U.S. Patent No. 6,775,922 to Langley et al., herein incorporated by reference.

[0014] To provide the desired releasable locking engagement between the barrel 20 and the attachment 30, the present system includes a fastening system including at least one engagement formation 26 on the barrel 20 for retaining a styling attachment thereto and a corresponding at least one complementary formation 28 on the attachment 30. In the preferred embodiment, the engagement formations 26 are radially extending lugs, and the complementary formations 28 are "J"-shaped bayonet-type notches or recesses disposed on an apron 38 of the attachment. Thus, a bayonet-lug attachment arrangement is provided, as is known in the mechanical arts.

[0015] In the preferred embodiment, there are four engagement formations 26 positioned at approximate 90-degree increments around the barrel 20 and aligned on a common plane, however the number and spacing of the formations 26, 28 may vary to suit the application. With the preferred arrangement, the attachment 30 may be positioned upon the dryer 10 in one of four orientations.

[0016] In the locking arrangement of the present invention, the complementary formation 28 encloses the engagement formation 26 with an enclosure structure 29. The enclosure structure 29 is preferably flush with the outside of the attachment 30 and extends over the notch of the complementary formation 28. In this configuration, the enclosure structure 29 strengthens the complementary formation 28 to prevent accidental deformation of the notch.

[0017] Another feature of the present invention is that the barrel 20 of the dryer 10 is relatively short compared to conventional or "standard-size" dryers used by professional stylists and/or individuals. The length of the barrel 20 is measured from a first end 32 beginning at a general vertical line defined by a front edge 34 of the handle 16, and in the present dryer 10 is also represented by an optional ornamental shoulder 36 on the housing 12, and the outlet 22. It will be seen that the attachment 30 forms a part of the overall barrel of the dryer 10, and as such shortens the working length of the dryer while providing a variety of styling alternatives.

[0018] The apron 38 is generally flared, having a larger diameter at a first end 40 than a second end 42 which is adjacent a working portion 44 of the attachment 30. Also, the complementary formations 28 are located closely adjacent the first end 40. The apron 38 is configured for being supported by the barrel 20 between the engagement formations 26 and the outlet 22. As such, the apron 38 is slidably and rotatably engageable on the barrel 20 for easy installation and removal by the user. At the same time, the apron 38 is intended to be positively located on the barrel 20.

[0019] In addition to the engaging formations 26, 28 and the physical support provided by the close proximity of the barrel 20 to the apron 38 (best seen in FIG. 2), the apron 38 also optionally locates the outlet 22 in a positive and consistent manner. This location is obtained with an optional stop 46, which in the preferred embodiment is a shoulder formed by the apron 38 as it is attached to the working portion 44.

[0020] Referring now to FIGs. 1-4, the attachment 30 is referred to as an aeration barrel attachment having a substantially tubular body 50 provided with a perforated sidewall 52 of generally constant diameter with rows of openings 54. The first end 38 of the attachment 30, also referred to as the apron, receives the barrel 20, and an outlet end 58 is configured to dispense the axial air flow. In addition, the attachment 30 is preferably provided with a plurality of axially spaced, radially projecting annular ribs 60 which are secured to, or integrally formed with the sidewall 52. The rows of preferably generally circular openings 54 are preferably disposed on the sidewall between the annular ribs 60.

[0021] Referring now to FIG. 2, when the hand held dryer 10 is positioned such that air flow is not significantly impeded at the outlet end 58, the air travels through the barrel 20 of the dryer and is constricted as it enters the attachment 30. When the air flow enters an area of constriction, its velocity increases and the pressure within the constriction drops. This is known as a Venturi effect. The localized area of low pressure within the constriction (i.e. the attachment 30) causes the ambient air to move from high pressure to low pressure, that is, the air flows from outside the sidewall 52 through the openings 54 and into the attachment 30 where it combines with the air from the dryer and exits out the outlet end 58. Since additional air flow is introduced to the system through the

sidewall 52, the openings 54 provide additional air flow dispensed at the outlet end 58, generally in the order of 5-10% more volumetric flowrate than the dryer alone.

[0022] In use, the attachment 30 creates an air stream under the hair, in effect sucking the moisture from the hair strands into the attachment. The ribs 60 are designed to part and separate the hair, strands of which are sucked towards the openings 54 in the sidewall 52, and between the ribs. In addition to the combing action of the ribs 60 parting the hair, the attachment 30 is intended to be used with a comb or a brush.

[0023] Generally using the entire length of the sidewall 52, the hair is dried from the root to the tip, preferably without overheating or drying out the scalp, herein referred to as radial drying. In radial drying, a gentle alternative is provided to the relatively violent and aggressive turbulence associated with standard barrel dryers set at high heat/high fan speed. In addition, radial drying provides an alternative to drying the hair with a concentrated flow at the outlet end 58, herein referred to as axial drying (FIG. 4). The present attachment 30 of the present invention is configured for both axial drying and radial drying.

[0024] In the present attachment, the openings 54 are disposed along the length of the sidewall 52, and are preferably circular and preferably of different sizes depending on their location on the attachment 30. Preferably there are eight circular rows of openings 54 disposed transverse to the axis of the tubular body 50. In the preferred embodiment, the first three rows located towards the outlet end 58 are the smallest, the diameter of the openings 54S being approximately 3/16 of an inch (4.8 mm), the last three rows located towards the apron 38 are the largest, the diameter of the openings 54L being approximately 5/16 of an inch (7.9 mm), and the middle two rows are medium sized, the diameter of the openings 54M being approximately 1/4 of an inch (6.3 mm) in diameter. Also, there are preferably eight axial rows of the openings 54. However, it is contemplated that other sizes, arrangements and shapes of openings 54 may be employed.

[0025] Referring now to FIG. 4, when the hand held dryer 10 is positioned such that the air flow is impeded, such as by positioning the outlet end 58 closely adjacent the scalp, a pressure backup forms within the attachment 30. In a conventional hand held dryer 10 using an attachment, the increased pressure creates a situation where the dryer can overheat because there is insufficient dispensing of air flow.

[0026] In the present attachment 30, the openings 54 are configured to dispense air flow while the dryer is on, and further, is configured to dispense air evenly along the length of the sidewall 52, to effectively utilize the released air for radial drying. When the attachment 30 is positioned such that the air flow is significantly impeded at the outlet end 58, such as by positioning the outlet adjacent the scalp, a pressure backup forms within the attachment 30. Instead of dispensing the air at one lo-

calized area on the sidewall 52, the attachment 30 is configured to dispense the air flow generally evenly over the length of the sidewall for radial drying.

[0027] To distribute the air flow evenly from within the attachment 30 to the ambient generally along the length of the sidewall 52, smaller openings 54S are located on the sidewall where more backpressure accumulates inside the attachment, and larger openings 54L are located where less backpressure accumulates. Medium sized openings 54M are located on the sidewall 52 where a medium amount of backpressure accumulates.

[0028] Thus, it will be seen that the present attachment for a hand held dryer provides even drying capabilities whether there is impedance at the outlet or not. The direction of air flow at the openings 54 switches from ingress to egress depending on whether there is a low pressure or high pressure differential inside the attachment 30 as compared to the ambient (i.e. whether the air flow is significantly impeded at the outlet end 58). When there is no significant impedance, the air is sucked at the openings 54, and when there is significant impedance, the air is blown from the openings. Further, even, radial drying of the hair can occur at the sidewall regardless of whether there is ingress or egress of air at the openings 54.

[0029] While a particular embodiment of the present hair dryer attachment has been described herein, it will be appreciated by those skilled in the art that changes and modifications may be made thereto without departing from the invention in its broader aspects and as set forth in the following claims.

Claims

1. An aeration barrel attachment (30) for use with a hand held hair dryer (10) having a barrel (20) with an outlet (22), said attachment comprising:
 - a substantially tubular body (50) with a perforated sidewall (52) defining a generally uniform diameter along said tubular body;
 - a first end (40) for receiving the barrel (20), and
 - a second end with an outlet (58) configured for dispensing air flow axially from the dryer; and
 - a plurality of openings (54) along the length of said sidewall (52) configured for permitting the radial ingress of air to the attachment when a low pressure differential exists in the attachment and egress from the attachment when a high pressure differential exists in the attachment.
2. The aeration barrel attachment of claim 1 further including a plurality of spaced, radially projecting annular ribs (60) provided on said sidewall (52).
3. The aeration barrel attachment of claim 1 wherein the flow rate of air dispensed from said outlet increases when there is radial ingress of air to the attach-

ment at the openings (54).

4. The aeration barrel attachment of claim 1 wherein said openings (54) are different sizes. 5
5. The aeration barrel attachment of claim 4 wherein said openings (54) are smaller towards said outlet (58) and larger towards the hand held dryer (10).
6. The aeration barrel attachment of claim 2 wherein said annular ribs (60) divide said openings (54) into transverse rows of openings, and wherein within each row the openings are the same size. 10
7. The aeration barrel attachment of claim 6 wherein said rows of openings are arranged in groups along said tubular body such that openings (54) in a first group disposed adjacent said outlet (58) are the smallest openings (54S), openings (54) in a second group disposed adjacent to said first group are medium sized openings (54M), and openings (54) in a third group disposed adjacent the hand dryer (10) are the largest openings (54L). 15
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8. The aeration barrel attachment of claim 7 wherein said smallest openings (54S) are about 3/16 of an inch (4.8 mm) in diameter and said largest openings (54L) are about 5/16 of an inch (7.9 mm) in diameter. 25
9. The aeration barrel attachment of claim 1 wherein when said outlet (58) is substantially impeded, at least a portion of the air flowing into said attachment (30) from the hand held dryer flows radially outward through said openings (54), and such that when the outlet (58) is not substantially impeded, air flows radially inward through said openings (54) and out said outlet (58). 30
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10. The aeration barrel attachment of claim 9 wherein said openings (54) are configured such that, when said outlet (58) is substantially impeded, said at least portion of the air flowing radially outward through the openings (54) is distributed evenly along the length of the sidewall (52). 40
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11. The aeration barrel attachment of claim 1 wherein the hair dryer (10) includes a housing (12) and a generally tapered barrel (20) with an outlet (22), said barrel being provided with at least one engagement formation (26) for retaining said attachment thereto, wherein said attachment (30) is provided with at least one complementary formation (28) for releasably engaging said corresponding engagement formation (26) for releasably locking said attachment to said barrel, said at least one complementary formation being disposed on an apron (38) of said corresponding attachment, said apron being generally flared and being configured for being supported by said 50
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barrel between said at least one engagement formation and said outlet; wherein said engagement formation is enclosed by an enclosure structure (29).

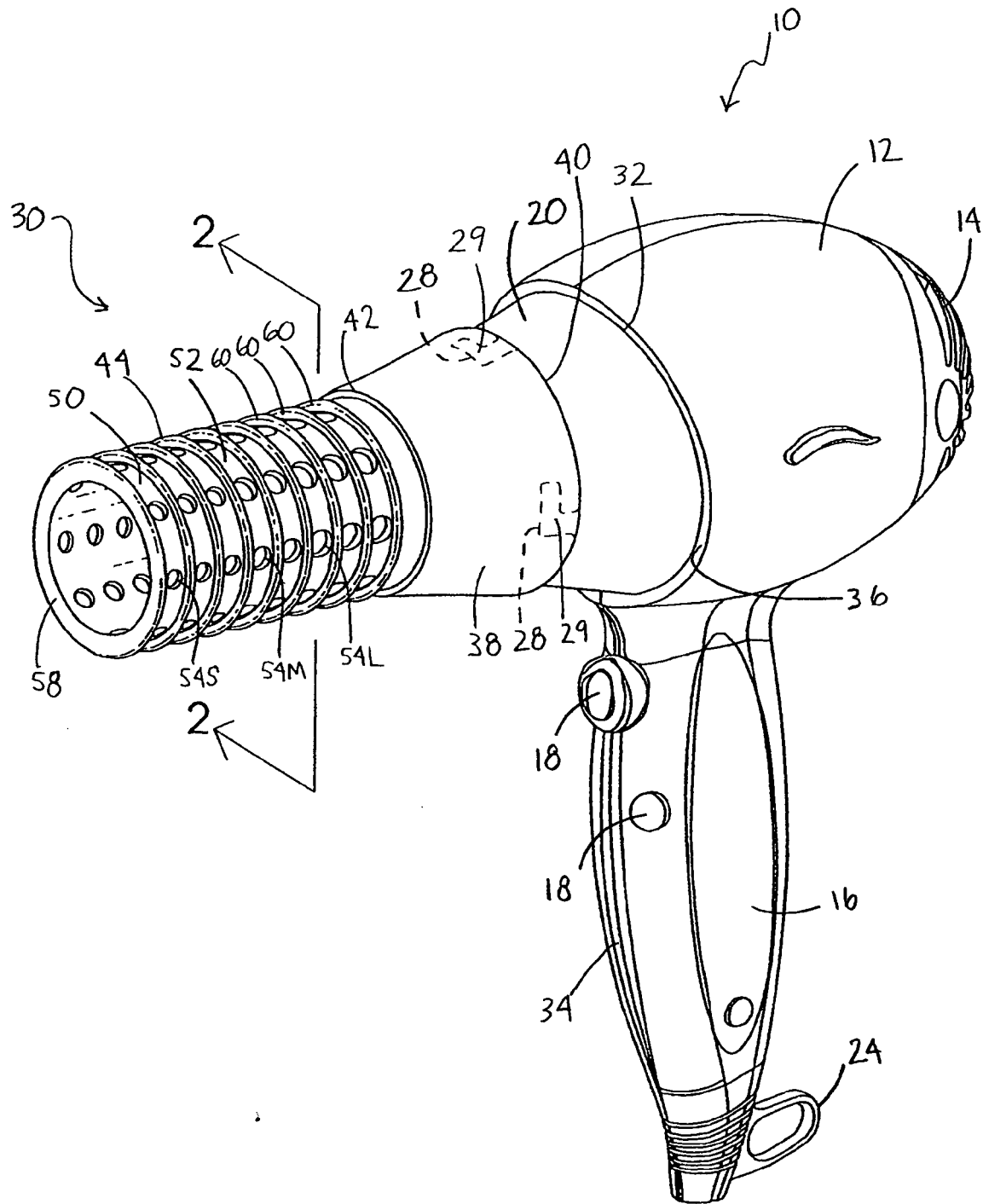
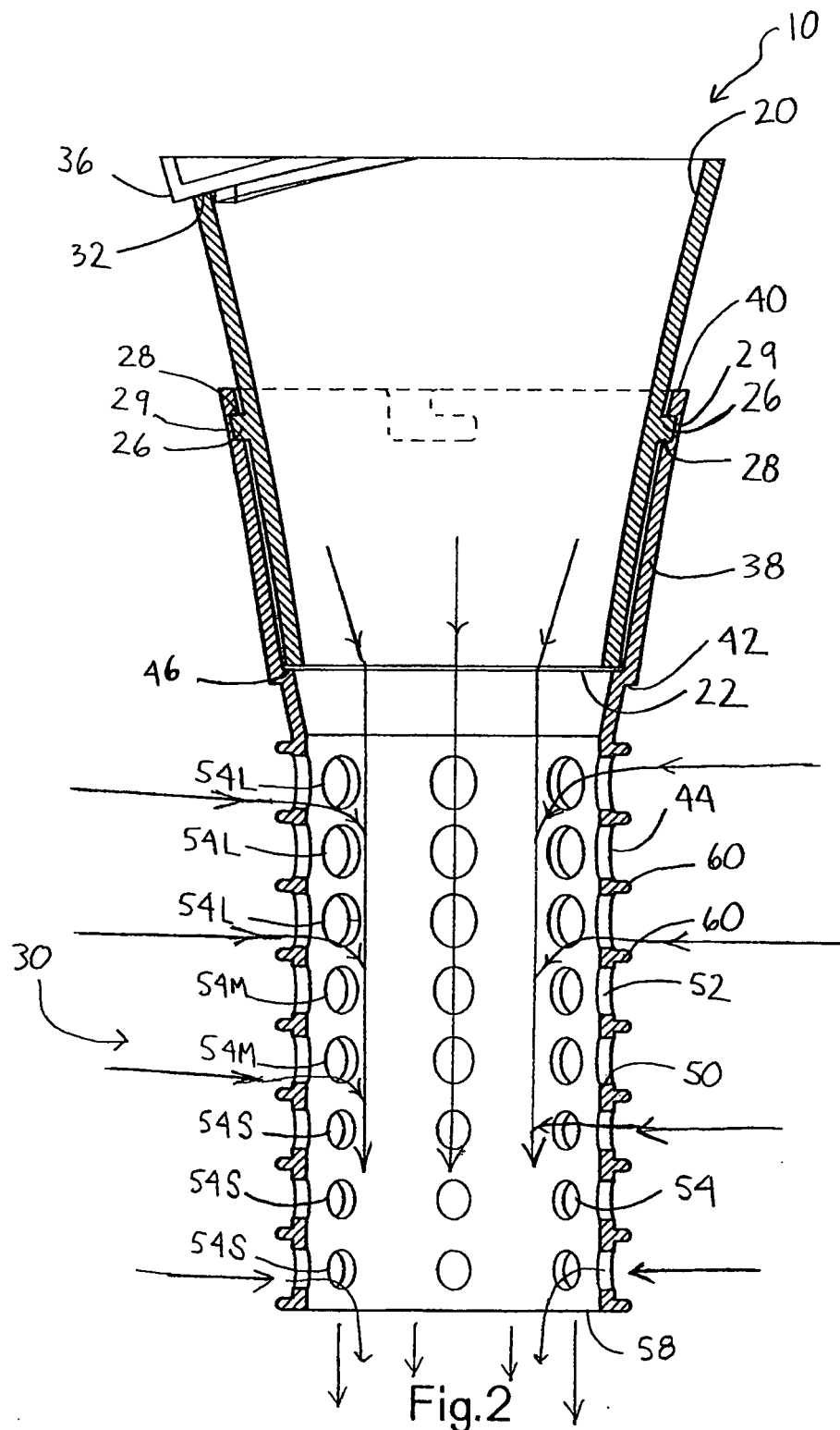
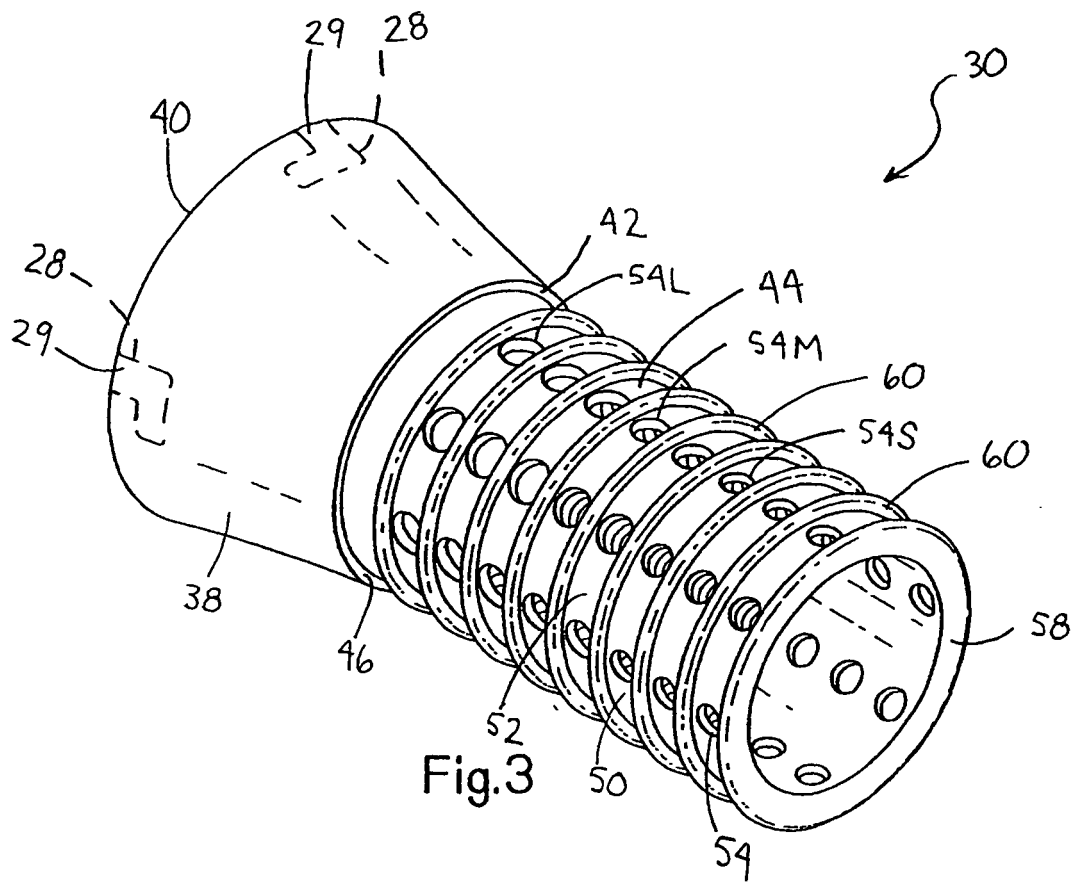


Fig.1





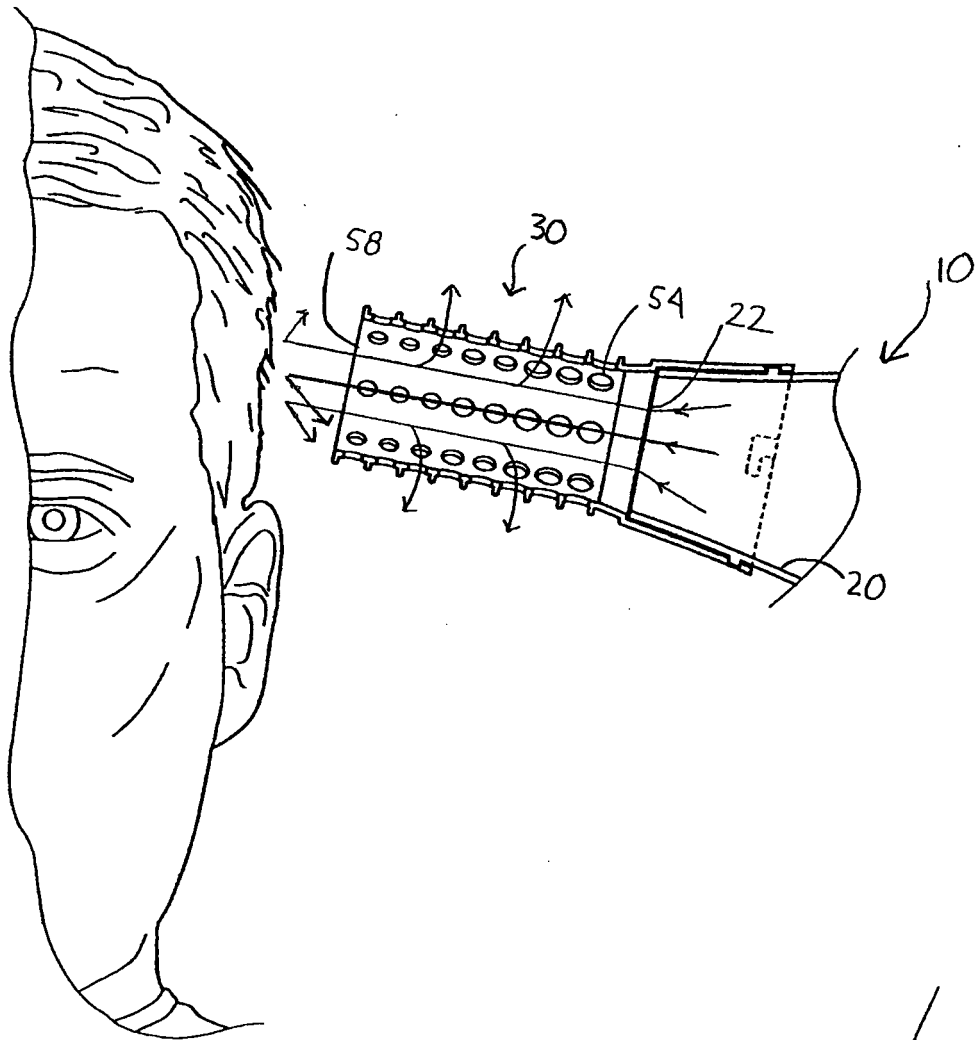


Fig.4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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