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THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290

APPLICATION #
19331676

U.S. Patents

Cite #	Patent #	Kind Code[1]	Issue Date (YYYY/MM/DD)	First Named Inventor
1	9596916		2017/03/21	Patrick Joseph William MOLONEY

U.S. patent application publications

Cite #	Publication #	Kind Code[1]	Publication Date (YYYY/MM/DD)	First Named Inventor

Foreign patents and published foreign patent applications

Cite #	Foreign Document #[3]	Country Code[2]	Kind Code[1]	Publication Date (YYYY/MM/DD)	Applicant, patentee or first named inventor	T[5]
1	TWM580903U	TW		2019/07/21	WANG SHANG-YUAN	☑
2	CN107928071A	CN		2018/04/20	MENG FANDI	☑
3	EP2863770B1	EP		2017/06/07	LARKIN JONATHAN JAMES	☐

Non-patent publications

Cite #	Author (if any), title of the publication, page(s) being submitted, publication date, publisher (where available), place of publication (where available).	T[5]	E[6]

Statements

The party making the submission is not an individual who has a duty to disclose information with respect to the above-identified application under 37 CFR 1.56.

This submission complies with the requirements of 35 U.S.C. 122(e) and 37 CFR 1.290.

Fee required: The following fee set forth in 37 CFR 1.290(f) is submitted herewith: **Regular Discounted**

Signature	Name	Registration #
/Zachary W. Zadow/	Zachary Zadow	82487

Examiner Signature	Date considered

*EXAMINER: Signature indicates all documents listed above have been considered,except for citations through which a line is drawn. Draw line through citation if not considered. Include a copy of this form with next communication to applicant. 1. If known, enter kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16. See MPEP 901.04(a). 2. Enter the country or patent office that issued the document, by two-letter code under WIPO standard ST.3. See MPEP 1851. 3. For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 4. If known, enter the kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 . See MPEP 901.04(a). 5. Check mark indicates translation attached. 6. Check mark indicates evidence of publication attached.

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THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290
CONCISE DESCRIPTION OF RELEVANCE

APPLICATION #
19331676

U.S. Patents

Cite #	Patent #	Concise Description of Relevance
1	9596916	Attachment: 2026-07-16_Third-Party Observation_US19-331676.pdf

U.S. patent application publications

Cite #	Publication #	Concise Description of Relevance

Foreign patent documents

Cite #	Foreign Document #	Concise Description of Relevance
1	TWM580903U	Attachment: 2026-07-16_Third-Party Observation_US19-331676.pdf
2	CN107928071A	Attachment: 2026-07-16_Third-Party Observation_US19-331676.pdf
3	EP2863770B1	Attachment: 2026-07-16_Third-Party Observation_US19-331676.pdf

Non-patent publications

Cite #	Reference	Concise Description of Relevance

PATENT
Confirmation No. 9204

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	SHIN, Daekee	Examiner:	Docket Central
Serial No.:	19/331,676	Group Art Unit:	
Filed:	September 17, 2025		
Title:	HAIR DRYER		

THIRD-PARTY PREISSUANCE SUBMISSION
UNDER 35 U.S.C. § 122(e) AND 37 C.F.R. § 1.290

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Commissioner:

Pursuant to 37 C.F.R. § 1.290, this Third-Party Preissuance Submission is being filed in U.S. Patent Application No. 19/331,676, filed September 17, 2025 (published as US 2026/0013617 A1).

This submission should be considered because it is being submitted within the time period prescribed by 35 U.S.C. § 122(e) and 37 C.F.R. § 1.290(b), and before the date on which a notice of allowance is given or mailed in the application.

Submitted is a document list identifying the documents being submitted.

A concise description of the asserted relevance of each item identified in the document list is provided.

The party making the submission is not an individual who has a duty to disclose information with respect to U.S. Patent Application No. 19/331,676 under 37 C.F.R. § 1.56.

The submission complies with the requirements of 35 U.S.C. § 122(e) and 37 C.F.R. § 1.290.

Description of Relevance:

The four tables below describe the potential relevance of four references to certain published claims of US 2026/0013617 A1.

Table 1

As shown in Table 1 below, at least portions of TWM580903U, hereinafter "D1," are believed to be relevant to at least published claims 1-6 of U.S. Patent Application No. 19/331,676.

Table 2

As shown in Table 2 below, at least portions of CN107928071A, hereinafter "D2," are believed to be relevant to at least published claims 1-6 of U.S. Patent Application No. 19/331,676.

Table 3

As shown in Table 3 below, at least portions of U.S. Patent No. 9,596,916, hereinafter "D3," are believed to be relevant, together with the disclosures of D1 and/or D2 as indicated, to at least published claims 1, 2, and 18 of U.S. Patent Application No. 19/331,676.

Table 4

As shown in Table 4 below, at least portions of EP2863770B1, hereinafter "D4," are believed to be relevant, together with the disclosures of D1 and/or D2 as indicated, to at least published claims 7 and 8 of U.S. Patent Application No. 19/331,676.

TABLE 1

US 2026/0013617 A1	D1 -- TWM580903U
1. A hair dryer comprising:	D1 concerns a hair dryer with paragraph [0001] of D1 stating "the present invention related to hairdressing appliances, namely a hair dryer".
a main body including a gas outlet portion disposed thereon for discharging gas;	The hair dryer of D1 has a main body which has a gas outlet with paragraph [0010] of D1 stating "a body 10, which is elongate in shape and has an inlet opening 11 and an outlet opening 12".
a handle extending from the main body;	The hair dryer of D1 has a handle extending from the main body with paragraph [0011] of D1 stating "a handle 20, with one end 21 situated on one side of the body 10 is provided for the user to grip".
a gas inlet portion located on the main body or the handle,	The hair dryer of D1 has a gas inlet on the main body with paragraph [0010] of D1 stating "a body 10, which is elongate in shape and has an inlet opening 11".
wherein gas is introduced into the gas inlet portion from an outside of the hair dryer, and	Gas is introduced into the gas inlet portion of the hair dryer of D1 from the outside with paragraph [0010] of D1 stating "air enters the tubular space 13 through the air inlet 11".
wherein the gas inlet portion is in communication with the gas outlet portion;	The gas inlet and gas outlet portions of the hair dryer of D1 are in communication with paragraph [0010] of D1 stating "the main body 10 has a tubular space 13 communicating with the air inlet 11 and the air outlet 12".
a gas flow path defined inside the main body to communicate the gas inlet portion with the gas outlet portion; and	The hair dryer of D1 has a gas flow path within the body with paragraph [0010] of D1 stating "the main body 10 has a tubular space 13 communicating with the air inlet 11 and the air outlet 12 […] air enters the tubular space through the air inlet 11 and then flows out of the tubular space 13 through the air outlet 12".
a fan disposed on the gas flow path to flow gas,	The hair dryer of D1 has a fan with paragraph [0010] of D1 stating "a motor 14 and a fan 15 are housed within the tubular space 13; driven by the fan 15, air enters the tubular space 13".
wherein the gas outlet portion includes a center hole through which gas inside the main body is discharged; and	The hair dryer of D1 has a center hole with paragraph [0010] of D1 stating "a body 10, […] has an outlet opening 12" and Figure 2 of D1 illustrating that the outlet opening 12 is central on the face of the hair dryer.
wherein the center hole has a guide cone disposed therein,	The hair dryer of D1 has a guide cone within the center hole with paragraph [0014] of D1 stating "a flow guide 40, which is elongated, preferably oblong or egg-shaped is provided at the air outlet of the main body".
the guide cone protruding along a direction in which gas is discharged from the center hole	The guide cone of D1 protrudes along a direction in which gas is discharged with paragraph [0014] of D1

US 2026/0013617 A1	D1 -- TWM580903U
to guide a flow of the gas from the interior of the main body toward the center hole.	stating "one end of the flow guide 40 protrudes from the exhaust opening 12". Figure 3 of D1 further illustrates that the guide cone protrudes along the direction in which gas is discharged. Paragraph [0015] further states "by virtue of the structure of the present invention, when air is blown by the fan 15 and flows from the tubular space 13 towards the outlet opening 12, the air forms a Coanda effect as it passes through the outlet opening 12 along the flow guide 40. The Coanda effect refers to the tendency of a fluid to deviate from its original direction of flow and instead follow the surface of a protruding object, thereby drawing surrounding fluid into the jet".
2. The hair dryer of claim 1, wherein the guide cone is disposed at a center of the center hole.	The guide cone of the hair dryer of D1 is disposed at the center of the center hole with Figure 2 of D1 illustrating the flow guide 40 as being centered within the air outlet 12.
3. The hair dryer of claim 2, wherein the flow of the gas from the interior of the main body toward the center hole is discharged in a cross-sectional shape of a ring.	Gas is discharged in a cross-sectional shape of a ring from the hair dryer of D1 with paragraph [0007] of D1 stating "the dimension at the point of maximum outer diameter of the air deflector is 50% to 90% of the diameter of the air outlet". As illustrated in Figure 2, this dimension leaves a gap between flow guide 40 and the inner surface of the air outlet, through which gas is discharged with a ring-shaped cross-section.
4. The hair dryer of claim 3, wherein the guide cone is disposed to be spaced apart from an inner surface of the center hole, and	The guide cone of D1 is spaced apart from an inner surface of the center hole with paragraph [0007] of D1 stating "the dimension at the point of maximum outer diameter of the air deflector is 50% to 90% of the diameter of the air outlet".
wherein the flow of the gas from the interior of the main body toward the center hole is discharged through a space between the inner surface of the center hole and the guide cone.	The gas discharged from the hair dryer of D1 is discharged through a space between the inner surface of the center hole and the guide cone with paragraph [0015] of D1 stating "by virtue of the structure of the present invention, when air is blown by the fan 15 and flows from the tubular space 13 towards the outlet opening 12, the air forms a Coanda effect as it passes through the outlet opening 12 along the flow guide 40".
5. The hair dryer of claim 4, wherein the guide cone has one end protruding toward the gas flow path and the other end, opposite to the one end, protruding in a gas discharge direction of the center hole,	The guide cone of D1 protrudes toward the gas flow path and in a gas discharge direction with Figure 3 illustrating that the two ends of the flow guide 40 protrude in such a configuration. Paragraph [0006] further states that "the deflector is elongated and elliptical in shape, with a configuration symmetrical about its longitudinal axis".

US 2026/0013617 A1	D1 -- TWM580903U
wherein each of said one end and the other end of the guide cone has a cone shape.	The guide cone of D1 has two ends, and Figure 2 illustrates that the diameter of the guide cone decreases toward each end.
6. The hair dryer of claim 5, the flow of the gas from the interior of the main body toward the center hole is guided to a rim of the center hole by the other end of the guide cone.	The flow of the gas toward the center hole of the hair dryer of D1 is guided to a rim of the center hole by the guide cone with paragraph [0015] stating “when air is blown by the fan 15 and flows from the tubular space 13 towards the outlet opening 12, the air forms a Coanda effect as it passes through the outlet opening 12 along the flow guide 40. The Coanda effect refers to the tendency of a fluid to deviate from its original direction of flow and instead follow the surface of a protruding object, thereby drawing surrounding fluid into the jet”.

TABLE 2

US 2026/0013617 A1	D2 -- CN107928071A
1. A hair dryer comprising:	D2 concerns a hair dryer with paragraph [0001] of D2 stating "the present disclosure related to […] an airflow guide structure for a hair dryer and a hair dryer".
a main body including a gas outlet portion disposed thereon for discharging gas;	The hair dryer of D2 has a main body with paragraph [0093] of D2 stating "the hair dryer comprises: a body casing 5; a handle housing 6 connected to the side wall of the main housing 5". The terms body casing 5 and main housing 5 refer to the same component, illustrated in Figure 3 of D2, which corresponds to the claimed main body. The main body of the hair dryer of D2 has a gas outlet with claim 13 of D2 stating "the hair dryer comprising: […] an air inlet and an air outlet provided at opposite ends of the main body housing (5)".
a handle extending from the main body;	The hair dryer of D2 has a handle with paragraph [0029] of D2 stating "a handle housing connected to the side wall of the main housing".
a gas inlet portion located on the main body or the handle,	The hair dryer of D2 has a gas inlet on the main body with paragraph [0034] of D2 stating "the two ends of the main body housing are provided with an air inlet and an air outlet, respectively".
wherein gas is introduced into the gas inlet portion from an outside of the hair dryer, and	This follows from D2's use of the term "air inlet" in paragraph [0034].
wherein the gas inlet portion is in communication with the gas outlet portion;	The gas inlet and the gas outlet of the hair dryer of D2 are in communication with paragraph [0101] stating "air is drawn in through the air inlet on the housing 5 and blown out through the air outlet on the housing 5". The passage shows a continuous airflow from the inlet to the outlet and thus communication between them.
a gas flow path defined inside the main body to communicate the gas inlet portion with the gas outlet portion; and	The hair dryer of D2 has a gas flow path within the main body with paragraphs [0101] and [0102] of D2 stating "an electric heating element situated inside the housing of the hair dryer body 7 […] the electric heating wire heats up, converting the cold air passing through it into hot air, which is then blown out through the air outlet". This shows the air passes through the heating element before leaving via the air outlet. Because the heating element is within the main body, the disclosed gas flow path between the inlet and outlet is likewise within the main body.
a fan disposed on the gas flow path to flow gas,	The hair dryer of D2 has a fan with paragraph [0101] stating "the hair dryer body 7 comprises: […] a fan assembly […]. The fan assembly comprises: a motor situated inside the housing and electrically connected to

US 2026/0013617 A1	D2 -- CN107928071A
	the main control unit; and fan blades situated outside the housing and connected to the motor's output shaft. Under the control of the main control unit, the output shaft of the motor rotates, thereby driving the fan blades to rotate; as a result, air is drawn in through the air inlet on the housing 5 and blown out through the air outlet on the housing 5".
wherein the gas outlet portion includes a center hole through which gas inside the main body is discharged; and	The hair dryer of D2 has a center hole of the gas outlet with Figure 3 of D2 illustrating a central circular hole in the air outlet grille 2. Figure 1-1 of D2 further illustrates annular support 1011 as defining an opening through which gas inside the main body is discharged.
wherein the center hole has a guide cone disposed therein,	The hair dryer of D2 has a guide cone with claim 1 of D2 stating "the air guiding structure comprises: a support body (101) mounted at the air outlet of the hair dryer main body; a conical flow-guiding element (102) positioned in the central portion of the support body (101), the outer diameter of which gradually increases in the direction of airflow". Figure 1-1 of D2 illustrates that the conical flow-guiding element (102) is disposed within the annular support 1011. Figure 4 of D2 illustrates a hair dryer with such an arrangement.
the guide cone protruding along a direction in which gas is discharged from the center hole to guide a flow of the gas from the interior of the main body toward the center hole.	The guide cone of D2 protrudes along a direction of gas discharge with paragraph [0006] of D2 stating "positioning the conical deflector 102 in the centre of the support body 101 and ensuring that its outer diameter gradually increases along the direction of the airflow". Paragraph [0060] of D2 describes some functions of the guide cone stating "reduce the frictional force between it and the outgoing air; furthermore the outgoing air gradually diverges under the guiding effect of the conical deflector 102".
2. The hair dryer of claim 1, wherein the guide cone is disposed at a center of the center hole.	The guide cone of D2 is disposed centrally with claim 5 stating "the conical airflow guide (102) coincides with the central axis of the air outlet".
3. The hair dryer of claim 2, wherein the flow of the gas from the interior of the main body toward the center hole is discharged in a cross-sectional shape of a ring.	The gas discharged from the air outlet of the hair dryer of D2 has a ring-shaped cross-section; paragraph [0072] states, "the air outlets of hair dryers are designed with a ring-shaped structure". Figure 1-1 of D2 illustrates a ring of vanes surrounding the central cone. Together with Figure 4, this shows that air from the central

US 2026/0013617 A1	D2 -- CN107928071A
	opening is discharged with a ring-shaped cross-section around conical airflow guide 102.
4. The hair dryer of claim 3, wherein the guide cone is disposed to be spaced apart from an inner surface of the center hole, and	The guide cone of D2 is spaced apart from the inner surface of the center hole with Figures 1-1, 3, and 4 illustrating that the tip of the guide cone proximal to the main body is smaller than the central hole. Therefore, there is a gap between the guide cone and the inner surface of the center hole. Paragraph [0078] of D2 further states "the airflow guide support 1012 comprises: a plurality of helical airflow guide vanes, wherein one end of each helical airflow guide vane is connected to the inner wall of the annular support 1011, and the other end is connected to the end side wall of the conical airflow guide 102". This arrangement requires the guide cone to be spaced apart from the inner surface of the center hole. Figure 1-1 of D2 illustrates this arrangement.
wherein the flow of the gas from the interior of the main body toward the center hole is discharged through a space between the inner surface of the center hole and the guide cone.	Figure 3 of D2 illustrates a central opening in the air outlet grille 2. Given the spacing described for limitation 4.2, gas flows through the space between the inner surface of that opening and the guide cone.
5. The hair dryer of claim 4, wherein the guide cone has one end protruding toward the gas flow path and the other end, opposite to the one end, protruding in a gas discharge direction of the center hole,	The guide cone of D2 has two ends, one protruding toward the inlet (and thus toward the gas flow path) and the other protruding in the gas-discharge direction with paragraph [0062] stating "the end facing the air inlet" and "the end facing the air outlet". This description in combination with Figures 1-1 and 4 illustrate the orientation of the guide cone relative to the gas flow path and discharge of gas.
wherein each of said one end and the other end of the guide cone has a cone shape.	The guide cone of D2 is conical where each end has a cone shape with paragraph [0062] stating "the outer diameter at the end facing the air inlet (i.e., the apex of the cone) is the minimum outer diameter, while the outer diameter at the end facing the air outlet (i.e., the base of the cone) is the maximum outer diameter". Figure 1-1 further illustrates that the two ends of the conical deflector 102 are cone-shaped.
6. The hair dryer of claim 5, the flow of the gas from the interior of the main body toward the center hole is guided to a rim of the center hole by the other end of the guide cone.	The larger outer diameter at the end protruding in the gas-discharge direction directs the gas flow outward toward the rim of the center hole. Paragraph [0080] of D2 additionally states "For the multiple helical air guiding vanes, one end converges at the end side wall of the conical air deflector 102, while the other end diverges along the inner side wall of the annular support 1011, causing the spacing between two adjacent helical air guiding vanes to gradually increase.

US 2026/0013617 A1	D2 -- CN107928071A
	This helps to improve the dispersion of the outgoing airflow".

TABLE 3

US 2026/0013617 A1	D3 -- U.S. 9,596,916 B2
1. A hair dryer comprising:	D3 concerns a hair dryer with col. 1, ll. 11-15 of D3 stating "this invention relates to […] an attachment for a hair care appliance and an appliance, particularly a hair care appliance comprising such an attachment". Col. 1, ll. 18-21 further states "blowers and in particular hot air blowers are used for a variety of applications such as drying substances such as paint or hair".
a main body including a gas outlet portion disposed thereon for discharging gas;	The hair dryer of D3 has a main body with col. 9, l. 65 of D3 stating "a hair dryer 10 with a handle 20 and a body 30". The body 30 of the hair dryer of D3 includes a gas outlet with col. 10, l. 61 of D3 stating "the second end 34 of the body includes a fluid outlet 340".
a handle extending from the main body;	The hair dryer of D3 has a handle extending from the main body with col. 9, ll. 66-67 of D3 stating "the handle has a first end 22 which is connected to the body 30 and a second end 24 distal from the body 30".
a gas inlet portion located on the main body or the handle,	The hair dryer of D3 has a gas inlet with the sentence bridging cols. 9-10 of D3 stating "the handle has […] a second end 24 distal from the body 30 and which includes a primary inlet 40".
wherein gas is introduced into the gas inlet portion from an outside of the hair dryer, and	The hair dryer of D3 draws air in through the inlet from the outside with col. 10, ll. 37-38 stating "the fan unit 70 draws fluid through the primary inlet 40 towards the body".
wherein the gas inlet portion is in communication with the gas outlet portion;	The gas inlet and the gas outlet of the hair dryer of D3 are in communication with col. 10, ll. 39-40 of D3 stating "a fluid flow path 400 that extends from the primary inlet 40 and into the body 30" while col. 10, ll. 50-53 of D3 further states "the primary fluid flow path 400 extends along the body from the junction of the handle 20 and the body 30 […] towards the primary fluid outlet".
a gas flow path defined inside the main body to communicate the gas inlet portion with the gas outlet portion; and	The hair dryer of D3 has a gas flow path between the gas inlet and gas outlet with col. 10, ll. 39-40 of D3 stating "a fluid flow path 400 that extends from the primary inlet 40 and into the body 30" while col. 10, ll. 50-53 of D3 further states "the primary fluid flow path 400 extends along the body from the junction of the handle 20 and the body 30 […] towards the primary fluid outlet".

US 2026/0013617 A1	D3 -- U.S. 9,596,916 B2
a fan disposed on the gas flow path to flow gas,	The hair dryer of D3 includes a fan with col. 10, ll. 37-39 of D3 stating "the fan unit 70 draws fluid through the primary inlet 40 towards the body through a fluid flow path 400".
wherein the gas outlet portion includes a center hole through which gas inside the main body is discharged; and	The body 30 of the hair dryer of D3 includes a central fluid outlet through which gas inside the body is discharged with col. 10, l. 61 of D3 stating "the second end 34 of the body includes a fluid outlet 340". Col. 10, ll. 64-66 of D3 further stating "a fluid flow path 300 extends within the duct from the fluid inlet 320 to the fluid outlet 340".
wherein the center hole has a guide cone disposed therein,	The hair dryer of D3 has a guide cone with col. 18, ll. 36-37 of D3 stating "the bung 610 has two parts a cone 612 and a base 614". Figure 13 of D3 illustrates that the bung 610, including cone 612, is positioned within the fluid outlet 340.
the guide cone protruding along a direction in which gas is discharged from the center hole to guide a flow of the gas from the interior of the main body toward the center hole.	See the corresponding disclosures of D1 and/or D2 in Tables 1 and 2.
2. The hair dryer of claim 1, wherein the guide cone is disposed at a center of the center hole.	The guide cone of the hair dryer of D3 is in the center of the center hole with Figure 13 illustrating that the bung 610 (comprising the cone 612) is centered within the fluid outlet 340.
18. The hair dryer of claim 1, wherein the gas inlet portion is located at an end of the handle,	The gas inlet portion of the hair dryer of D3 is positioned at an end of the handle with the sentence bridging cols. 9-10 of D3 stating "the handle has […] a second end 24 distal from the body 30 and which includes a primary inlet 40".
wherein the gas flow path extends from an interior of the main body to an interior of the handle, and	The gas flow path of the hair dryer of D3 extends through the handle and into the main body, with col. 10, ll. 39-40 stating "a fluid flow path 400 that extends from the primary inlet 40 [in the handle] and into the body 30".
wherein the fan is located inside the handle.	The fan of D3 is located inside the handle with col. 3, ll. 35-36 of D3 stating "it is preferred that the handle has a fan unit for drawing fluid into the primary fluid flow path".

TABLE 4

US 2026/0013617 A1	D4 -- EP 2 863 770 B1
7. The hair dryer of claim 1, further comprising:	See Tables 1 and 2 for the limitations of claim 1. D4 also concerns a hair dryer; paragraph [0001] states "the invention relates to hair dryers".
a concentrator coupled to the main body,	The hair dryer of D4 has a concentrator coupled to the main body with paragraph [0055] of D4 stating "Figures 1 to 7b show a hair dryer 10 with a nozzle 20 coupled thereto". Paragraph [0055] of D4 further states "the nozzle attachment 20 provides a focused stream of air".
wherein the concentrator receives gas discharged from the gas outlet portion and discharges received gas to the outside,	The concentrator of D4 receives gas from the gas outlet of the hair dryer with paragraph [0059] of D4 stating "the separation of hot and cold (unheated) air continues in the nozzle 20. A cool air channel 24 extends through the nozzle and aligns with the cool air duct/channel 44 in the hair dryer body. A hot air channel 22 extends through the nozzle and aligns with the first airflow channel passing through the heater 46. The nozzle attachment 20 thus has two channels of air flow. The first inner channel 22 provides a hot air outlet and surrounding the hot air channel 24 is a cool air channel which provides a cool air outlet." Read in the context of Figure 3a of D4, this passage illustrates how air from the outlet of the attachment is discharged to the outside.
wherein the concentrator includes a first flow path for flowing gas discharged from the center hole therealong.	The concentrator of D4 has a first flow path for gas from the center hole with paragraph [0059] of D4 stating "a hot air channel 22 extends through the nozzle and aligns with the first airflow channel passing through the heater". Paragraph [0022] of D4 further states "the cool air channel may be in the form of an outer duct which circumscribes the hot air channel".
8. The hair dryer of claim 7, wherein the concentrator includes a second flow path divided from the first flow path for flowing gas discharged from the side hole therealong.	The concentrator of D4 includes a second flow path divided from the first flow path for gas from the side hole with paragraph [0059] of D4 stating "the separation of hot and cold (unheated) air continues in the nozzle 20. A cool air channel 24 extends through the nozzle and aligns with the cool air duct/channel 44 in the hair dryer body". Paragraph [0022] of D4 further states "the cool air channel may be in the form of an outer duct which circumscribes the hot air channel".

Conclusion:

It is requested that the documents submitted herewith be considered for U.S. Patent Application 19/331,676.

Respectfully submitted,

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Reg. No.: 82,487

M580903

(19)中華民國智慧財產局

(12)新型說明書公告本　**(11)證書號數：TW M580903 U**

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申請專利範圍項數：10 項　圖式數：4　共 12 頁

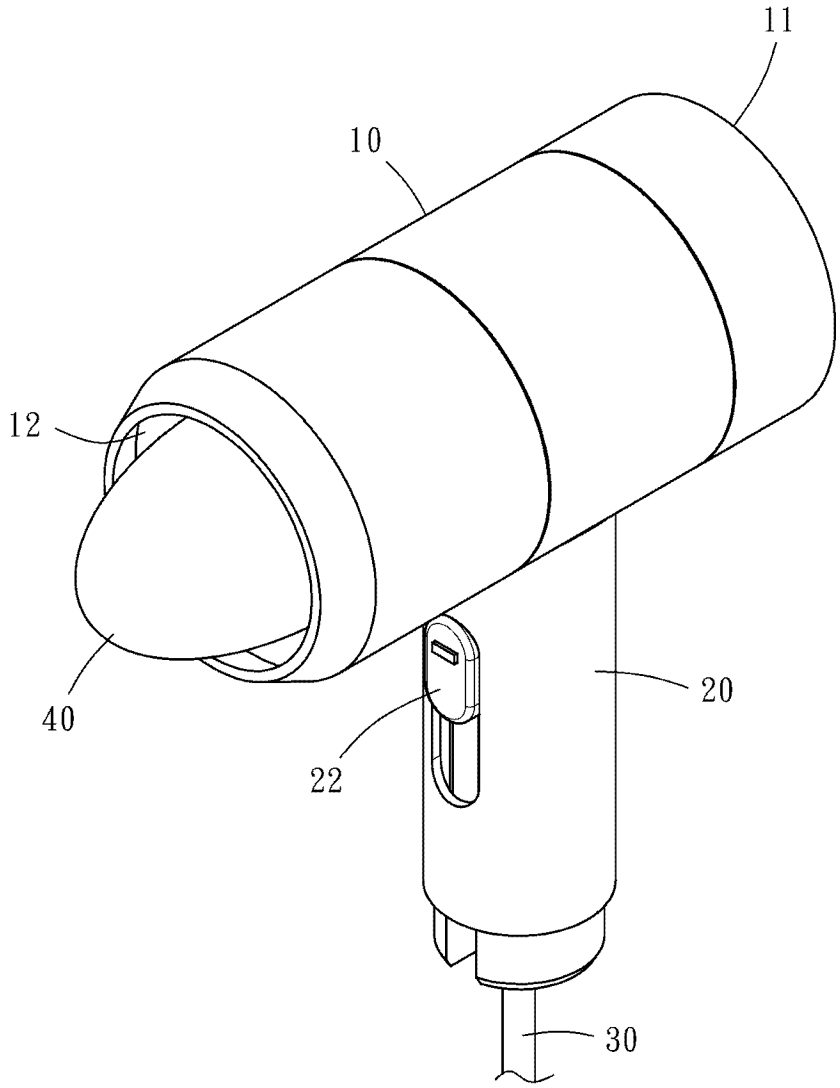
(54)名稱

吹風機

(57)摘要

一種吹風機，包含有一本體，具有一進氣開口以及一出氣開口，本體內設有一馬達以及一風扇。本體的一側設有一握把，握把上設有一控制開關。一導流體，呈長橢圓形，設於出氣開口處且有局部凸伸出出氣開口。導流體外徑最大處之尺寸約為出氣開口口徑尺寸的 50%~90%。

指定代表圖：



符號簡單說明：

10・・・本體

11・・・進氣開口

12・・・出氣開口

20・・・握把

22・・・控制開關

30・・・電源線

40・・・導流體

第1圖

【新型說明書】

【中文新型名稱】　吹風機

【技術領域】

【0001】　本創作係與美髮器具相關，即一種吹風機。

【先前技術】

【0002】　已知現有的吹風機大多是利用一馬達帶動一風扇轉動，利用風扇的轉動將空氣由一管體中吹出，以形成吹風的效果。這樣的吹風機若要提升其出氣量時通常的做法是加大馬達的輸出功率，使風扇轉動的速度可以更快以吹出更多的空氣，但相對的這樣的做法也會使吹風機的耗電量增加。

【新型內容】

【0003】　有鑒於現有技術的上述缺陷，本創作主要目的即在提供一種不需增加馬達輸出功率即可增加輸出空氣量的吹風機。

【0004】　緣以達成上述目的，本創作提供一種吹風機包含有：一本體，該本體呈長形，其長軸向的兩端各有一開口，分別為一進氣開口以及一出氣開口。該本體內具有一管狀空間分別與該進氣開口與該出氣開口連通，該管狀空間內設有一馬達以及一風扇。一握把，以一頂端設於該本體的一側，供使用者握持，該握把上設有一控制開關。一電源線，連接於該握把的一尾端。一導流體，呈長形，設於該本體的出氣開口處。該導流體的一端凸出於該出氣開口處而該導流體所凸伸出該出氣開口的長度L2小於等於該導流體總長度L1的1/2。

【0005】　藉由該導流體凸出於該出氣開口，因此可以在出氣開口處形成康達效應以增加風量達成本創作之目的。

【0006】　較佳地，該導流體係呈長橢圓形，以其沿長軸向對稱的形態形成

較佳的導流效果。

【0007】 較佳地，該導流體外徑最大處之尺寸為該出氣開口口徑尺寸的50%~90%。

【圖式簡單說明】

【0008】

第1圖係本創作之外觀立體圖。

第2圖係本創作之左側視圖。

第3圖係第1圖中3-3剖線方向之剖視圖。

第4圖係本創成另一角度之立體視圖，並將該導流體在本體內的部份用虛線表示。

【實施方式】

【0009】 如第1圖至第4圖所示，本創作所提供的一種吹風機，包含有：

【0010】 一本體10，該本體呈長形，其長軸向的兩端各有一開口，分別為一進氣開口11以及一出氣開口12。該本體10內具有一管狀空間13分別與該進氣開口11與該出氣開口12連通，該管狀空間13內設有一馬達14以及一風扇15，藉由該風扇15的推動，空氣可以由該進氣開口11進入該管狀空間13然後由該出氣開口12流出該管狀空間13。

【0011】 一握把20，以一頂端21設於該本體10的一側，供使用者握持，該握把20上設有一控制開關22，以控制吹風機的啟閉以及風速的大小。

【0012】 一電源線30，連接於該握把20的一尾端23，用於供使用者連接於電源插座以提供該吹風機所需要的電力。

【0013】 本創作的特徵在於：

【0014】 一導流體40，呈長形，最佳是長楕圓形或蛋形，設於該本體的出氣開口12處。該導流體40的周面上設有複數連接桿41，該等連接桿41一端與該導流體40連接，另一端與該本體管狀空間13的壁面連接。該導流體40的一端凸出於該出氣開口12而該導流體40所凸伸出該出氣開口12的長度L2小於等於該導流體總長度L1的1/2但大於等於1/4。最佳狀況是使該導流體40外徑最大處落在該出氣開口12的口緣。而且該導流體40外徑最大處之尺寸小於該本體出氣開口12的尺寸。因該導流體外徑最大處若過大會造成出氣開口的阻塞，但若太小則所產生的導流效果不明顯，因此若以該導流體40外徑最大處之尺寸D2與該出氣開口口徑D1的尺寸來比較，該導流體40外徑最大處之尺寸D2為該出氣開口12口徑尺寸D1的50%~90%可以得到較佳的導流效果。

【0015】 藉由本創作之結構，當空氣被風扇15吹動而自管狀空間13朝該出氣開口12流動時，空氣在沿該導流體40通過出氣開口12時會形成康達效應（Coanda effect）。所謂Coanda effect指的是流體有離開本來的流動方向改為隨著凸出物體的表面流動的傾向，並且會使周圍的流體一併加入此一噴流中。而由於流體移動方向的改變，使周圍會形成壓力較低的區域，亦即當氣流經過曲面時因為氣壓差的關係所以會將出氣開口外部周圍的空氣吸引過來而使輸出的空氣量增加。如此一來，本創作即可以在不需增加馬達輸出功率的情形下增加出氣開口端所吹出來的空氣量。

【符號說明】

【0016】

本體10

進氣開口11

出氣開口12

管狀空間13

馬達14

風扇15

握把20

頂端21

控制開關22

尾端23

電源線30

導流體40

連接桿41

專利案號：108200324

公告本

申請日：
IPC 分類：

M580903

【新型摘要】

【中文新型名稱】　吹風機

【中文】

一種吹風機，包含有一本體，具有一進氣開口以及一出氣開口，本體內設有一馬達以及一風扇。本體的一側設有一握把，握把上設有一控制開關。一導流體，呈長楕圓形，設於出氣開口處且有局部凸伸出出氣開口。導流體外徑最大處之尺寸約為出氣開口口徑尺寸的50%~90%。

【指定代表圖】　　第（1）圖。

【代表圖之符號簡單說明】

本體10

進氣開口11

出氣開口12

握把20

控制開關22

電源線30

導流體40

【新型申請專利範圍】

【第1項】 一種吹風機，包含有：

一本體，具有一進氣開口以及一出氣開口，該本體內具有一管狀空間與該進氣開口及出氣開口連通，該管狀空間內設有一馬達以及一風扇；

一握把，以一頂端設於該本體的一側，供使用者握持，該握把上設有一控制開關，以控制吹風機的啟閉以及風速的大小；

一電源線，連接於該握把的一尾端，用於供使用者插設於電源插座以提供該吹風機所需要的電力；

其特徵在於：

一導流體，呈長形，設於該本體的出氣開口處，該導流體的一端凸出於該出氣開口，而且該導流體外徑最大處之尺寸小於該本體出氣開口的尺寸。

【第2項】 如請求項1所述之吹風機，其中該導流體的一端凸出於該出氣開口而該導流體所凸伸出該出氣開口的長度小於等於該導流體總長度的1/2但大於等於1/4。

【第3項】 如請求項2所述之吹風機，其中該導流體外徑最大處之尺寸為該出氣開口口徑尺寸的50%~90%。

【第4項】 如請求項1所述之吹風機，其中該導流體外徑最大處之尺寸為該出氣開口口徑尺寸的50%~90%。

【第5項】 如請求項1所述之吹風機，其中該導流體呈長楕圓形。

【第6項】 如請求項5所述之吹風機，其中該導流體外徑最大處落在該出氣開口的口緣。

【第7項】 如請求項6所述之吹風機，其中該導流體的一端凸出於該出氣開口而該導流體所凸伸出該出氣開口的長度小於等於該導流體總長度的1/2但大於

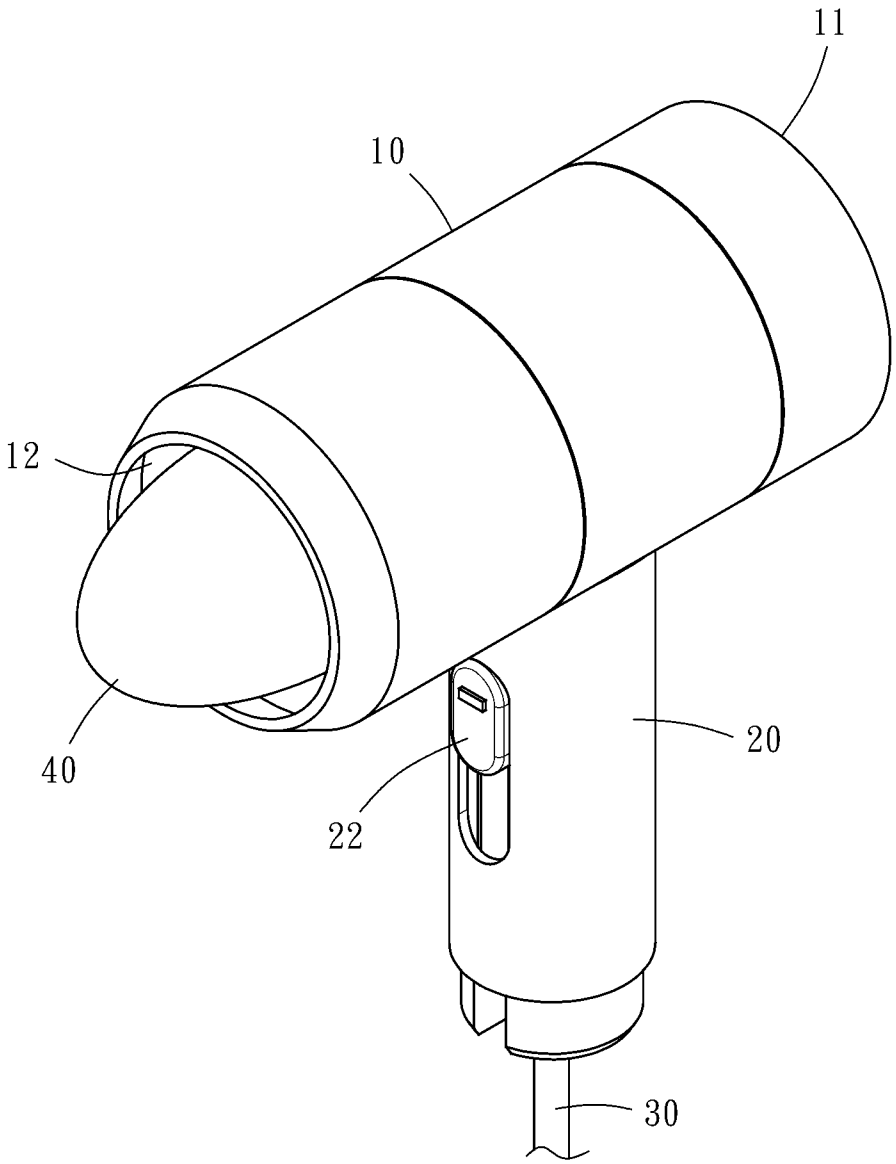
等於1/4。

【第8項】 如請求項7所述之吹風機，其中該導流體外徑最大處之尺寸為該出氣開口口徑尺寸的50%~90%。

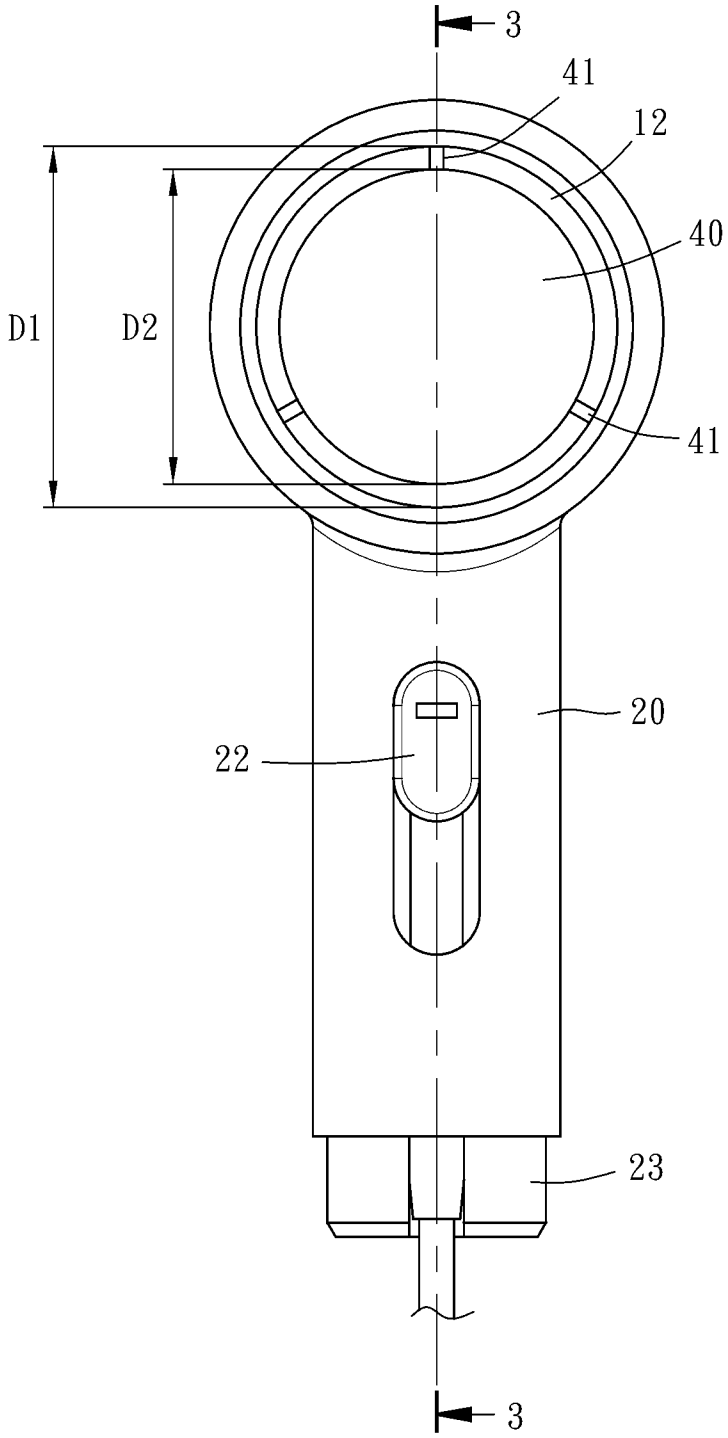
【第9項】 如請求項6所述之吹風機，其中該導流體外徑最大處之尺寸為該出氣開口口徑尺寸的50%~90%。

【第10項】 如請求項5所述之吹風機，其中該導流體的周面上設有複數連接桿，該等連接桿一端與該導流體連接，另一端與該本體管狀空間的壁面連接。

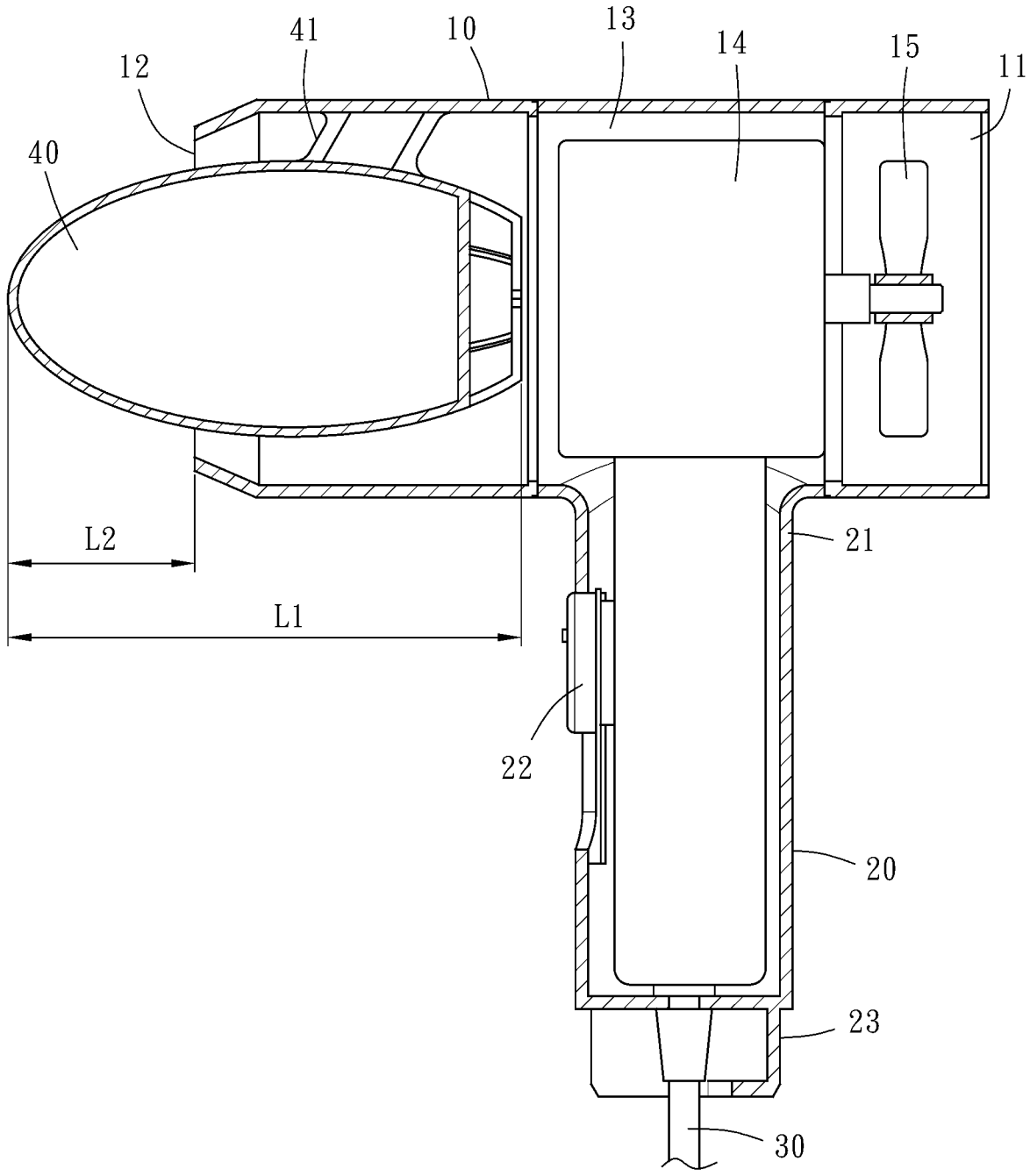
【新型圖式】



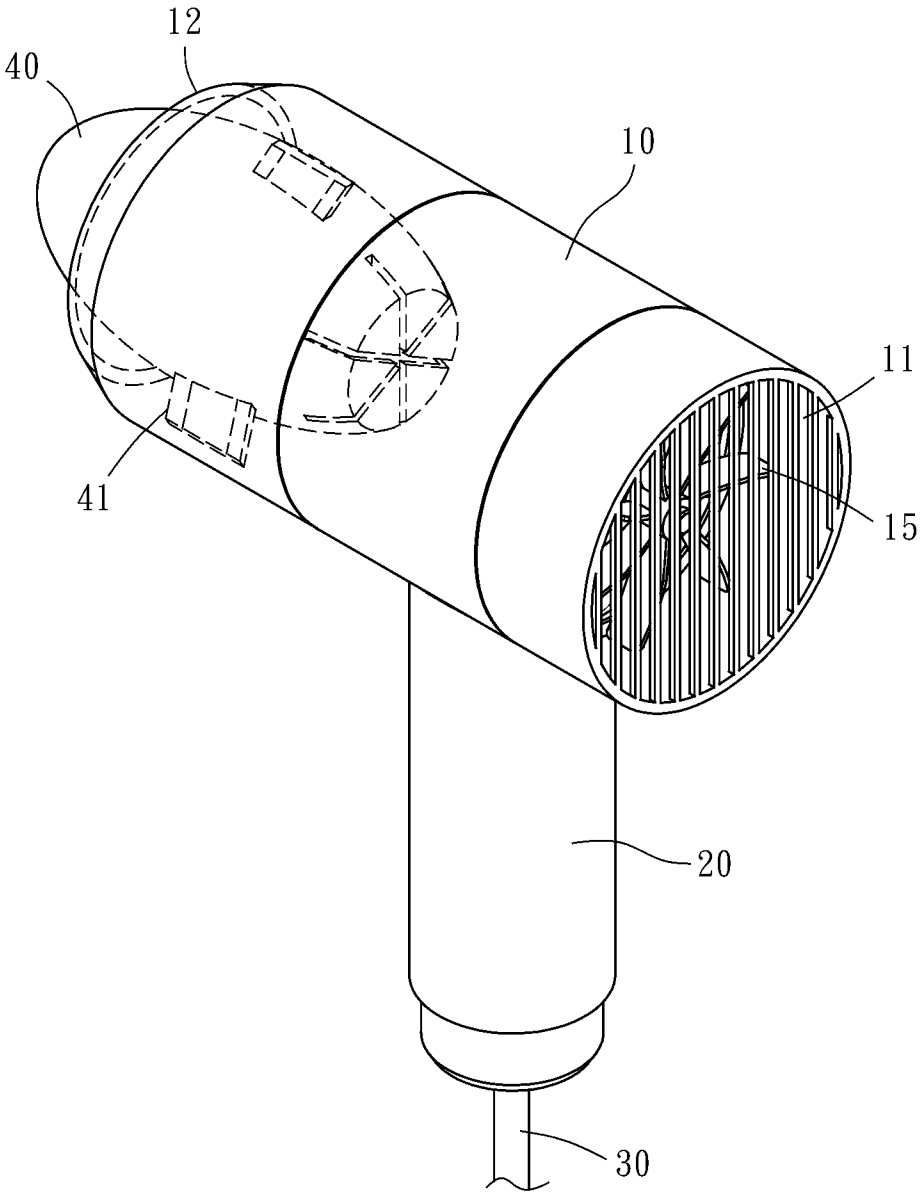
第1圖



第2圖



第3圖



第4圖

TWM580903U Hair dryer

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The wording below is an initial machine translation of the original publication. To generate a version using the latest translation technology, go to the original language text and use Patent Translate.

hair dryer

This creation is related to hairdressing appliances, namely a hair dryer.

It is known that most existing hair dryers use a motor to drive a fan to rotate, and use the rotation of the fan to blow air out of a tube to create a blowing effect. When such a hair dryer wants to increase its air output, the usual approach is to increase the output power of the motor so that the fan can rotate faster to blow out more air. However, this approach will also increase the power consumption of the hair dryer. Increase.

In view of the above-mentioned shortcomings of the prior art, the main purpose of this invention is to provide a hair dryer that can increase the air output without increasing the motor output power.

In order to achieve the above purpose, the present invention provides a hair dryer including: a body, which is elongated and has an opening at both ends of its long axis, which are respectively an air inlet opening and an air outlet opening. There is a tubular space in the body that is connected to the air inlet opening and the air outlet opening respectively. A motor and a fan are installed in the tubular space. A grip is provided with a top end on one side of the body for the user to hold, and a control switch is provided on the grip. A power cord is connected to a tail end of the handle. A guide body is elongated and is located at the air outlet opening of the body. One end of the guide body protrudes from the air outlet opening, and the length L2 of the guide body protruding out of the air outlet opening is less than or equal to 1/2 of the total length L1 of the guide body.

Because the guide body protrudes from the air outlet opening, a Coanda effect can be formed at the air outlet opening to increase the air volume and achieve the purpose of this invention.

Preferably, the flow diversion system is in the shape of an elongated shape, and its symmetrical shape along the long axis forms a better flow diversion effect.

Preferably, the maximum outer diameter of the guide body is 50% to 90% of the diameter of the air outlet opening.

As shown in Figures 1 to 4, the hair dryer provided by this invention includes:

A body 10 is elongated and has an opening at both ends in the long axis direction, which are an air inlet opening 11 and an air outlet opening 12 respectively. There is a tubular space 13 in the body 10 that is connected with the air inlet opening 11 and the air outlet opening 12 respectively. A motor 14 and a fan 15 are provided in the tubular space 13. With the push of the fan 15, the air can flow through the inlet. The air opening 11 enters the tubular space 13 and then flows out of the tubular space 13 through the air outlet opening 12 .

A handle 20 is provided with a top end 21 on one side of the body 10 for the user to hold. The handle 20 is provided with a control switch 22 to control the opening and closing of the hair dryer and the wind speed.

A power cord 30 is connected to a tail end 23 of the handle 20 for the user to connect to a power socket to provide the power required by the hair dryer.

The characteristics of this creation are:

A guide body 40 is elongated, preferably elongated or egg-shaped, and is located at the air outlet opening 12 of the body. A plurality of connecting rods 41 are provided on the peripheral surface of the guide body 40 . One end of the connecting rods 41 is connected to the guide body 40 , and the other end is connected to the wall of the tubular space 13 of the main body. One end of the guide body 40 protrudes from the air outlet opening 12 and the length L2 of the guide body 40 protrudes from the air outlet opening 12 is less than or equal to 1/2 but greater than or equal to 1/4 of the total length L1 of the guide body. The best situation is to make the maximum outer diameter of the guide body 40 fall on the edge of the air outlet opening 12 . Moreover, the size of the largest outer diameter of the guide body 40 is smaller than the size of the air outlet opening 12 of the body. If the maximum outer diameter of the guide body is too large, it will cause obstruction of the air outlet opening, but if it is too small, the flow guide effect will not be obvious. Therefore, if the size D2 of the maximum outer diameter of the guide body 40 is compared with the diameter of the air outlet opening, Comparing the size of D1, the size D2 of the largest outer diameter of the guide body 40 is 50% to 90% of the diameter D1 of the air outlet opening 12, which can achieve a better guide effect.

With the structure of this invention, when the air is blown by the fan 15 and flows from the tubular space 13 toward the air outlet opening 12, a Coanda effect will be formed when the air passes through the air outlet opening 12 along the guide body 40. The so-called Coanda effect refers to the tendency of fluid to deviate from its original flow direction and flow along the surface of a protruding object, and will cause surrounding fluids to join this jet. Due to the change in the movement direction of the fluid, a lower pressure area will be formed around it. That is, when the air flow passes through the curved surface, the air pressure difference will attract the air around the outside of the air outlet opening, thereby increasing the amount of air output. In this way, this invention can increase the amount of air blown out from the air outlet opening without increasing the motor output power.

10···Body 11···Air intake opening 12···Exhaust opening 13···Tubular space 14···Motor 15···Fan 20···Grip 21···Top 22···Control switch 23···Tail end 30···power cord 40···Conductor 41···Connecting rod

Picture 1 is a three-dimensional view of the appearance of this creation. Picture 2 is the left side view of this creation. Figure 3 is a cross-sectional view along line 3-3 in Figure 1. Figure 4 is a three-dimensional view of the invention from another angle, and the part of the guide body inside the main body is indicated by a dotted line.

10···Body 11···Air intake opening 12···Exhaust opening 13···Tubular space 14···Motor 15···Fan 20···Grip 21···Top 22···Control switch 23···Tail end 30···power cord 40···Conductor 41···Connecting rod

Claims:

A hair dryer, including: A body with an air inlet opening and an air outlet opening. The body has a tubular space connected to the air inlet opening and the air outlet opening. A motor and a fan are provided in the tubular space; A handle , with a top end provided on one side of the body for the user to hold. The handle is provided with a control switch to control the opening and closing of the hair dryer and the size of the wind speed; A power cord is connected to one end of the handle The end is used for the user to plug into a power outlet to provide the power required by the hair dryer; It is characterized by: A guide body, elongated, located at the air outlet opening of the body, one end of the guide body protrudes from The air outlet opening, and the size of the largest outer diameter of the guide body is smaller than the size of the air outlet opening of the body.

The hair dryer of claim 1, wherein one end of the guide body protrudes from the air outlet opening and the length of the guide body protruding out of the air outlet opening is less than or equal to 1/2 but greater than or equal to 1/ of the total length of the guide body. 4.

The hair dryer as described in claim 2, wherein the size of the largest outer diameter of the guide body is 50% to 90% of the diameter of the air outlet opening.

The hair dryer as described in claim 1, wherein the size of the largest outer diameter of the guide body is 50% to 90% of the diameter of the air outlet opening.

The hair dryer as claimed in claim 1, wherein the guide body is in an oblong shape.

The hair dryer of claim 5, wherein the maximum outer diameter of the guide body is located at the edge of the air outlet opening.

The hair dryer of claim 6, wherein one end of the guide body protrudes from the air outlet opening and the length of the guide body protruding out of the air outlet opening is less than or equal to 1/2 but greater than or equal to 1/ of the total length of the guide body. 4.

The hair dryer as described in claim 7, wherein the size of the largest outer diameter of the guide body is 50% to 90% of the diameter of the air outlet opening.

The hair dryer as described in claim 6, wherein the size of the largest outer diameter of the guide body is 50% to 90% of the diameter of the air outlet opening.

The hair dryer of claim 5, wherein a plurality of connecting rods are provided on the peripheral surface of the guide body, one end of the connecting rods is connected to the guide body, and the other end is connected to the wall of the tubular space of the body.

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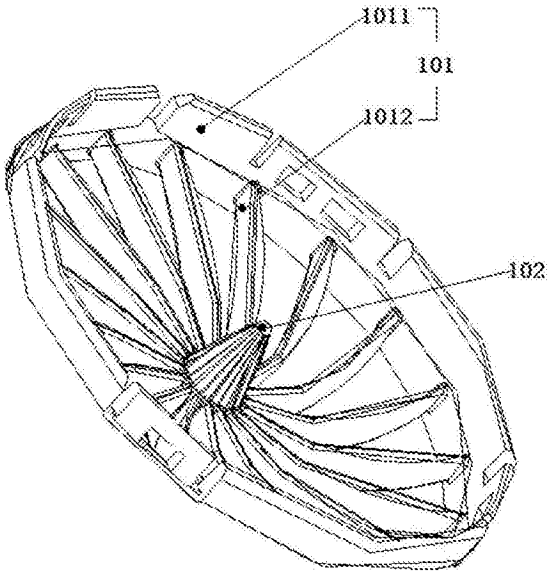
权利要求书1页 说明书7页 附图6页

(54)发明名称

一种电吹风导风结构及电吹风

(57)摘要

本申请公开了一种电吹风导风结构及电吹风，属于电器领域。该导风结构包括：安装在电吹风主体的出风口处的支撑体；设置在所述支撑体上的锥形导流体，锥形导流体的外径沿风向逐渐增大。通过在出风口处设置支撑体，来为该导风机构提供支撑；通过在支撑体上设置锥形导流体，锥形导流体的上述结构将显著减小其与出风的摩擦力，并且，出风在锥形导流体的导流作用下逐渐发散，从而达到降低出风所受阻力的目的。



CN 107928071 A

1.一种电吹风导风结构，其特征在于，所述导风结构包括：安装在电吹风主体的出风口处的支撑体(101)；

设置在所述支撑体(101)中部的锥形导流体(102)，所述锥形导流体(102)的外径沿风向逐渐增大。

2.根据权利要求1所述的电吹风导风结构，其特征在于，所述锥形导流体(102)的外壁上沿轴向方向设置有多条导流槽(1021)。

3.根据权利要求2所述的电吹风导风结构，所述导流槽(1021)设置成弯槽。

4.根据权利要求1所述的电吹风导风结构，其特征在于，所述锥形导流体(102)的锥顶设置成球体结构。

5.根据权利要求1所述的电吹风导风结构，其特征在于，所述锥形导流体(102)与所述出风口的中轴线重合。

6.根据权利要求1-5任一项所述的电吹风导风结构，其特征在于，所述支撑体(101)包括：环状支撑(1011)、设置在所述环状支撑(1011)内部的导风支撑(1012)；

所述环状支撑(1011)安装在所述出风口处；

所述锥形导流体(102)安装在所述导风支撑(1012)中部。

7.根据权利要求6所述的电吹风导风结构，其特征在于，所述导风支撑(1012)包括：多条螺旋导风片；

所述螺旋导风片的一端与所述环状支撑(1011)的内侧壁连接，另一端与所述锥形导流体(102)的端部侧壁连接。

8.根据权利要求7所述的电吹风导风结构，其特征在于，所述导风支撑(1012)沿风向凸出于所述环状支撑(1011)外部。

9.一种电吹风，其特征在于，所述电吹风包括权利要求1-8任一项所述的导风结构(1)。

10.根据权利要求9所述的电吹风，其特征在于，所述电吹风包括：电吹风主体；

所述电吹风主体的出风口处还设置有出风网(2)；

所述出风网(2)、所述导风结构(1)沿风向依次设置。

11.根据权利要求10所述的电吹风，其特征在于，所述出风网(2)包括：环形支撑、设置在所述环形支撑内部的网状本体；

所述网状本体沿与风向相反的方向凸出于所述环形支撑外部。

12.根据权利要求10所述的电吹风，其特征在于，所述电吹风主体的出风口处还设置有风嘴(3)；

所述出风网(2)、所述导风结构(1)、所述风嘴(3)沿风向依次设置。

13.根据权利要求9-12任一项所述的电吹风，其特征在于，所述电吹风主体包括：本体外壳(5)；

与所述本体外壳(5)的侧壁连接的手柄外壳(6)；

设置在所述手柄外壳(6)内部的主控元件；

设置在所述手柄外壳(6)上，且与所述主控元件电性连接的开关元件；

设置在所述本体外壳(5)内部，且与所述主控元件电性连接的电吹风本体(7)；

与所述主控元件电性连接，且由所述手柄外壳(6)的后端穿出的电源线(8)；

所述本体外壳(5)的两端分别设置有进风口和出风口。

一种电吹风导风结构及电吹风

技术领域

[0001] 本公开涉及电器领域，特别涉及一种电吹风导风结构及电吹风。

背景技术

[0002] 电吹风通过产生具有特定温度的风起到干燥作用，其包括：电吹风主体、设置在电吹风主体两端的进风口和出风口。电吹风主体由进风口吸入空气，形成一定温度和风速的风，并由出风口排出。

[0003] 现有技术通常在电吹风的出风口处设置平面出风网，以对出风进行导流，其中，平面出风网的中心位置处汇集成一平面状中心连接点。

[0004] 发明人发现，现有技术至少存在以下技术问题：

[0005] 出风由平面出风网直接排出时，其中心连接点会对出风产生阻力，使风速受到影响。

[0006] 公开内容

[0007] 为克服相关技术中存在的问题，本公开提供一种电吹风导风结构及电吹风，所述技术方案如下：

[0008] 第一方面，提供了一种电吹风导风结构，所述导风结构包括：安装在电吹风主体的出风口处的支撑体；

[0009] 设置在所述支撑体中部的锥形导流体，所述锥形导流体的外径沿风向逐渐增大。

[0010] 在一种可能的实现方式中，所述锥形导流体的外壁上沿轴向方向设置有多条导流槽。

[0011] 在一种可能的实现方式中，所述导流槽设置成弯槽。

[0012] 在一种可能的实现方式中，所述锥形导流体的锥顶设置成球体结构。

[0013] 在一种可能的实现方式中，所述锥形导流体与所述出风口的中轴线重合。

[0014] 在一种可能的实现方式中，所述支撑体包括：环状支撑、设置在所述环状支撑内部的导风支撑；

[0015] 所述环状支撑安装在所述出风口处；

[0016] 所述锥形导流体安装在所述导风支撑中部。

[0017] 在一种可能的实现方式中，所述导风支撑包括：多条螺旋导风片；

[0018] 所述螺旋导风片的一端与所述环状支撑的内侧壁连接，另一端与所述锥形导流体的端部侧壁连接。

[0019] 在一种可能的实现方式中，所述导风支撑沿风向凸出于所述环状支撑外部。

[0020] 第二方面，本公开实施例提供了一种电吹风，其特征在于，所述电吹风包括第一方面所提及的任一项导风结构。

[0021] 在一种可能的实现方式中，所述电吹风包括：电吹风主体；

[0022] 所述电吹风主体的出风口处还设置有出风网；

[0023] 所述出风网、所述导风结构沿风向依次设置。

[0024] 在一种可能的实现方式中，所述出风网包括：环形支撑、设置在所述环形支撑内部的网状本体；

[0025] 所述网状本体沿与风向相反的方向凸出于所述环形支撑外部。

[0026] 在一种可能的实现方式中，所述电吹风主体的出风口处还设置有风嘴；

[0027] 所述出风网、所述导风结构、所述风嘴沿风向依次设置。

[0028] 在一种可能的实现方式中，所述电吹风主体包括：本体外壳；

[0029] 与所述本体外壳的侧壁连接的手柄外壳；

[0030] 设置在所述手柄外壳内部的主控元件；

[0031] 设置在所述手柄外壳上，且与所述主控元件电性连接的开关元件；

[0032] 设置在所述本体外壳内部，且与所述主控元件电性连接的电吹风本体；

[0033] 与所述主控元件电性连接，且由所述手柄外壳的后端穿出的电源线；

[0034] 所述本体外壳的两端分别设置有进风口和出风口。

[0035] 本公开实施例提供的技术方案带来的有益效果是：

[0036] 本公开实施例在电吹风主体的出风口处安装导风结构来降低风阻，通过在出风口处设置支撑体，来为该导风机构提供支撑；通过在支撑体的中部设置锥形导流体，并使其外径沿风向逐渐增大，锥形导流体的上述结构将显著减小其与出风的摩擦力，并且，出风在锥形导流体的导流作用下逐渐发散，从而达到降低出风所受阻力的目的。

附图说明

[0037] 为了更清楚地说明本公开实施例中的技术方案，下面将对实施例描述中所需要使用的附图作简单地介绍，显而易见地，下面描述中的附图仅仅是本公开的一些实施例，对于本领域普通技术人员来讲，在不付出创造性劳动的前提下，还可以根据这些附图获得其他的附图。

[0038] 图1-1是本公开实施例提供的，从第一视角获取的电吹风导风结构的结构示意图；

[0039] 图1-2是本公开实施例提供的，从第二视角获取的电吹风导风结构的结构示意图；

[0040] 图2是本公开实施例提供的锥形导流体的结构示意图；

[0041] 图3是本公开实施例提供的出风网与电吹风主体的连接关系示意图；

[0042] 图4是本公开实施例提供的导风结构、出风网与电吹风主体的连接关系示意图；

[0043] 图5是本公开实施例提供的电吹风的爆炸图。

[0044] 附图标记分别表示：

[0045] 1-导风结构，

[0046] 101-支撑体，1011-环状支撑，1012-导风支撑，

[0047] 102-锥形导流体，1021-导流槽，

[0048] 2-出风网，

[0049] 3-风嘴，

[0050] 4-进风网，

[0051] 5-本体外壳，

[0052] 6-手柄外壳，

[0053] 7-电吹风本体，

[0054] 8-电源线，

[0055] 9-内支撑件，

[0056] 10-盖板，

[0057] 11-螺钉。

具体实施方式

[0058] 除非另有定义，本公开实施例所用的所有技术术语均具有与本领域技术人员通常理解的相同的含义。为使本公开的目的、技术方案和优点更加清楚，下面将结合附图对本公开实施方式作进一步地详细描述。

[0059] 第一方面，本公开实施例提供了一种电吹风导风结构，如附图1-1及附图1-2所示，该导风结构1包括：安装在电吹风主体的出风口处的支撑体101；设置在支撑体101中部的锥形导流体102，锥形导流体102的外径沿风向逐渐增大。

[0060] 本公开实施例在电吹风主体的出风口处安装导风结构来降低风阻，具体地，通过在出风口处设置支撑体101，来为该导风机构提供支撑；通过在支撑体101的中部设置锥形导流体102，并使其外径沿风向逐渐增大，锥形导流体102的上述结构将显著减小其与出风之间的摩擦力，并且，出风在锥形导流体102的导流作用逐渐发散，从而达到降低出风所受阻力的目的。

[0061] 此外，锥形导流体102也起到了中心连接点的作用，但是，通过对其结构的上述限定，相比于平面状的中心连接点，锥形导流体102利于降低出风所受阻力，同时还达到了使出风均匀导流的目的。

[0062] 可以理解的是，本公开实施例所述的“风向”指的是：风由进风口流动至出风口的方向。锥形导流体102的外径沿风向逐渐增大，也可以理解为，其面向进风口的端部(即，锥顶)的外径为最小外径，面向出风口的端部(即，锥底)的外径为最大外径。

[0063] 为了提高该锥形导流体102的导流效果，达到进一步降低风阻的目的，如附图2所示，本公开实施例在锥形导流体102的外壁上沿轴向方向设置有多条导流槽1021。即，每条导流槽1021在锥形导流体102的外壁上由其面向进风口的一端延伸至其面向出风口的一端，同时，多条导流槽1021沿锥形导流体102的周向均匀分布。

[0064] 进一步地，该导流槽1021设置成弯槽，以扩大导流槽1021的面积，达到优化降阻效果的目的。

[0065] 对于每一条导流槽1021来说，其弯曲方向与电吹风本体7内部的风扇旋向相同，以使出风沿着其原本的旋流方向经过导流槽1021，利于进一步减少风阻。

[0066] 本公开实施例中，将锥形导流体102的锥顶设置成球体结构，由于出风首先会与锥形导流体102的锥顶接触，通过将该锥顶设置为球体结构，利于对出风进行均匀分配，提高其导流时的均匀性。

[0067] 为了使出风经锥形导流体102的锥顶均匀分配后可直接流经其外壁上的导流槽1021，锥顶上的球体结构可以为半球体。可以理解的是，半球体的球面面向进风口。

[0068] 为了对出风进行均匀导流，本公开实施例中，锥形导流体102与出风口的中轴线重合。

[0069] 考虑到使电吹风轻量化的目的，本公开实施例可以将锥形导流体102设置为空心

结构，其空腔面向出风口。进一步地，可使锥形导流体102的材质为高强质轻的材料，例如聚氯乙烯、聚乙烯、聚丙烯、聚苯乙烯、改性聚苯乙烯塑料等。

[0070] 以上对锥形导流体102的结构进行了阐述，以下就用于支撑锥形导流体102的支撑体101的结构进行示例说明：

[0071] 如附图1-1及附图1-2所示，该支撑体101包括：环状支撑1011、设置在环状支撑1011内部的导风支撑1012。其中，环状支撑1011安装在出风口处；锥形导流体102安装在导风支撑1012中部。

[0072] 考虑到电吹风的出风口均设计成环状结构，本公开实施例通过环状支撑1011来将支撑体101安装在出风口处。可以理解的是，环状支撑1011与出风口的结构相适配。

[0073] 为了确保出风经锥形导流体102后可以顺利排出，通过在环状支撑1011内部设置导风支撑1012，以确保出风的流通性。同时，通过将锥形导流体102安装在导风支撑1012上，来为锥形导流体102提供稳定支撑。

[0074] 为了便于对电吹风内部进行维护和清洁，环状支撑1011以可拆卸的方式安装在电吹风的出风口处，举例来说，可以通过螺纹连接、卡接、扣接等方式进行上述安装。

[0075] 示例地，当采用螺纹连接方式时，可以在出风口的内壁上设置内螺纹，在环状支撑1011的外壁上设置与其相适配的外螺纹，使环状支撑1011套设于出风口内部即可。

[0076] 示例地，当采用卡接方式时，可以在出风口和环状支撑1011上设置适配卡接的第一卡接块与第二卡接块。例如，第一卡接块可以设置成卡槽，第二卡接块可以设置成弹性卡体，当弹性卡体受到径向压力时可以收缩，以适配插入卡槽内，并在卡槽内释放，以确保两者的稳定卡接。举例来说，第一卡接块可以设置在出风口的内壁上，对应地，第二卡接块可以设置在环状支撑1011的外壁上。

[0077] 示例地，当采用扣接方式时，可以在出风口和环状支撑1011上设置适配扣接的公扣和母扣。举例来说，可以在出风口的端面上设置公扣，在环状支撑1011的端面上设置母扣即可。

[0078] 考虑到导风支撑1012一方面需要为锥形导流体102提供支撑，一方面需要提供良好的导流功能，且不能增加风阻，在本公开实施例中，导风支撑1012包括：多条螺旋导风片，其中，螺旋导风片的一端与环状支撑1011的内侧壁连接，另一端与锥形导流体102的端部侧壁连接。

[0079] 可以理解的是，多条螺旋导风片的螺旋方向与电吹风本体7内部的风扇旋向相同。

[0080] 对于多个螺旋导风片来说，其一端汇集在锥形导流体102的端部侧壁上，另一端分散在环状支撑1011的内侧壁上，使相邻两个螺旋导风片之间的间距逐渐增大，利于提高对出风的分散性，在满足降低风阻的同时，提高导流效果。

[0081] 进一步地，导风支撑1012沿风向凸出于环状支撑1011外部，即，导风支撑1012与锥形导流体102连接的一端位于环状支撑1011外部，而其与环状支撑1011连接的一端位于环状支撑1011的内部，如此设置，可使出风迅速导流至外部，进一步降低出风所受阻力。

[0082] 锥形导流体102可通过焊接、插接、卡接等方式与支撑体101的中部(即导风支撑1012的中部)连接，考虑到能够提高导风结构1的强度，可以使锥形导流体102与支撑体101一体成型。

[0083] 第二方面，本公开实施例还提供了一种电吹风，该电吹风包括第一方面所提及的

任一项导风结构1。

[0084] 本公开实施例提供的电吹风，基于采用了上述导风结构1，能够有效降低出风口处的风阻，不仅利于获得更好的体验效果，且利于减小电吹风的功耗。

[0085] 示例地，如附图3所示，该电吹风包括：电吹风主体；其中，电吹风主体的出风口处还设置有出风网2；如附图4所示，出风网2、导风结构1沿风向依次设置。

[0086] 可以理解的是，出风网2、导风结构1沿风向依次设置可以理解为两者由内至外顺次设置，通过设置出风网2，以将外界的杂质与电吹风本体7内部进行隔离，同时，也可实现对出风进行导流。

[0087] 作为一种示例，出风网2包括：环形支撑、设置在环形支撑内部的网状本体。其中，网状本体沿与风向相反的方向凸出于环形支撑外部。通过如此设置出风网2的结构，其与导风结构1相互配合，两者之间利于获得更大的容风空间，利于提高导风结构1的减阻效果。

[0088] 为了使出风网2也能降低风阻，可以使出风网2的网状本体中部设置环状中心连接点。

[0089] 为了使电吹风吹出去的风能够沿特定的方向吹出，本公开实施例中，如附图5所示，电吹风主体的出风口处还设置有风嘴3。其中，出风网2、导风结构1、风嘴3沿风向依次设置。

[0090] 对于风嘴3的结构来说，其可以包括顺次连接的连接体和嘴体，其中，连接体安装在出风口处，嘴体可以设置成特定的形状，以获取特定的风向，而连接体的内腔结构设置成能够使出风顺利导流至嘴体即可。示例地，嘴体可以设置成扁腔状。

[0091] 进一步地，如附图5所示，在电吹风主体的进风口处还设置有进风网4，通过设置进风网4，以将外界的杂质与电吹风本体7内部进行隔离，同时，也可实现对来风进行导流的作用。其中，进风网4包括：环形支撑、设置在环形支撑内部的网状本体。其中，网状本体沿与风向相反的方向凸出于环形支撑外部。

[0092] 对于电吹风来说，其电吹风主体为本领域所常见的，以下就电吹风主体的结构给出示例说明：

[0093] 如附图5所示，该电吹风主体包括：本体外壳5；

[0094] 与本体外壳5的侧壁连接的手柄外壳6；

[0095] 设置在手柄外壳6内部的主控元件；

[0096] 设置在手柄外壳6上，且与主控元件电性连接的开关元件；

[0097] 设置在本体外壳5内部，且与主控元件电性连接的电吹风本体7；

[0098] 与主控元件电性连接，且由手柄外壳6的后端穿出的电源线8；

[0099] 本体外壳5的两端分别设置有进风口和出风口。

[0100] 应用时，通过将电源线8插接在外部电源上，来为电吹风供电。通过操作开关元件，使主控元件控制电吹风本体7进行吹风作业。

[0101] 可以理解的是，电吹风本体7包括：壳体、风扇元件和电加热元件。其中，风扇元件包括：设置在壳体内部且与主控元件电性连接的电动机，以及，设置在壳体外部且与电动机的输出轴连接的扇叶。在主控元件的控制下，电动机的输出轴进行旋转，进而带动扇叶旋转，从而由本体外壳5上的进风口吸入空气，而由本体外壳5上的出风口吹出风。

[0102] 电加热元件包括：设置在电吹风本体7的壳体内部，且与主控元件电性连接的电加

热丝。在主控元件的控制下，电加热丝加热，使由此经过的冷风变成热风，进而由吹风口吹出。

[0103] 对于上述的主控元件来说，其可设计成印制电路板的形式，并且可以通过螺丝固定在手柄外壳6内部，同时，该主控元件与设置在手柄外壳6上的开关元件相对。

[0104] 主控元件与电吹风本体7的电动机和电加热丝电性连接，以对两者进行作业控制，可以理解的是，主控元件可通过线缆与电动机和电加热丝电性连接，该线缆由手柄外壳6前端引出，直至伸入到电吹风本体7的壳体内部。

[0105] 主控元件与开关元件电性连接，两者可以通过电触点的方式进行电性连接。

[0106] 其中，开关元件可以包括：开关按键，进一步地，还可包括：调温按钮或推钮、以及，调速按钮或推钮。其中，通过按压开关按键，使其上的触点与主控元件上的触点相接触，以使主控元件控制电动机和/或电加热丝的开/关。

[0107] 通过按压或者推拉调温按钮或推钮，使其上的电子触点与主控元件上的电子触点相接触，以使主控元件控制电加热丝的温度，进而实现对风温大小的调节。

[0108] 通过按压或者推拉调速按钮或推钮，使其上的电子触点与主控元件上的电子触点相接触，以使主控元件控制电动机的转速，进而实现对风速大小的调节。

[0109] 进一步地，还可以在手柄外壳6上设置用于显示风速和风温的显示屏元件，其同样与主控元件电性连接，以在进行风速和风温调节时，其适应性地显示对应的风速等级和风温等级。

[0110] 对于本体外壳5和手柄外壳6来说，在本公开实施例中，如附图5所示，本体外壳5可以一体成型制备得到，并且，手柄外壳6也可以一体成型制备得到。该电吹风还可以包括：内支撑件9。其中，本体外壳5用于容纳电吹风本体7，且本体外壳5的侧壁上设置有作业孔；内支撑件9的前端用于与暴露于作业孔中的电吹风本体7的外壁可拆卸连接；手柄外壳6套设于内支撑件9外部，且手柄外壳6的前端与作业孔卡接。

[0111] 当进行电吹风的组装时，可将电吹风本体7放置于本体外壳5内部，随后，利用内支撑件9的前端与暴露于作业孔中的电吹风本体7连接，并将主控元件和电源线8安装于内支撑件9上，随后，将手柄外壳6套设于内支撑件9外部，并使电源线8由手柄外壳6后端引出，随后，使手柄外壳6的前端与本体外壳5侧壁上的作业孔进行卡接，即可实现电吹风的组装。

[0112] 综上可知，本公开实施例提供的电吹风，通过设置一体成型的本体外壳5和一体成型的手柄外壳6，并使手柄外壳6与本体外壳5上开设的作业孔卡接，其外表面无任何连接件，例如螺钉11外露，能提高电吹风外壳的触感和的整体美观性。同时，通过设置内支撑件9，使其不仅能与本体外壳5内部的电吹风本体7连接，还能够安装主控元件，实现对电吹风内部组件的固定。通过使手柄外壳6套设于内支撑件9外部，实现对以上各内部组件，特别是主控元件的密封和防护。可见，本公开实施例提供的电吹风，不仅便于电吹风的组装，而且，基于手柄外壳6和本体外壳5均一体成型，利于提高电吹风外壳的触感和美观性。

[0113] 其中，使手柄外壳6的后端与内支撑件9的后端通过可拆卸的紧固件连接。并且，该电吹风还包括：盖板10，盖装在手柄外壳6的后端。

[0114] 通过利用可拆卸的紧固件，即可实现手柄外壳6后端与内支撑件9后端的连接，当需要拆卸时，将紧固件拆卸下来即可。基于紧固件的存在，为了提高电吹风外壳的美观性，该电吹风还包括盖板10，以盖装在手柄外壳6的后端，从而将紧固件给密封于其内，防止其

外露。可以理解的是，盖板10上也设置有用于使电源线8穿过的线缆过孔。

[0115] 对于紧固件来说，其可以为螺钉、紧固销钉等，示例地，该紧固件可以为螺钉11(也可理解为螺丝)。此时，可以在手柄外壳6的后端内壁上设置至少一个连接块，同时在连接块上设置螺钉11孔。对应地，在内支撑件9的后端设置对应的连接块，在连接块上设置与螺钉11相适配的内螺纹孔，或者，直接在内支撑件9的后端设置与螺钉11相适配的内螺纹孔，使螺钉11穿过手柄外壳6后端上的螺钉11孔与内支撑件9后端的内螺纹孔螺纹连接即可。

[0116] 对于内支撑件9来说，考虑到其即要适配套设于手柄外壳6内部，又需要和电吹风本体7稳定连接，本公开实施例中，该内支撑件9包括：内支撑件9本体、设置在内支撑件9本体前端的连接体。其中，连接体用于与电吹风本体7的外壳可拆卸连接。

[0117] 通过设置连接体，使其与暴露于作业孔中的电吹风本体7的外壳适配连接。作为一种示例，该可拆卸连接可通过可拆卸的紧固件来实现，例如，该紧固件可以为螺钉11，此时，在卡接体和电吹风本体7上设置对应连通的内螺纹孔，通过使螺钉11与该内螺纹孔螺纹连接，即可实现两者的可拆卸连接。

[0118] 以上所述仅为本公开的说明性实施例，并不用以限制本公开的保护范围，凡在本公开的精神和原则之内，所作的任何修改、等同替换、改进等，均应包含在本公开的保护范围之内。

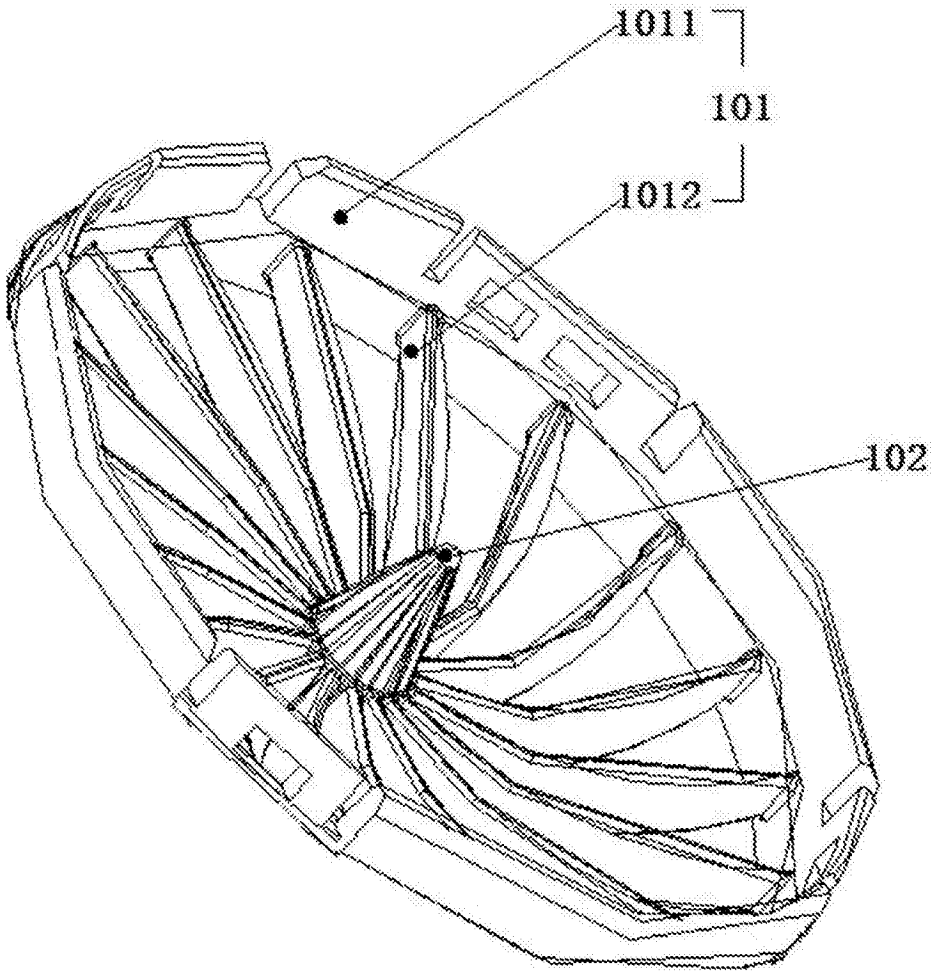


图1-1

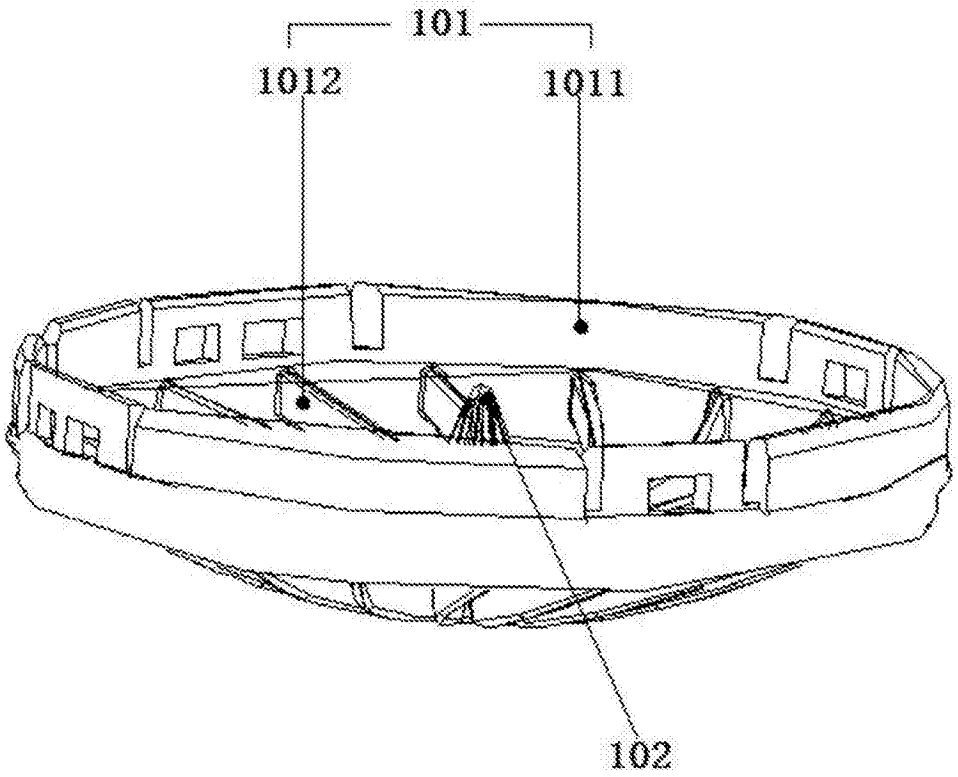


图1-2

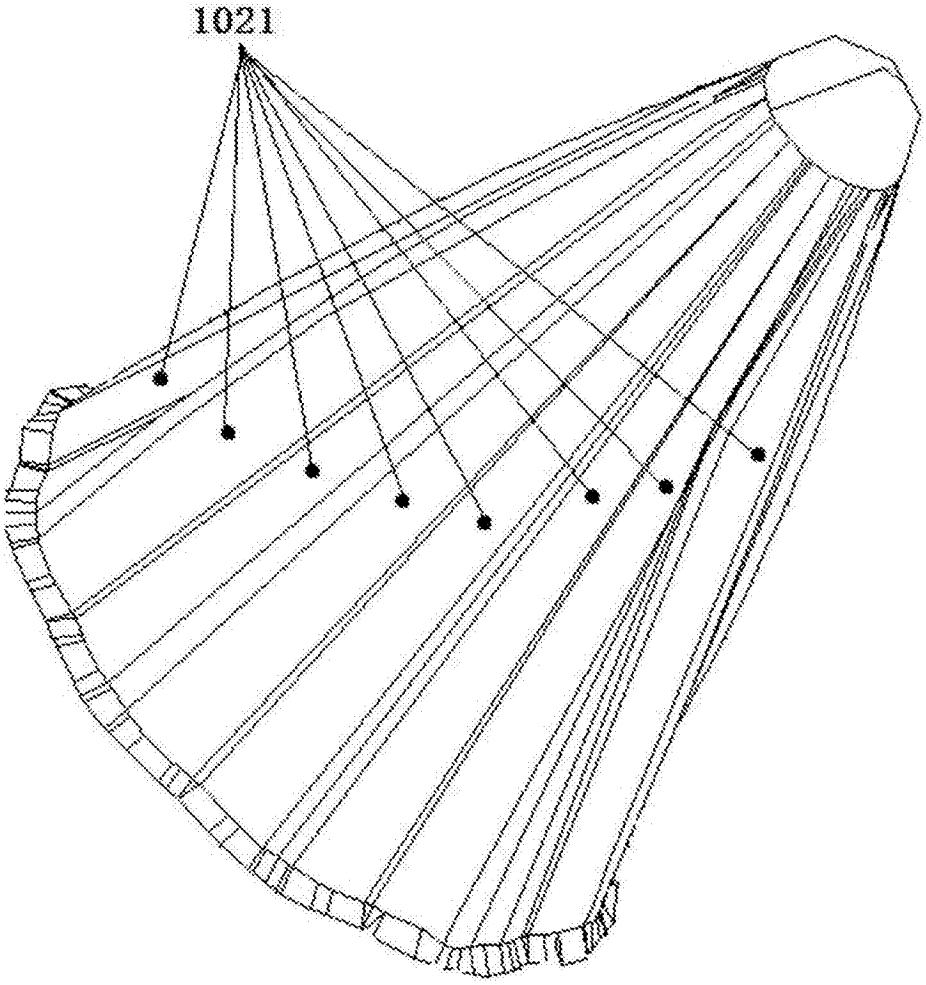


图2

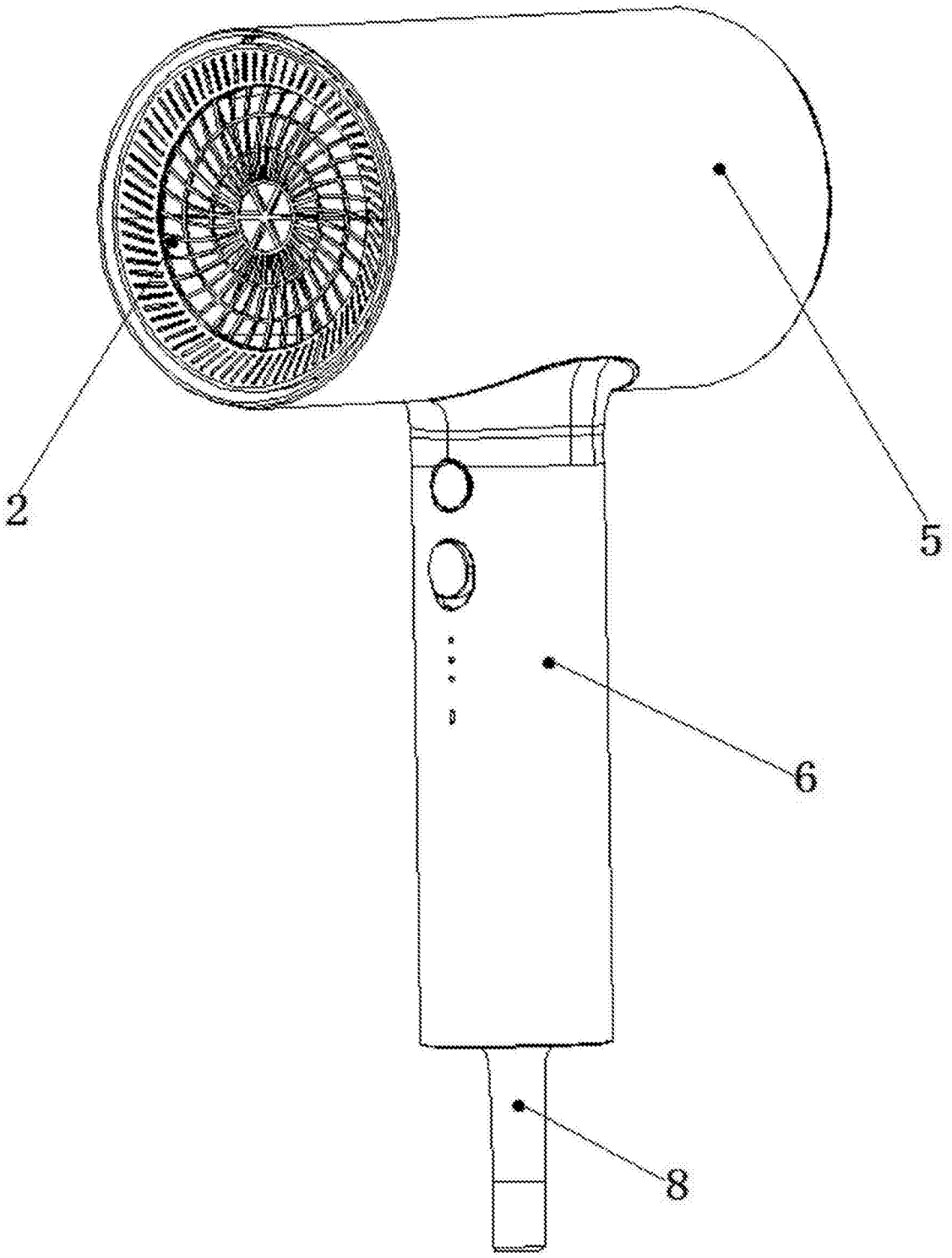


图3

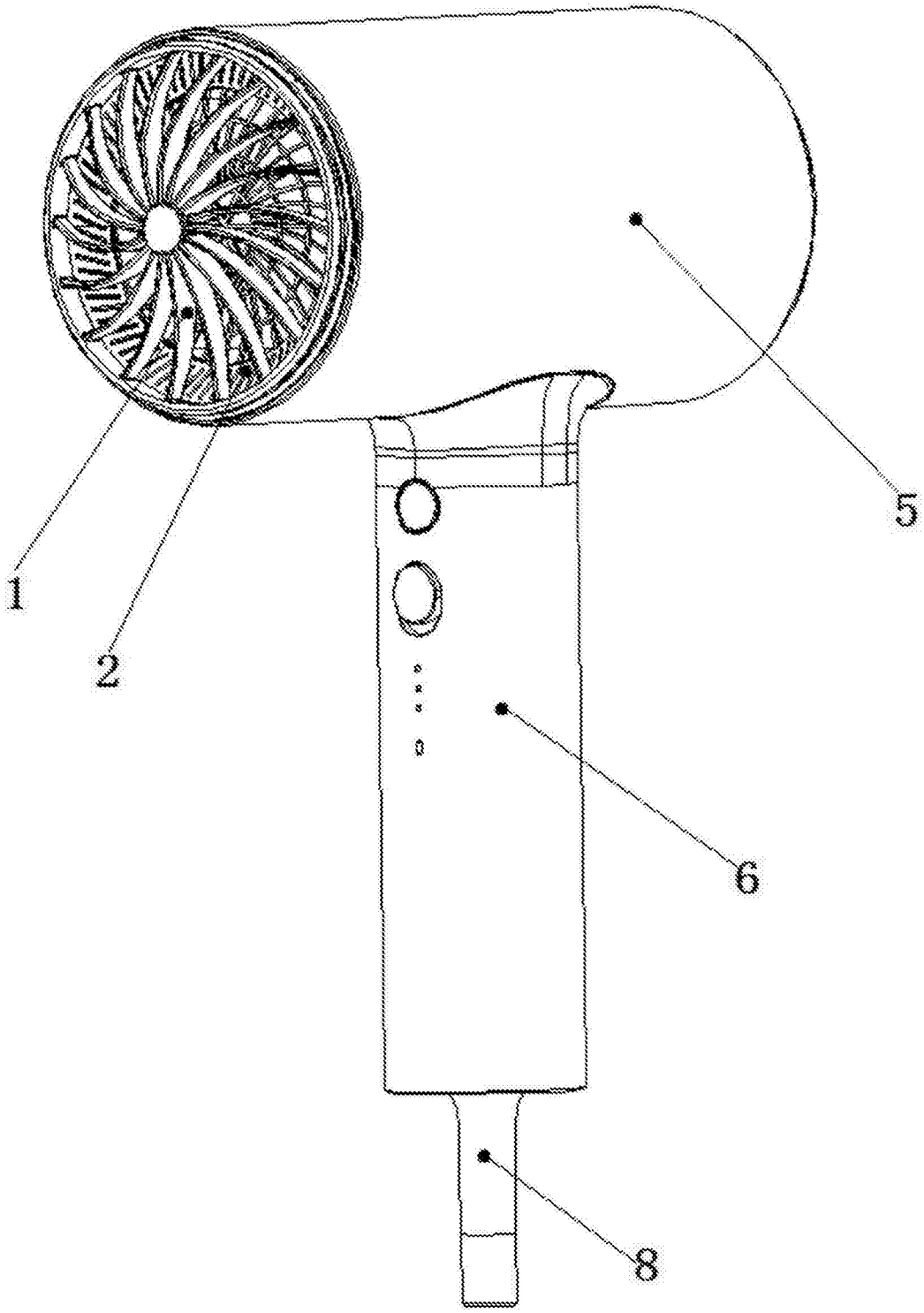


图4

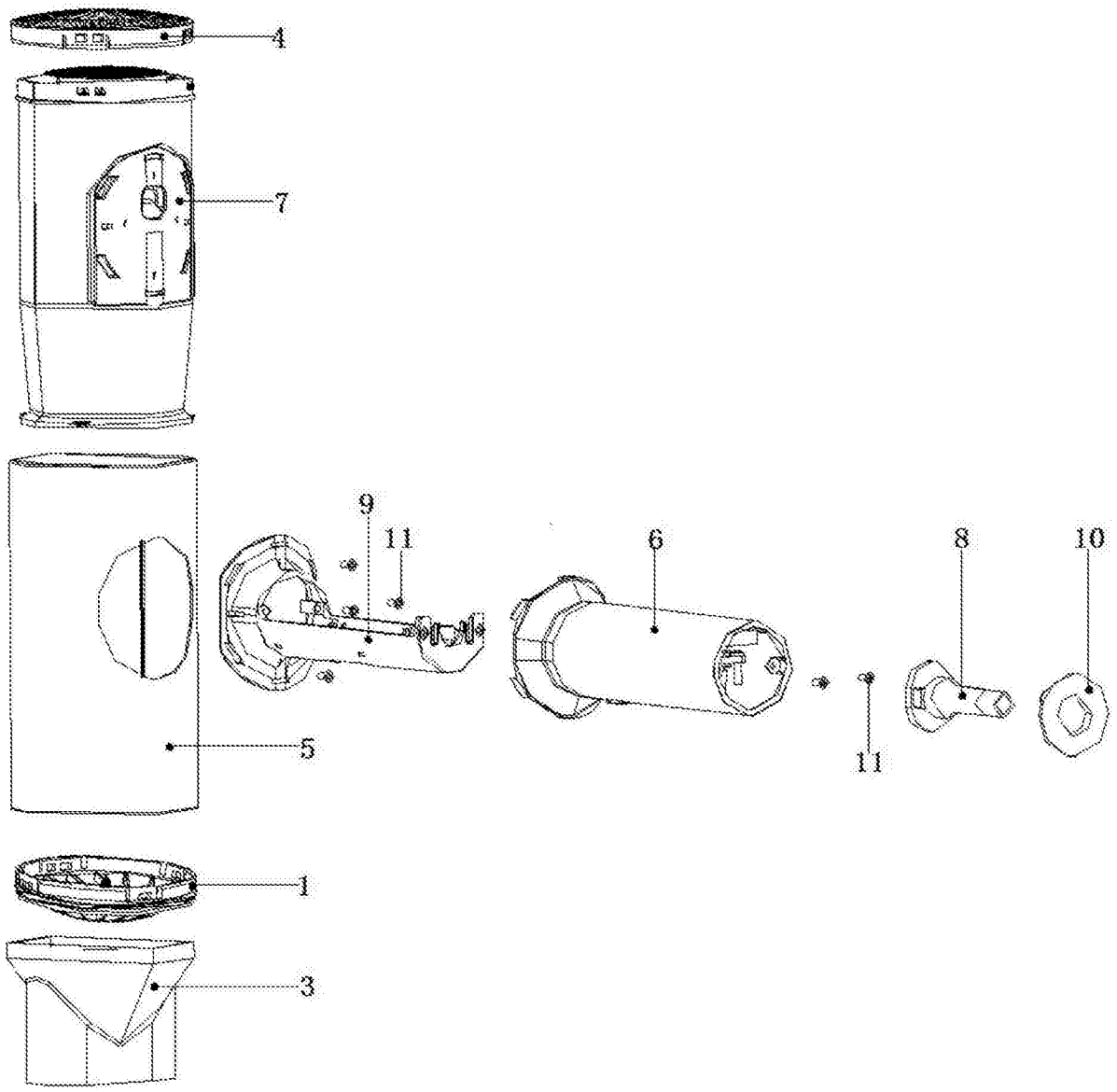


图5

CN107928071A Electric hair dryer air guide structure and electric hair dryer

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Hair dryer air guide structure and hair dryer

Technical field

The present disclosure relates to the field of electrical appliances, and in particular to a hair dryer air guide structure and a hair dryer.

Background technique

The hair dryer plays a role of drying by generating wind having a specific temperature, and includes a main body of the air blower, air inlets and air outlets disposed at both ends of the main body of the air blower. The main body of the hair dryer draws air from the air inlet to form a wind with a certain temperature and wind speed, and is discharged from the air outlet.

In the prior art, a plane outlet net is usually arranged at the outlet of the hair dryer to guide the outlet air, wherein a central connection point of the plane outlet net is gathered at a central position of the outlet net.

The inventor found that the existing technology has at least the following technical problems:

When the air outlet is directly discharged from the flat air outlet net, the center connection point will cause resistance to the wind, which will affect the wind speed.

Public content

In order to overcome the problems in related technologies, the present disclosure provides a hair dryer air guide structure and a hair dryer. The technical solution is as follows:

In a first aspect, a hair dryer air guide structure is provided. The air guide structure includes: a support body installed at an air outlet of a main body of a hair dryer;

A tapered conductive fluid is disposed in the middle of the support body, and the outer diameter of the tapered conductive fluid gradually increases along the wind direction.

In a possible implementation manner, a plurality of guiding grooves are arranged in the axial direction of the outer wall of the conical conducting body.

In a possible implementation, the flow guiding groove is configured as a curved groove.

In a possible implementation, the conical head of the conical conducting body is arranged in a spherical structure.

In a possible implementation, the tapered conductive fluid is coincident with the central axis of the air outlet.

In a possible implementation manner, the supporting body includes: a ring-shaped support and an air guide support disposed inside the annular support;

The annular support is installed at the air outlet;

The tapered guide fluid is mounted in the middle of the wind guide support.

In a possible implementation manner, the wind guide support includes: multiple spiral air guide blades;

One end of the spiral air guiding piece is connected with the inner side wall of the annular support, and the other end is connected with the side wall of the end of the conical flow guiding body.

In a possible implementation, the wind guide support protrudes outside the annular support in the wind direction.

In a second aspect, an embodiment of the present disclosure provides a hair dryer, characterized in that the hair dryer includes any of the air guide structures mentioned in the first aspect.

In a possible implementation manner, the hair dryer includes: a body of a hair dryer;

An outlet net is also arranged at the outlet of the main body of the hair dryer.

The air outlet net and the wind guide structure are arranged in sequence along the wind direction.

In a possible implementation manner, the air outlet net includes: an annular support, a mesh body disposed inside the annular support;

The mesh body projects out of the annular support in a direction opposite to the direction of the wind.

In a possible implementation manner, a tuyere is also provided at the outlet of the main body of the hair dryer.

The air outlet net, the air guide structure, and the air nozzle are arranged in sequence along the wind direction.

In a possible implementation manner, the hair dryer body includes: a body housing;

a handle housing connected to a side wall of the body housing;

a main control element provided inside the handle housing;

a switch element electrically connected to the main control element disposed on the handle housing;

a hair dryer body disposed inside the body housing and electrically connected to the master control element;

a power cord electrically connected to the main control element and passing through the rear end of the handle housing;

Both ends of the body housing are respectively provided with an air inlet and an air outlet.

The technical solution provided by the embodiment of the present disclosure brings the following beneficial effects:

In the embodiment of the present disclosure, an air guide structure is installed at the air outlet of the air blower body to reduce the wind resistance, and a support body is provided at the air outlet to provide support for the air guide mechanism; a conical flow guiding fluid is disposed in the middle of the support body. The outer diameter of the tapered conductive fluid will gradually reduce its friction with the wind, and the outflow will gradually diverge under the effect of the diversion of the tapered conductive fluid, so as to reduce the external diameter along the wind direction. The purpose of the resistance to the wind.

Description of the drawings

In order to more clearly explain the technical solutions in the embodiments of the present disclosure, the drawings needed to be used in the description of the embodiments will be briefly described below. Obviously, the drawings in the following description are merely some embodiments of the present disclosure. For those of ordinary skill in the art, other drawings may also be obtained based on these drawings without any creative work.

FIG. 1-1 is a schematic structural diagram of an air-guiding air-guiding structure obtained from a first perspective provided by an embodiment of the present disclosure; FIG.

1-2 is a schematic structural diagram of an air-guiding wind-guiding structure obtained from a second perspective provided by an embodiment of the present disclosure;

2 is a schematic structural view of a tapered conductive fluid provided by an embodiment of the present disclosure;

FIG. 3 is a schematic diagram of a connection relationship between an air outlet net and a hair dryer main body provided by an embodiment of the present disclosure; FIG.

4 is a schematic diagram of a connection relationship between an air guide structure, an air outlet net, and a hair dryer body according to an embodiment of the present disclosure;

FIG. 5 is an exploded view of a hair dryer provided by an embodiment of the present disclosure.

The reference numerals respectively indicate:

1- Wind guide structure,

101- Support body, 1011-ring support, 1012-wind deflector,

102- Cone-shaped fluid guide, 1021 - flow channel,

2- Out of the net,

3- Wind mouth,

4- Into the wind network,

5- body shell,

6- handle housing,

7- hair dryer body,

8-power cable,

9- Internal support,

10-covers,

11- Screws.

detailed description

Unless otherwise defined, all technical terms used in the embodiments of the present disclosure have the same meaning as commonly understood by those skilled in the art. To make the objectives, technical solutions, and advantages of the present disclosure more comprehensible, the embodiments of the present disclosure will be further described in detail below with reference to the accompanying drawings.

In a first aspect, an embodiment of the present disclosure provides an air-guiding wind-guiding structure. As shown in FIGS. 1-1 and 1-2, the air-guiding structure 1 includes: being installed at an air outlet of a hair dryer body. The support body 101 is a tapered conductive fluid 102 disposed in the middle of the support body 101. The outer diameter of the tapered conductive fluid 102 gradually increases along the wind direction.

The embodiment of the present disclosure installs a wind guide structure at the air outlet of the main body of the air blower to reduce the wind resistance. Specifically, the air guide mechanism is provided at the air outlet to provide support for the air guide mechanism; and it is set in the middle of the support body 101 . Conical guide fluid 102, and its outer diameter gradually increases in the direction of the wind, the above structure of the tapered guide fluid 102 will significantly reduce the friction between it and the wind, and the outflow of air in the tapered guide fluid 102 The diversion effect gradually diverges to achieve the purpose of reducing the resistance to the wind.

In addition, the conical guide fluid 102 also functions as a central connection point, but by the above-described definition of its structure, the conical guide fluid 102 contributes to reducing the resistance to the outflow compared to the planar central connection point, while Also reached the purpose of uniform air diversion.

It can be understood that the “wind direction” described in the embodiments of the present disclosure refers to the direction in which the wind flows from the air inlet to the air outlet. The outer diameter of the tapered guide fluid 102 gradually increases along the wind direction. It can also be understood that the outer diameter of the end facing the air inlet (ie, the conical top) is the smallest outer diameter and the end facing the air outlet (ie, the cone). The outer diameter of the bottom) is the largest outer diameter.

In order to improve the guiding effect of the conical conducting body 102 and further reduce the wind resistance, as shown in FIG. 2, the disclosed embodiment has multiple guiding channels in the axial direction on the outer wall of the conical conducting body 102. Slot 1021. That is, each channel 1021 extends on the outer wall of the tapered conductive fluid 102 from its end facing the air inlet to its end facing the air outlet, and at the same time, the plurality of flow channels 1021 follow the circumferential direction of the tapered conductive fluid 102. Evenly distributed.

Further, the diversion groove 1021 is configured as a curved groove to expand the area of the diversion groove 1021 so as to achieve the purpose of optimizing the drag reduction effect.

For each guiding slot 1021, the bending direction thereof is the same as the direction of rotation of the fan inside the body 7 so that the wind passes through the guiding slot 1021 along its original swirling direction, which is advantageous for further reducing the wind resistance.

In the embodiment of the present disclosure, the cone top of the cone-shaped guiding fluid 102 is configured as a sphere structure, because the outflow firstly comes into contact with the cone top of the cone-shaped guiding fluid 102 , and by setting the cone top as a sphere structure, it is favorable for out winds. Uniform distribution to increase the uniformity of its flow.

In order to make the outflow evenly distributed through the apex of the cone-shaped guiding fluid 102, it can directly flow through the guiding groove 1021 on the outer wall thereof, and the spherical structure on the apex of the cone can be a hemisphere. It can be understood that the spherical surface of the hemisphere is facing the air inlet.

In order to uniformly conduct the outflow, in the embodiment of the present disclosure, the tapered guide fluid 102 coincides with the central axis of the air outlet.

In consideration of the purpose of making the hair dryer lightweight, the embodiment of the present disclosure may provide the tapered conductive fluid 102 with a hollow structure with its cavity facing the air outlet. Further, the material of the tapered guide fluid 102 may be a high-strength, light-weight material such as polyvinyl chloride, polyethylene, polypropylene, polystyrene, modified polystyrene plastic, or the like.

The structure of the tapered guide fluid 102 has been described above. An example of the structure of the support 101 for supporting the tapered guide fluid 102 will be described below.

As shown in FIGS. 1-1 and 1-2, the support body 101 includes an annular support 1011 and a wind guide support 1012 provided inside the annular support 1011. Wherein, the annular support 1011 is installed at the air outlet; the conical flow guider 102 is installed at the middle of the air guide support 1012.

Considering that the air outlet of the hair dryer is designed as a ring structure, the embodiment of the present disclosure uses the ring support 1011 to mount the support body 101 at the air outlet. It can be understood that the annular support 1011 is adapted to the structure of the air outlet.

In order to ensure that the air is smoothly discharged after passing through the conical shaped fluid guide 102, the air guide support 1012 is provided inside the annular support 1011 to ensure the outflow of the air. At the same time, the tapered guide fluid 102 is provided with stable support by mounting the tapered guide fluid 102 on the wind guide support 1012 .

In order to facilitate the maintenance and cleaning of the inside of the hair dryer, the ring support 1011 is detachably installed at the outlet of the hair dryer. For example, the installation may be performed by screwing, snapping, fastening, or the like.

Exemplarily, when a threaded connection is adopted, an internal thread may be provided on the inner wall of the air outlet, and an outer thread matched with the outer wall of the annular support 1011 may be provided so that the annular support 1011 is set inside the air outlet. can.

For example, when the card connection method is adopted, the first snap-in block and the second snap-in block that are adapted to be snap-fitted may be disposed on the air outlet and the ring-shaped support 1011 . For example, the first clamping block may be configured as a card slot, and the second clamping block may be configured as an elastic card body. When the elastic card body is subjected to radial pressure, the elastic card body can be contracted to fit into the insertion slot and is inserted into the slot. Release to ensure a stable clamping of both. For example, the first latching block may be disposed on the inner wall of the air outlet. Correspondingly, the second latching block may be disposed on the outer wall of the annular support 1011 .

For example, when the fastening method is adopted, the male buckle and the female buckle that are adapted to be buckled may be disposed on the air outlet and the annular support 1011 . For example, a male buckle may be provided on the end surface of the air outlet, and a female buckle may be provided on the end surface of the annular support 1011.

Considering that the wind guide support 1012 needs to provide support for the tapered conductive fluid 102 on the one hand, on the one hand, it is required to provide a good flow guiding function, and wind resistance cannot be increased. In the embodiment of the present disclosure, the wind guide support 1012 includes multiple spiral guides. The wind piece, wherein one end of the spiral air guide piece is connected with the inner side wall of the annular support 1011, and the other end is connected with the end side wall of the tapered conductive fluid 102.

It can be understood that the helix direction of the spiral wind deflectors is the same as that of the fan inside the hair dryer body 7 .

For a plurality of spiral air deflector, one end is collected on the side wall of the end of the tapered conductive fluid 102, and the other end is distributed on the inner side wall of the annular support 1011, so that between adjacent two spiral air guides The gradual increase of the spacing will help to improve the dispersion of the wind, while meeting the need to reduce the wind resistance, while improving the effect of diversion.

Further, the wind guide support 1012 protrudes outside the annular support 1011 along the wind direction, that is, one end of the wind guide support 1012 connected with the tapered conductive fluid 102 is located outside the annular support 1011, and its end connected to the annular support 1011 is Located inside the ring-shaped support 1011 is so arranged that the outflow can be promptly guided to the outside and the resistance to the outflow can be further reduced.

The conical conducting body 102 may be connected to the middle portion of the supporting body 101 (ie, the middle portion of the air guiding support 1012) by welding, plugging, snapping, or the like. In consideration of the fact that the strength of the air guiding structure 1 can be increased, the conical conducting fluid can be made. 102 is integrally formed with the support body 101.

In a second aspect, embodiments of the present disclosure also provide a hair dryer including any of the air guide structures 1 mentioned in the first aspect.

The hair dryer provided by the embodiment of the present disclosure is based on the adoption of the air guide structure 1 described above, and can effectively reduce the wind resistance at the air outlet, which is not only beneficial for obtaining better experience effect, but also conducive to reducing the power consumption of the hair dryer.

Exemplarily, as shown in FIG. 3, the hair dryer includes: a main body of the air blower; wherein an air outlet net 2 is also arranged at the outlet of the main body of the air blower; as shown in FIG. 4, the air outlet net 2 and the air guide Structure 1 is set in order along the wind direction.

It can be understood that the air outlet net 2 and the air guide structure 1 can be sequentially disposed along the wind direction, which can be understood as that the two are sequentially disposed from the inside to the outside, and the air outlet net 2 is disposed to perform the external impurities and the interior of the hair dryer body 7 . Segregation, at the same time, can also divert the outflow.

As an example, the air outlet screen 2 includes an annular support, a mesh body disposed inside the annular support. Wherein, the mesh body projects out of the annular support in a direction opposite to the wind direction. By arranging the structure of the air outlet net 2 in this way, it cooperates with the air guide structure 1 , which facilitates obtaining a greater space for air tolerance between the two and facilitates the improvement of the drag reduction effect of the air guide structure 1 .

In order to reduce the wind resistance of the air outlet net 2 , an annular center connection point can be provided in the center of the net-shaped body of the air outlet net 2 .

In order to make the wind blown out by the hair dryer blow out in a specific direction, in the embodiment of the present disclosure, as shown in FIG. 5, the air outlet 3 is also provided at the outlet of the main body of the hair dryer. Among them, the air outlet net 2, the air guide structure 1, and the air nozzle 3 are set in order along the wind direction.

For the structure of the tuyere 3, it may include a connecting body and a nozzle body sequentially connected, wherein the connecting body is installed at the air outlet, and the nozzle body may be set to a specific shape to obtain a specific wind direction, and the connecting body The inner cavity structure is configured so that the air can be smoothly guided to the mouthpiece. For example, the mouthpiece may be provided in a flat cavity shape.

Further, as shown in FIG. 5, an air inlet net 4 is also arranged at the air inlet of the main body of the air blower, and the air inlet net 4 is arranged to isolate the external impurities from the interior of the main body 7 of the hair dryer. Can achieve the role of diversion of the incoming wind. Among them, the air inlet net 4 includes an annular support and a mesh body disposed inside the annular support. Wherein, the mesh body projects out of the annular support in a direction opposite to the wind direction.

For the hair dryer, the main body of the hair dryer is common in the field. The following provides an example of the structure of the main body of the hair dryer:

As shown in Figure 5, the main body of the hair dryer includes: a body housing 5;

Handle housing 6 is connected to the side wall of the body housing 5;

The main control element provided inside the handle housing 6;

a switch element electrically connected to the main control element provided on the handle housing 6;

Provided in the body housing 5, and electrically connected with the main control element of the hair dryer body 7;

Electrically connected with the main control element, and from the back of the handle housing 6 through the power cord 8;

Both ends of the body casing 5 are respectively provided with an air inlet and an air outlet.

In application, the hair dryer is powered by plugging the power cord 8 into an external power source. By operating the switch element, the main control element controls the hair dryer body 7 to perform a blow operation.

As can be appreciated, the hair dryer body 7 includes a housing, a fan element, and an electrical heating element. The fan element includes a motor disposed inside the housing and electrically connected to the main control element, and a fan blade disposed outside the housing and connected to the output shaft of the motor. Under the control of the main control

element, the output shaft of the motor rotates, thereby driving the fan blade to rotate, so that air is taken in from the air inlet on the body casing 5, and the air is blown out from the air outlet on the body casing 5.

The electric heating element includes an electric heating wire disposed inside the housing of the hair drier body 7 and electrically connected with the main control element. Under the control of the main control element, the electric heating wire is heated so that the cold wind thus passed becomes hot air and is blown out from the air outlet.

For the above-mentioned main control element, it may be designed in the form of a printed circuit board and may be fixed inside the handle housing 6 by screws, while the main control element is opposite to the switch element provided on the handle housing 6 .

The main control element is electrically connected with the motor of the hair drier body 7 and the electric heating wire to perform job control on both. It can be understood that the main control element can be electrically connected with the motor and the electric heating wire through the cable. The cable is led out from the front end of the handle housing 6 until it projects into the housing of the hair drier body 7 .

The main control element and the switch element are electrically connected, and the two can be electrically connected by means of electrical contacts.

The switch element may include: a switch button, and further may further include: a temperature adjustment button or a push button, and a speed control button or a push button. Among them, by pressing the switch button, the contact on it is brought into contact with the contact on the main control element, so that the main control element controls the on/off of the motor and/or the electric heating wire.

By pushing or pushing the thermostat button or push button, the electronic contact on it is in contact with the electronic contact on the master control element, so that the master control element controls the temperature of the electric heating wire, thereby realizing the adjustment of the temperature of the air. .

By pressing or pushing the speed control button or pushing button, the electronic contact on it is in contact with the electronic contact on the main control element, so that the main control element controls the rotation speed of the motor, thereby realizing the adjustment of the wind speed.

Further, a display screen element for displaying the wind speed and the wind temperature may also be provided on the handle housing 6 , which is also electrically connected with the main control element so as to adaptively display the corresponding wind speed level when adjusting the wind speed and the wind temperature. Wind temperature rating.

For the body housing 5 and the handle housing 6, in the embodiment of the present disclosure, as shown in FIG. 5, the body housing 5 may be integrally formed and prepared, and the handle housing 6 may also be integrally formed and prepared. The hair dryer may also include an inner support 9 . Wherein, the body housing 5 is used for accommodating the hair drier body 7, and a working hole is arranged on the side wall of the body housing 5; the front end of the inner support 9 is used for detachable connection with the outer wall of the hair drier body 7 exposed in the working hole. The handle shell 6 is sleeved on the outside of

the inner support member 9, and the front end of the handle shell 6 is snapped with the working hole.

When assembling the hair dryer, the hair drier body 7 can be placed inside the body housing 5, and then the front end of the inner support 9 is used to connect with the hair drier body 7 exposed in the working hole, and the main control element and the power supply are connected. The wire 8 is mounted on the inner support member 9. Then, the handle housing 6 is sheathed outside the inner support member 9, and the power cord 8 is led out from the rear end of the handle housing 6. Then, the front end of the handle housing 6 and the body housing 5 are made. The work hole in the side wall is snapped and the assembly of the hair dryer can be realized.

To sum up, the hair dryer provided by the embodiment of the present disclosure has an integrally formed body shell 5 and an integrally formed handle shell 6 , and the handle shell 6 is clamped to the working hole opened on the body shell 5 so that its outer surface is free. Any connector, such as a screw 11 exposed, can increase the feel and overall aesthetic appearance of the hair drier housing. At the same time, the inner support member 9 is provided so that it can not only connect with the hair dryer body 7 inside the body housing 5, but also can install a main control element to fix the internal components of the hair dryer. By arranging the handle housing 6 on the outside of the inner support member 9 , the above-mentioned internal components, particularly the main control member, are sealed and protected. It can be seen that the hair dryer provided by the embodiments of the present disclosure not only facilitates the assembly of the hair dryer, but also that the handle housing 6 and the body housing 5 are integrally molded, which is beneficial to improving the touch and aesthetic appearance of the hair dryer housing.

Here, the rear end of the handle housing 6 and the rear end of the inner support 9 are connected by a detachable fastener. In addition, the hair dryer further includes a cover plate 10 mounted on the rear end of the handle housing 6 .

By using a detachable fastener, the connection between the rear end of the handle housing 6 and the rear end of the inner support 9 can be achieved, and when the disassembly is required, the fastener can be detached. Based on the presence of the fastener, in order to improve the aesthetic appearance of the hair drier housing, the hair drier also includes a cover plate 10 to cover the rear end of the handle housing 6 so as to seal the fastener therein and prevent its exposure. . It can be understood that the cover plate 10 is also provided with a cable through hole for passing the power cable 8 therethrough.

For a fastener, it may be a screw, a fastening pin, etc., which may be, for example, a screw 11 (also understood as a screw). At this time, at least one connecting block may be provided on the inner wall of the rear end of the handle housing 6 while the screw 11 is provided on the connecting block. Correspondingly, a corresponding connecting block is provided on the rear end of the inner support member 9, an inner threaded hole adapted to the screw 11 is provided on the connecting block, or the rear end of the inner support member 9 is matched with the screw 11. With an internally threaded hole, the screw 11 can be screwed through the screw 11 on the rear end of the handle housing 6 and the inner threaded hole on the rear end of the inner support 9 .

For the inner support member 9 , considering that it needs to be properly disposed inside the handle housing 6 and needs to be connected with the hair dryer body 7 stably, in the disclosed

embodiment, the inner support member 9 includes: the inner support member 9 The body and the connecting body provided at the front end of the body of the inner support 9 . Among them, the connecting body is used to detachably connect with the housing of the hair drier body 7 .

By arranging the connecting body, it is adapted to be coupled with the housing of the hair drier body 7 exposed in the working hole. As an example, the detachable connection may be implemented by a detachable fastener. For example, the fastener may be a screw 11. At this time, corresponding internal threads are provided on the buckling body and the hair drier body 7. The holes can be detachably connected to each other by screwing the screws 11 to the internally threaded holes.

The foregoing descriptions are merely illustrative embodiments of the present disclosure and are not intended to limit the protection scope of the present disclosure. Any modifications, equivalent replacements, and improvements made within the spirit and principle of the present disclosure shall be included in the present disclosure. Within the scope of protection disclosed.

Claims:

1.A hair dryer wind guide structure, characterized in that the wind guide structure comprises: a support body (101) installed at the outlet of the main body of the air blower;
A tapered conductive fluid (102) is disposed in the middle of the support (101), and the outer diameter of the tapered conductive fluid (102) gradually increases along the wind direction.

2.The hair dryer air guide structure according to claim 1, wherein a plurality of guide grooves (1021) are provided on an outer wall of the tapered guide fluid (102) in an axial direction.

3.The hair dryer wind guide structure according to claim 2, wherein the guide groove (1021) is a curved groove.

4.The hair dryer wind guide structure according to claim 1, characterized in that the cone top of the tapered conductive fluid (102) is arranged in a spherical structure.

5.The hair dryer wind guide structure according to claim 1, characterized in that the tapered conductive fluid (102) coincides with the central axis of the air outlet.

6.The hair dryer air guide structure according to any one of claims 1 to 5, wherein the support body (101) comprises: an annular support (1011) disposed inside the annular support (1011) Guide wind support (1012);
The annular support (1011) is installed at the air outlet;
The cone-shaped fluid guide (102) is mounted in the middle of the wind guide support (1012).

7.The hair dryer wind guide structure according to claim 6, wherein the wind guide support (1012) comprises: a plurality of spiral air guide fins;
One end of the spiral air deflector is connected with the inner side wall of the annular support (1011), and the other end is connected with the end side wall of the tapered conductive fluid (102).

8.The hair dryer wind guide structure according to claim 7, characterized in that the wind guide (1012) protrudes outside the ring support (1011) in the wind direction.

9.A hair dryer is characterized in that the hair dryer comprises the wind guide structure (1) according to any one of claims 1-8.

10.The hair dryer according to claim 9, wherein the hair dryer comprises: a body of a hair dryer;
The air outlet of the body of the hair dryer is also provided with a wind outlet net (2);
The air outlet net (2) and the air guide structure (1) are disposed in the wind direction in sequence.

11.The hair dryer according to claim 10, wherein the air outlet net (2) comprises: an annular support, a mesh body disposed inside the annular support;
The mesh body projects out of the annular support in a direction opposite to the direction of the wind.

12.The hair dryer according to claim 10, wherein a wind nozzle (3) is further disposed at the air outlet of the hair dryer body.

The air outlet net (2), the wind guide structure (1) and the air nozzle (3) are arranged in the wind direction in sequence.

13.The hair dryer according to any one of claims 9 to 12, wherein the hair dryer body comprises: a body housing (5);
a handle housing (6) connected to the side wall of the body housing (5);
a master control element provided inside the handle housing (6);
a switch element electrically connected to the main control element provided on the handle housing (6);
a hair dryer body (7) disposed inside the body housing (5) and electrically connected to the main control element;
a power cable (8) electrically connected to the main control element and passing through the rear end of the handle casing (6);
Both ends of the body housing (5) are respectively provided with an air inlet and an air outlet.

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(54) **HAIR DRYER**

HAARTROCKNER

SÈCHE-CHEVEUX

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Description

FIELD OF THE INVENTION

[0001] The invention relates to hair dryers.

BACKGROUND TO THE INVENTION

[0002] A typical hand-held hair dryer (see WO2008/064075) comprises a hand-held housing with an air inlet, an air outlet, and a motor in between to draw air in from the air inlet and drive air out from the air outlet. A heating element is located in the air flow between the air inlet and the air outlet, typically after the motor in the air flow.

[0003] In some prior art hair dryers, a motor is coupled to a radial impeller to draw air in axially and generate a high air pressure by thrusting the air outwards. The fact that the air is confined by the housing means it is then forced through the hair dryer air outlet. The high pressure achieved by such a technique can be useful in forcing apart strands of hair. However, one downside is that a turbulent air stream can be produced meaning that although a hair pressure air flow is achieved, there is little control over the air flow. This invention addresses such issues and considers techniques for improving the flow of air within hand-held hair dryers.

[0004] Safety is also an important aspect in the design of such appliances - the presence of a heater element can be potentially dangerous if left to heat without appropriate dispersement of the heated air - there is a risk that it may overheat parts of the hair dryer or heater element. The invention further considers such issues.

[0005] Measures to reduce the weight of hair dryers are also considered. This can be particularly beneficial to professional hairdressers, and those at home, to avoid a user becoming tired of holding the hair dryer over extended periods of time.

SUMMARY OF THE INVENTION

[0006] The above mentioned safety aspect is solved by providing a hair dryer according to claim 1.

[0007] Aspects and preferred features are set out in the accompanying claims.

[0008] According to one embodiment of the invention there is provided a hair dryer comprising

a housing having an air inlet and an air outlet,

an air flow assembly for creating an air flow from the air inlet and to the air outlet such that the air flow is generally axial within the housing;

a heating element located in said air flow between the air inlet and to the air outlet; and

a laminar element located between the heating element and the air outlet, the laminar element being arranged to compensate for any disturbance introduced into the axial air flow by the heating element

whereby air flow from the air outlet is generally laminar.

[0009] A laminar flow occurs when a fluid, in this case air, flows in parallel layers with no disruption between the layers. As explained in more detail below, the arrangement of the components of the hair dryer allows a heated and laminar air flow to be produced and retained at a distance from the hair dryer. This means that the high pressure air output of conventional hair dryers is not needed (in conventional hair dryers the output air flow will disperse). The ability to focus the hot air stream means that the hot air is imparted into hair efficiently and leads to rapid hair dryer whilst also provided styling capabilities.

[0010] The air flow assembly may comprise a ducted axial impeller to provide an increased volumetric flow rate which leads to an improved uniform air flow compared to conventional radial impellers used on existing hair dryers. An axial impeller benefits the generation of a laminar air flow output by generating a generally uniform axial air. This uniform air flow is then driven through a laminar element positioned between the heating element and outlet to produce a laminar / streamline air flow without any cross currents or turbulence. This is particularly useful to aid in styling as a controllable, narrow stream of hot air is produced that allows a stylist to accurately position the generated air stream to improve hair styling.

[0011] The air flow assembly comprises an axial impeller driven by a motor. These components may be separate or may form an integrated fan and motor assembly. The integrated fan and motor assembly may comprise a motor concentrically mounted around a drive shaft and an axial impeller having a plurality of blades which extend radially around the motor and which are connected to the drive shaft to drive the blades. The motor may be a DC brushless motor.

[0012] In embodiments the integrated fan and motor assembly may further comprise a fan and a motor concentrically mounted about an axis of rotation of the fan, wherein the fan comprises an axial impeller having a plurality of blades which extend radially around the motor. The motor may further comprise a yoke and magnet coupled to the yoke. The magnet interacts with the stator assembly and rotates when driven by an electric current. The magnet is coupled to the yoke and the blades coupled (in some embodiments mounted directly) to the yoke. This removes the need for any further coupling from a drive shaft to a separate fan.

[0013] Thus according to another embodiment of the invention, there is provided a hair dryer comprising

a housing having an air inlet and an air outlet,

an air flow assembly for creating an air flow from the air inlet and to the air outlet such that the air flow is generally axial within the housing;

a heating element located in said air flow between the air inlet and to the air outlet; wherein

said air flow assembly is an integrated fan and motor assembly comprising a motor concentrically mounted around a drive shaft and an axial impeller having

a plurality of blades which extend radially around the motor and which are connected to the drive shaft to drive the blades.

[0014] Such an integrated fan and motor assembly can be manufactured as a separate unit then easily inserted into the hair dryer housing. Said integrated fan and motor assembly may be housed within a ducting and at least a portion of the ducting may be cylindrical. The fact that the fan assembly has its own ducting means that the hair dryer housing may be formed into one or more different shapes without affecting the air flow through the heater air channel/outlet. A plurality of strakes may extend from an inner surface of the ducting whereby circular air currents within the housing of the hairdryer are reduced. Thus, the ducting can also contribute to ensure a laminar flow.

[0015] The laminar element may comprise array of elongate tubes.

[0016] According to another embodiment of the invention there is provided a laminar element comprising an array of elongate tubes for insertion in an outlet of a hair dryer housing to produce a laminar air flow.

[0017] The array of tubes is positioned between the heating element and outlet to produce a laminar / streamline air flow without any cross currents or turbulence. This is particularly useful to aid in styling as a controllable, narrow stream of hot air is produced that allows a stylist to accurately position the generated air stream to improve hair styling.

[0018] At least a subset of said channels may have a matching cross-section in order uniformly form a laminar flow air stream. At least a subset of said channels may have a hexagonal cross section. In variants, at least a subset may have a square cross section or a circular cross section.

[0019] The array of tubes may be formed from silicone rubber, metal or plastic. Forming from silicone rubber may be particularly beneficial due to the poor thermal conductivity of silicone rubber meaning. This means the array of silicone rubber tubes heat up significantly less that metal and so reduces the risk of a user burning their head/hair. These tubes may have a length in the range of approximately 0.5cm to 2cm.

[0020] The array of tubes may be formed into a structure that appears like a mesh or grille when viewed face on. This structure may also be removable and/or interchangeable which may be desirable should a user require a more dispersed air flow.

[0021] The hair dryer may further comprise a nozzle having an inlet which matches the outlet of the hairdryer housing and an outlet having a generally rectangular cross-section. The nozzle may be shaped so that the cross-section of the nozzle changes gradually from the nozzle inlet to the nozzle outlet whereby disturbance to the air flow within the nozzle is minimised. The outlet is a generally planar / more flattened outlet providing an "airbrush", i.e. a generally flat air stream. The inlet has a cross-sectional area generally corresponding to the cross-sectional area of, what may be for example, a generally circular region of the hair dryer before the nozzle region. The outlet may have a cross-section which is generally of a similar area to that of the inlet but in practice the inlet is likely to be larger. As explained above, an axial impeller is used and thus reducing the air flow through the nozzle does not have an adverse effect on performance becase of the low pressure of the air flow generated.

[0022] The outlet of the hair dryer housing may comprise a hot air outlet and a cool air outlet and the hair dryer housing may comprise a hot air channel through which air is drawn from the inlet past the heater to the hot air outlet and a cool air channel through which air is drawn from the inlet to the cool air outlet without passing the heater. Tthe cool air channel may be in the form of an outer duct which circumscribes the hot air channel

[0023] The cooler channel of air may have a plurality of strakes positioned at the exit of the air outlet and extending into the second air flow channel. These strakes control the cool air stream, minimise dispersement, may help to provide a laminar air flow and enable the cool air stream (when arranged such that the second air flow channel circumscribes the first air channel) to form a shroud around the heated air to further assist retaining a laminar air flow.

[0024] The second air channel may also extend forward of the first air channel which may be particularly useful for preventing the hair dryer outlet burning anything that it touches.

[0025] The outlets may preferably be arranged such that one circumscribes the other. The outlets may be arranged to emit the air streams such that the air streams emitted are generally concentric (i.e. emitted in the same direction) which minimises any mixing of the air streams. This minimises any interference between the hot and cool air streams and thus minimises turbulence and mixing between the hot and cool air. The effect of this is to emit a laminar air flow from at least the hot air outlet.

[0026] The first air flow channel provides heated air, the second a cool air channel, which, in some embodiments may circumscribe the hot (first) air flow channel. Where a nozzle is used, the first air flow channel and second air flow channel are extended into the nozzle. The nozzle may be arranged with the cool (second) outlet extending forward of the first (hot) air outlet which means that that the nozzle attachment can be placed very close to, or on the head of a person without burning their head whilst retaining a hot air stream that has been retained as a laminar air stream with minimal interaction with the cooler air. The second cool outlet may extend forward of the hot air outlet by 2mm or more.

[0027] A laminar air flow is emitted from the hot air outlet (of both the hair dryer housing and/or the nozzle). The cooler air channel (of both the hair dryer housing and/or the nozzle) may, in some embodiments also be laminar. The fact that the cool air outlet is generally par-

allel to the heater air outlet means that the air streams are emitted in the same direction minimising dispersement of the heater air flow. The second outlet forms an annular-like stream of air shrouding the heated air produced from the first air outlet, assisting the heater air stream to retain a laminar flow. This contrasts with many existing hair dryers which mix the two air streams in the nozzle.

[0028] The first and second outlets may be arranged such that one circumscribes the other to generate substantially separate air streams, both focussed in the same direction to minimise any intermixing.

[0029] The second outlet may comprise a plurality of strakes extending into said air flow, said strakes being arranged to direct the flow of air out of said second outlet in order to provide a generally planer cool air flow to shroud the heated air from the first outlet.

[0030] The fan assembly may further comprise a motor controller mounted within the motor assembly configured to control said axial impeller. This controlling may include controlling the speed of the fan and include one or more levels of variable speed, such as off, full power, medium power, and one or more other intermediate levels. The DC motor used may be a brushless DC motor which is capable of delivering a high performance for its size. The brushless DC motor may be used to provide high power without increasing the size of the housing.

[0031] Such a controller may be mounted co-axially with said impeller in said motor assembly and may even be mounted directly onto the motor, avoiding the need to place the controller anywhere else in the housing. It also means that the fan assembly unit can be manufactured and tested separately to the remaining components of the hair dryer.

[0032] In embodiments the heater will be powered by an AC power source and the DC motor will accordingly require a DC power source, thus the hair dryer may further comprise a power adapter comprising an AC to DC converter for driving at least the DC motor. Such a power adapter may be external to the hand-held housing to avoid housing the power adapter (which may include a switched mode power supply) in the portion of the hair dryer held by a user. Both AC and DC power may then be delivered to the hand-held housing portion of the hair dryer by a power cord.

[0033] To reduce weight of the power cord extending from the power adapter to the hair dyer housing, the power adapter may be configured to deliver both an AC supply and a DC supply to the hand-held housing by combining one or more signal rails of each of the AC and DC supply. This means that, rather than a four core cable being used (live and neutral for the AC, and positive and negative (or 0V) rail for the DC) one of these rails may be shared allowing a conventional three core cable to be used.

[0034] A neutral signal rail of the AC supply may be coupled to one of the DC signal rails - in particular the V- / 0V rail to provide a shared neutral power rail and allow a three core cable to be used.

[0035] The hair dryer, (preferably the power supply) may further comprise a controller configured to sense activation of said DC motor such that responsive to detecting activation the hair dryer is configured to power the heating element. In other words, the controller may prevent AC power being supplied to the heater until a DC current is detected / sensed as being delivered to rotate the fan and thus prevent the hair dryer housing overheating.

[0036] As a safety measure, the hair dryer may only allow mains AC voltage to be passed to the dryer only if the fan motor is turning. This ensures that air is been blown at force past the heater element before power is supplied to the heater. Without the fan on, the heater may get too hot and become a safety hazard. The power supply senses if the fan motor is on by sensing a current being drawn from the DC (for example +12V DC) line.

[0037] By sensing the motor current, electronics within the power supply then turn on a mechanical relay. The inclusion of a relay-switched live connection provides an important safety improvement over traditional dryers.

[0038] In order to improve air flow the fan assembly may further comprise a nose cone mounted co-axially with said impeller in the fan assembly which helps to guide air towards the fan axis and retain the uniform air flow.

[0039] According to another embodiment of the invention there is provided a hair dryer having a hand-held housing comprising: an air inlet and an air outlet; a motor assembly between said air inlet and said air outlet to draw air in from said air inlet and drive air out from said air outlet, wherein said motor assembly comprises a DC powered motor; a heating element located in said air flow between said air inlet and said air outlet; and a power controller configured to activate said heating element responsive to sensing activation of said DC powered motor.

[0040] Conventionally, hair dryers include a thermal cutout (such as a bimetallic thermal cutout) to disable power in the event of the hair dryer overheating. Such overheating may be caused by a failure of the motor/fan circuit for example meaning that the heating element is heating up static air rather than air flowing over it.

[0041] With the inclusion of both DC and AC powered components, the present invention provides features for further improving safety measures by sensing the motor current. The controller/power supply unit may then activate the heater (and any other AC powered components) in response to sensing the delivery of dc current to the dc fan/motor. The heater may then be powered by activating a relay for example to enable a switched live connection.

[0042] This relay-switched live connection provides an important safety improvement over traditional dryers as it prevents the heater being turned on without any air flow being produced.

[0043] Such sensing may comprise using a current sensor (for example a current sense resistor) to sense

activation of the DC powered motor. Delivery of AC power may then comprise using a relay positioned between a power source and the powered heating element which is activated by the controller in response to sensing delivery of a current to the DC motor. A particular advantage of this is that the DC sensing and AC relay can be implemented in a power supply external to the hair dryer, close to where power conversion (AC to DC) is taking place. This means that power can be completely removed from the hair dryer hand-held housing further increasing safety.

[0044] In another variant an optical sensor may be positioned in the hand-held housing used to detect rotation of the fan. When no (or insufficient) rotation is occurring, the controller may then prevent activation of the ac relay.

[0045] The relay may be activated by a transistor switch coupled to the relay. A protection diode may be connected across the relay to protect the transistor from any current spike generated as the relay is turned off.

[0046] According to another embodiment of the invention there is provided a hair dryer nozzle comprising

a nozzle housing having a first and second nozzle inlet and a first and second nozzle outlet,
a first air flow channel between said first air inlet and said first air outlet and
a second air flow channel between said second air inlet and said second air outlet;
wherein said second air outlet at least substantially circumscribes said first air outlet,
wherein said first air inlet is substantially circular and said first air outlet is substantially rectangular.

[0047] Strakes may be provided in the second outlet circumscribing the first outlet to control the air flow exiting the nozzle. When coupled to a hair dryer the first outlet may typically received a heated air stream and the outer circumscribing second air channel typically receives a cool are stream (from air not directly passing over a heater element). These strakes may assist in controlling the air flow such that the cool air stream is emitted in the same direction as the heated air stream emitted from the first air outlet, thus minimising introduction of turbulence. This can be particularly useful for shrouding any airflow produces from the inner first air stream and assists in preventing any separation / dispersement of this inner air stream.

[0048] The cross-sectional area of the inlets relative to the outlets may be preserved. By preserving the cross-sectional area, any change to the characteristic of the air flow (in particular through the interior first air flow channel) may be minimised and thus any laminar flow effect in the air stream received at the inlets is retained. The shape change may be gradual and provided by interior curved walls in order to minimise any turbulence to air flowing through one or both of the channels.

[0049] According to another embodiment of the invention there is provided a hair dryer comprising the nozzle according to the embodiment as described immediately hereinbefore of the invention. Such a nozzle may be detachable from the hair dryer or permanently fixed. The nozzle may even form part of the hair dryer housing.

[0050] We also describe a hair styling appliance having a hand-held housing comprising hair styling means, wherein said hair styling appliance comprises a power adapter external to said hand-held housing configured to generate a DC power supply from an AC input and configured to deliver both an AC power supply and said DC power supply to said hand-held housing, and wherein said power adapter is configured to deliver said AC supply and said DC supply by combining one or more signal rails of each of said AC and DC supply.

[0051] The number of power signal lines is reduced four to three by sharing a signal line. This provides a reduction in weight of the power cord (which may be up to 25% weight reduction) extending from the power adapter to the hair dyer housing whilst still allowing the power adapter deliver both an AC supply and a DC supply to the hand-held housing. This is achieved by combining one or more signal rails of each of the AC and DC supply. This means that, rather than a four core cable being used (live and neutral for the AC, and positive and negative (or 0V) rail for the DC) one of these rails may be shared allowing a conventional three core cable to be used.

[0052] The neutral signal rail of the AC supply may be coupled to one of the DC signal rails, in particular the V- / 0V rail to provide a shared neutral power rail.

[0053] One or more of the features described in the above embodiments may be interchangeable and applicable to other embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0054] For a better understanding of the invention and to show how it may be carried into effect reference shall now be made, by way of example only, to the accompanying drawings in which:

Figure 1 shows a hair dryer with nozzle attachment;

Figure 2 shows the hair dryer of Figure 1 without a nozzle attachment;

Figure 3a shows a cross section of the hair dryer of Figure 1;

Figure 3b shows a schematic view of the components of the hair dryer of Figure 1;

Figure 4 shows a perspective view of the integral heater and fan assembly of the hair dryer of Figure 1;

Figure 5 shows a perspective view of the integral fan/motor assembly of Figure 4;

Figures 6a and 6b show details of the laminar ele-

ment of the hair dryer of Figure 1;

Figure 7a and 7b show details of the nozzle attachment shown in Figure 1;

Figure 8 shows a hair dryer with external power supply unit;

Figure 9 shows a block diagram of the external power supply unit of Figure 8;

Figure 10 shows an example of an AC power switching circuit for the heater;

Figure 11 shows details of the external power supply incorporating an AC power switching circuit, switched mode power supply and circuit for providing a shared neutral / DC supply to the hair dryer;

Figure 12a shows a smoke diagram of laminar flow air output from the hairdryer of Figure 1;

Figure 12b shows the laminar flow output being used to style hair; and

Figures 13a to 13d shows further details of the integral fan/motor assembly of Figure 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0055] Figures 1 to 7b show a hair dryer 10 with a nozzle 20 coupled thereto. As explained in more detail below, the various components of the hair dryer, including the nozzle attachment, cooperate to ensure that the output from the hair dryer is generally in the form of a laminar flow. A laminar flow (streamline flow) occurs when a fluid, in this case air, flows in parallel layers with no disruption between the layers. This substantially reduces any form of fluid swirling and lateral mixing leading to minimal turbulence. As shown in Figure 12a, the arrangement of all the components means that the laminar flow is retained for up to 20 to 30cm from the nozzle. As shown in Figure 12b, the nozzle attachment 20 provides a focussed stream of air which allows the hairdryer to be used as an "airbrush".

[0056] The hair dryer comprises a casing (or housing) 12 having an inlet end 16 protected by a finger guard and an outlet end 15 to which the nozzle attachment 20 is releasably coupled. In line with standard hairdryers, a handle 14 extends from the casing 12 to allow a user to hold the hairdryer. As shown in Figures 3a and 3b, the casing houses an integrated fan/motor assembly 50 for creating air flow through the hairdryer from the inlet end and to the outlet end. Positioned on the front of the fan assembly is a nose cone 48 and in front of the fan assembly 50 is a heater 46 to heat air which comes into contact with the heater 46. A laminar element 70 is positioned at the outlet end and is described in more detail in relation to Figures 6a and 6b.

[0057] There are two airflow channels within the casing. It will be appreciated that this is an optional feature and that is possible to provide a laminar flow for a single hot air stream would also work.

[0058] Both channels draw air through the inlet with a first airflow channel outputting hot air through an inner outlet 34 and a second airflow channel outputting unheated air through an outer outlet 34. The first airflow channel passes through the heater 46 and is thus generally centrally located within the casing. The second airflow channel comprises an outer duct 44 which circumscribes the heater 46. The air flow along the second airflow channel does not contact the heater and thus maintained at approximately room temperature. Accordingly, the second airflow channel acts as an insulator and minimises the transfer of heat from the heater to the outer housing of the wall. As shown more clearly in Figure 2, the cool air channel outlet 34 of the hair dryer extends forwards of the inner hot air channel outlet 32. A plurality of air strakes 35 are positioned in the cool air channel, at least around the cool air channel outlet 34. The strakes 35 are generally planar projections extending from, and at an angle to, the exterior surface of the inner air channel. The strakes 35 help to control the exit flow of cool air and also maintain the structural integrity of the cool air channel.

[0059] The separation of hot and cold (unheated) air continues in the nozzle 20. A cool air channel 24 extends through the nozzle and aligns with the cool air duct/channel 44 in the hair dryer body. A hot air channel 22 extends through the nozzle and aligns with the first airflow channel passing through the heater 46. The nozzle attachment 20 thus has two channels of air flow. The first inner channel 22 provides a hot air outlet and surrounding the hot air channel 24 is a cool air channel which provides a cool air outlet.

[0060] As can be seen in Figure 7a, the cool air channel outlet extends forwards of the inner hot air channel outlet. Extending the cool air channel allows the hairdryer (with or without nozzle attachment) to be placed close to a user's head without burning their head. Furthermore, if the hair dryer is accidently left with the outlet in contact with a carpet or other object, the cool air channel prevents any burn damage. The cool air outlet may extend forward of the hot air outlet by a few millimetres (2mm or more for example) - both on the hair dryer and on the nozzle.

[0061] It is noted that allow the cool air outlet in the nozzle extends beyond the hot air outlet in the nozzle, there is little or no mixing of the two air flows within the nozzle. As explained above, the laminar flow produced by the hairdryer extends for upto 20cm and the extension of the cool air outlet is not sufficient to disrupt this flow.

[0062] The nozzle 20 is detachable allowing a stylist to select from one of a range of different nozzles. It will be appreciated however that in some variants the nozzle may be secured to the hair dryer and non-removable.

[0063] Figure 4 shows the heater unit 46 and integrated

fan and motor assembly 50. The two parts snap fit together to form a combined unit 60 via a series of retaining clips 61. The hot air channel is defined as the channel within this combined unit. The heater unit comprises a heater element (not shown) positioned inside the heater unit to heat air as it passes over the heater element. Such heater elements may have any standard design. As schematically drawn in Figure 3b, the heater unit may comprise a plurality of planar supports which are approximately axially aligned and which support a heating element in the form of a wire.

[0064] Figure 5 shows the integrated fan/motor assembly 50. As schematically drawn in Figure 3b, the assembly comprises a fan 45 and a motor 51 housed within a generally cylindrical housing 47 to form a ducted axial impeller fan. Air is drawn through the inlet and forced through the housing 47 in an axial direction. A conventional axial flow fan generally comprises a cylindrical central hub section, a plurality of blades extending radially from the central hub section and a housing encasing the blades. A driving motor is attached to the hub section via a motor shaft to drive the fan into rotation. Such a conventional arrangement may be used in the present application. However, the arrangement of Figure 5 and Figures 13a-d is an integrated fan/motor assembly which removes the need for a separate motor connected by a drive shaft to a separate fan. As shown in Figures 13a-d, this is achieved by mounting the fan blades 45 so that they extend radially from around the motor components themselves and by concentrically mounting the components of the motor around an axis of rotation of the fan. One example of an integrated fan/motor assembly is described in US6457953 and related applications which are incorporated by reference.

[0065] The motor 51 is preferably a brushless DC motor as depicted in Figure 13a. In other words, the motor 51 preferably comprises a coil subassembly and rotating permanent magnets 53 (as shown in Figure 13c) and a fixed armature (stator). The magnets 53 are bonded onto the yoke which also forms the casing onto which the fan blades are directly mounted. This arrangement eliminates the need for coupling the motor to a separate fan via a drive shaft. An electronic controller 57 replaces the brush assembly of a brushed DC motor and the electronic controller ensures that the motor keeps turning. A brushless motor typically is compact and high powered delivering a high rotation speed compared to a conventional AC motor.

[0066] A motor and motor controller 57 are positioned on the axis of the fan within the fan assembly to control the speed of rotation of the fan. This may include, for example, "off", "medium speed", "full speed" although it will be appreciated that may intermediate speed levels may also be provided.

[0067] Referring now to Figure 13d, the fan assembly also includes air vent holes 55 positioned between the blades of the fan. These vent holes allow cooling of the motor and controller and prevent overheating. The fan blades may be arranged such that they force a quantity of air through these holes to improve cooling.

[0068] The presence of a fast rotating axial impeller within the duct provides a high volumetric flow rate. Moreover, the air flow is generally uniform and is generally an axial flow. As schematically illustrated in Figure 3a, the cylindrical housing 47 further comprises a plurality of stators 49 which are generally planar projections extending from, and at an angle to, the interior surface of the housing. Any generated circular air currents are removed by the stators 49 resulting in a generally laminar air flow being emitted from the integrated fan and motor assembly.

[0069] The central axial motor creates a dead spot in the resultant flow. As shown in Figure 5, a nose cone 48 is centrally mounted on the front of the integrated motor/fan assembly which helps to guide air towards the fan axis and ensure a uniform air flow across the entire cross-section.

[0070] The air flow is generally laminar as it exits the integrated motor/fan assembly. As shown in Figure 3b, the air in the first air channel passes over the heater element in the heater unit 46. To counteract any turbulence introduced in the heated air from the heater element, a laminar element 70 is positioned in the hot air channel outlet 32. The laminar element comprises a plurality of tubes which are aligned with each other to produce a laminar flow output of hot air.

[0071] Figures 6a and 6b show the details of the laminar element 70. The laminar element comprises an array of tubes 76 (or elongate channels) which are all axially aligned with each other. The axial alignment of the channel forces air entering the array into a laminar air flow. The axes are generally aligned perpendicular to the plane of the outlet whereby the laminar air flow is generally perpendicular to the axis of the hairdryer housing. The laminar air flow may be arranged at a different angle to the axis of the hairdryer if desired.

[0072] In the example shown, the tubes have a hexagonal cross-section. Tubes having other cross-sectional shapes may be used and a mixture of shapes may be used. However, the array should have minimal dead space between the tubes because such dead space will block air flow. Rectangular or square cross-sectional shapes also have minimal dead space but these have sharp corners which increase turbulence. Circular cross-sectional shapes are the optimum for preventing turbulence but clearly result in dead space. The hexagonal arrangement provides a reasonable comprise between reducing sharp corners within the tubes and reducing the waste space between tubes. Other arrangements may provide the same benefit, including. a mixture of shapes to maximise tesselation and minimise corners. However, the hexagonal arrangement is likely to be easier to manufacture than such a composite arrangement, e.g by processes such as injection moulding.

[0073] The laminar element may be manufactured from metal, plastic or silicone rubber. Silicone rubber is

particularly useful as it is tolerant to a wide range of temperatures and does not get as hot to the touch as a metal, meaning that it is safer to use. Furthermore, this also means the laminar element may not need a guard in front or need to be recessed into the hair dryer, i.e. it can be positioned close to the outlet. The laminar element may also be removably mounted within the casing.

[0074] The air flow is generally laminar as it exits the laminar element and flows into the inner channel of the nozzle (if one is attached). The nozzle attachment 20 is shaped to retain this uniform air flow whilst also minimising turbulence. The simplest way to achieve this would be to match the nozzle outlet to the shape of the outlet of the casing. However, this would result in an air flow having a generally circular cross-section which is not very useful for styling. Accordingly, the nozzle has an outlet which is the form of a generally elongate rectangle with curved edges (or flattened ellipse) and thus resembles an "air-brush". The elongate outlet forms a "blade" of air for styling.

[0075] As shown in Figures 7a and 7b, the nozzle has a hot air channel inlet which is generally circular and which matches the hot air channel outlet from the hair dryer. The nozzle has a cool air channel inlet which is annular and which matches the hot air channel outlet from the hair dryer. The nozzle is shaped to change gradually from a substantially circular inlet to a generally rectangular outlet to minimise turbulence within the hot and cool air flow channels. This is achieved by using curved surfaces with no sharp angles or step changes.

[0076] As shown in Figure 7b, a series of air strakes 25 are positioned within the cool air channel 24 which may help to guide and control the cool air flow through and out of the nozzle. The strakes 25 may also help maintain the structural integrity of the cool air channel. In use, the cool air channel provides a cool air 'shroud' around the stream of hot air output from the nozzle which further limits any dispersement of the hot air stream providing a controllable narrow stream of hot air providing in effect an 'air brush'.

[0077] As described above, the fan assembly, heater unit, laminar element and nozzle all cooperate to ensure that the air output, particularly the hot air output is a laminar flow. It will be appreciated that each of these elements may be used alone or in combination. Without all co-operating elements, it is possible that a laminar flow as shown in Figure 12b may not be achieved but a reasonable compromise between cost, effectiveness and manufacturing issues may be achieved.

[0078] Figures 8 to 11 show a hairdryer which has an external power supply unit to reduce the weight of the hair dryer. It will be appreciated that this embodiment may be combined with the previous embodiment for producing a laminar airflow. In Figures 8 to 11, the hair dryer 90 comprises a hair dryer hand-held housing 10 (or any other variant as previously described) connected via power cable 42 to a power supply unit 44. The power supply unit is connected to mains power via plug 46. The power supply delivers both AC and DC power to the hair dryer body via a three core cable 42. AC power is used to power the heating elements and DC power to drive the DC brushless motor in the integrated fan and motor assembly.

[0079] Figure 9 shows a block diagram of the external power supply unit 44 of Figure 8. The power supply comprises an AC input and switched mode power supply (SMPS) 82. An AC relay circuit 86 is used to control AC power delivery to the heater element 85 only when the DC motor driven fan 84 is activated. This provides a safety measure to ensures the heater element is not activated without a flow of air, thus preventing overheating. The AC (neutral) and DC (V-/0V) rail are combined at the output of the power supply unit. This eliminates the need for a four core cable, meaning a lighter, conventional three core cable can be used to deliver both AC and DC power to the hair dryer from the external power supply.

[0080] Figure 10 shows an example schematic of the circuit used to control power delivery to the heater element. The circuit is configured to only deliver power to the heater when the DC fan is activated to avoid the risk of the hair dryer overheating. Resistor R1 acts as a current sense, to providing a current sense signal to Q1 on the closing of SW1 (which activates the DC motor). Transistor Q2 is driven into saturation so that majority of the 12V is DC supply is supplied across the motor relay. Diode D1 is connected in reverse across the relay as a snub to protect the transistor from any current spike generated as the relay switches off.

[0081] Figure 11 shows a schematic of the power supply unit 44 of Figure 8. The circuit is divided into three elements: the switched mode power supply circuit 82, the AC relay circuit 86 and the output circuit 84 providing a common mode line filter LF3 and shared neutral connection.

[0082] On the input side there are AC mains live and neutral connections (nominally 230Vac for UK). An earth connection is also provided to allow more effective EMI filtering.

[0083] The switched mode power supply circuit includes common mode line filters LF1 and LF2 on the primary side of transformer T1 to prevent high frequency interferences. Also shown are rectification diodes BD1 and transformer T1 arranged in a quasi resonant flyback configuration to generate a DC power source. This may be any DC voltage suitable for driving a brushless DC motor, such as 12V DC for example.

[0084] The AC relay circuit (roughly denoted by the dotted line region 86) operates in a similar manner to the circuit described in figure 10 by detecting delivery of a DC voltage to the V+ rail. On detection of a DC voltage on the secondary side of transformer T1 the relay is activated to connect the live "L" AC input and L1. L1 is then connected to the hair dryer via three core cable 42.

[0085] To reduce cord weight between the power supply unit and the actual hair dryer, the neutral connection is coupled with the DC 0V output to provide a common

/shared neutral output line. This means that only three conductors are required (+12V, 0V/neutral combination and a switched live as shown in Figure 11). Within the hair dryer assembly, the +12V line is used to power the fan motor, the switched live is used to power other mains voltage level components such as the heater coil and ioniser. The low voltage 12V DC connection and the mains AC voltage are accordingly connected to different parts of the hair dryer with the only overlap being the current return path for both is on the same conductor: the DC OV/ AC neutral.

[0086] The output of the SMPS 82 in Figure 11 comprises a common mode line filter LF3 to attenuate unwanted high frequencies on the +12V DC output which may radiate as electromagnetic interference (EMI). The circuit has two outputs: V+ and V-, each coupled via a separate side of the line filter LF3 to the SMPS providing a DC output. The main AC neutral input N is also coupled to the V- output (denoted by N1 in Figure 11). A three core cable including both DC and AC power rails can then used to power the hair dryer.

[0087] No doubt many other effective alternatives will occur to the skilled person. It will be understood that the invention is not limited to the described embodiments and encompasses modifications apparent to those skilled in the art lying within the spirit and scope of the claims appended hereto.

[0088] Through out the description and claims of this specification, the words "comprise" and "contain" and variations of the words, for example "comprising" and "comprise", means "including but not limited to, and is not intended to (and does not) exclude other moieties, additives, components, integers or steps.

[0089] Throughout the description and claims, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0090] Features, integers, characteristics or groups described in conjunction with a particular aspect, embodiment or example, of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.

Claims

1. A hair dryer (10) having a hand-held housing comprising:

   an air inlet and an air outlet;
   an air flow assembly between said air inlet and said air outlet to draw air in from said air inlet and drive air out from said air outlet, wherein said air flow assembly comprises a DC powered motor (51);
   a heating element located in said air flow between said air inlet and said air outlet; and
   a power controller configured to activate said heating element responsive to sensing activation of said DC powered motor.

2. A hair dryer according to claim 1, wherein the air flow assembly comprises an integrated fan and motor assembly (50), and optionally wherein the integrated fan and motor assembly comprises the DC powered motor which is concentrically mounted around a drive shaft and an axial impeller having a plurality of blades which extend radially around the motor and which are connected to the drive shaft to drive the blades.

3. A hair dryer according to claim 2, wherein the integrated fan and motor assembly (50) comprises a fan and the DC powered motor concentrically mounted about an axis of rotation of said fan, wherein said fan comprises an axial impeller having a plurality of blades which extend radially around the motor, and wherein optionally said motor further comprises a yoke and magnet coupled to said yoke, and wherein said plurality of blades are coupled to said yoke.

4. A hair dryer according to claim 2 or 3, wherein said integrated fan and motor assembly is housed within a generally cylindrical housing, and wherein optionally a plurality of strakes (25) extend from an inner surface of the cylindrical housing whereby circular air currents within the housing are reduced.

5. A hair dryer according to any one of the preceding claims, comprising a laminar element (70) located between the heating element and the air outlet, the laminar element being arranged to compensate for any disturbance introduced into the axial air flow by the heating element, and wherein optionally said laminar element comprises an array of elongate tubes, and wherein optionally the tubes in said array are parallel to one another, and wherein optionally at least some of the tubes in said array have a hexagonal cross-section.

6. A hair dryer as claimed in claim 5, wherein said array of tubes is formed from silicone rubber, and/or wherein each tube has a length between 0.5 and 2.0cm.

7. A hair dryer according to any one of the preceding claims wherein the outlet comprises a hot air outlet and a cool air outlet and the housing comprises a hot air channel through which air is drawn from the inlet past the heater to the hot air outlet and a cool air channel through which air is drawn from the inlet to the cool air outlet, and wherein optionally the cool air channel is in the form of an outer duct which circumscribes the hot air channel, and wherein option-

ally the cool air channel extends beyond the hot air channel.

8. A hair dryer according to any one of the preceding claims further comprising a nozzle (20) having an inlet which matches the outlet of the hairdryer housing and an outlet having a generally rectangular cross-section, and wherein optionally the nozzle is shaped so that the cross-section of the nozzle changes gradually from the nozzle inlet to the nozzle outlet whereby disturbance to the air flow within the nozzle is minimised.

9. A hair dryer according to claim 8, when dependent on claim 7, wherein the nozzle (20) comprises a hot air channel (22) which connects to the hot air channel in the hair dryer housing and a cool air channel (24) which connects to the hot air channel in the hair dryer housing, wherein optionally the cool air channel of the nozzle extends beyond the hot air channel of the nozzle, and wherein optionally said cool air channel of the nozzle and/or housing comprises a plurality of strakes.

10. A hair dryer as claimed in any one of the preceding claims, further comprising a power adapter (44) comprising an AC to DC converter for driving at least said DC motor, and wherein said power adapter is optionally external to said hand-held housing and coupled to said hand-held housing by a power cord.

11. A hair dryer as claimed in claim 10, wherein said power adapter (44) is configured to deliver both an AC supply and a DC supply to said hand-held housing, and wherein said power adapter is configured to deliver said AC supply and said DC supply by combining a signal rail of each of said AC and DC supply, and wherein a neutral signal rail of said AC supply is optionally coupled to one of said DC signal rails, in particular a 0V rail of said DC signal rails.

12. A hair dryer as claimed in any one of the preceding claims, wherein said controller is configured to sense activation of said DC motor by sensing a DC current delivered to said DC motor.

13. A hair dryer as claimed in claim 10 or 11, wherein said power adapter comprises said controller, and wherein optionally said power controller further comprises a current sensor to sense said activation of said DC powered motor, and wherein optionally said power controller further comprises a relay coupled between a power source and said powered heating element, and wherein said controller is configured to activating said relay responsive to said sensing.

14. A hair dryer as claimed in any one of the preceding claims, wherein said power controller further comprises transistor switch coupled to said relay, and a protection diode connected across said relay, and/or wherein said heating element is AC powered.

15. A hair dryer as claimed in any preceding claim, wherein said air flow assembly further comprises a nose cone (48) mounted co-axially with and downstream from said air flow assembly.

Patentansprüche

1. Haartrockner (10), der ein Handgehäuse aufweist, das Folgendes umfasst:

einen Lufteinlass und einen Luftauslass;
eine Luftströmungsbaugruppe zwischen dem genannten Lufteinlass und dem genannten Luftauslass, um Luft von dem genannten Lufteinlass anzusaugen und Luft aus dem genannten Luftauslass auszustoßen, wobei die genannte Luftströmungsbaugruppe einen Gleichstrommotor (51) umfasst;
ein Heizelement, das sich in dem genannten Luftstrom zwischen dem genannten Lufteinlass und dem genannten Luftauslass befindet; und
eine Leistungssteuereinheit, die dafür konfiguriert ist, das genannte Heizelement als Reaktion auf die Erfassung der Aktivierung des genannten Gleichstrommotors zu aktivieren.

2. Haartrockner nach Anspruch 1, wobei die Luftströmungsbaugruppe eine integrierte Ventilator- und Motorbaugruppe (50) umfasst und wahlweise wobei die integrierte Ventilator- und Motorbaugruppe Folgendes umfasst: den Gleichstrommotor, der konzentrisch um eine Antriebswelle montiert ist, und ein axiales Laufrad, das eine Vielzahl von Schaufeln aufweist, die sich radial um den Motor erstrecken und die mit der Antriebswelle verbunden sind, um die Schaufeln anzutreiben.

3. Haartrockner nach Anspruch 2, wobei die integrierte Ventilator- und Motorbaugruppe (50) einen Ventilator umfasst und der Gleichstrommotor konzentrisch um eine Drehachse des genannten Ventilators montiert ist, wobei der genannte Ventilator ein axiales Laufrad umfasst, das eine Vielzahl von Schaufeln aufweist, die sich radial um den Motor erstrecken, und wobei optional der genannte Motor ferner ein Joch und einen Magneten aufweist, der mit dem genannten Joch gekoppelt sind, und wobei die genannte Vielzahl von Schaufeln mit dem genannten Joch gekoppelt ist.

4. Haartrockner nach Anspruch 2 oder 3, wobei die genannte integrierte Ventilator- und Motorbaugruppe innerhalb eines im Allgemeinen zylindrischen Ge-

häuses untergebracht ist und wobei sich optional eine Vielzahl von Stegen (25) von einer Innenfläche des zylindrischen Gehäuses erstreckt, wodurch kreisförmige Luftströme innerhalb des Gehäuses verringert werden.

5. Haartrockner nach einem der vorhergehenden Ansprüche, der ein laminares Element (70) umfasst, das zwischen dem Heizelement und dem Luftauslass angeordnet ist, wobei das laminare Element so angeordnet ist, dass es jegliche Störung, die in den axialen Luftstrom durch das Heizelement eingeführt wird, kompensiert wird, und wobei optional das genannte laminare Element eine Anordnung von langgestreckten Röhren umfasst, wobei optional die Röhren in der genannten Anordnung parallel zueinander angeordnet sind und wobei optional mindestens einige der Röhren in der genannten Anordnung einen sechseckigen Querschnitt aufweisen.

6. Haartrockner nach Anspruch 5, wobei die genannte Anordnung von Röhren aus Silikongummi gebildet ist und/oder wobei jede Röhre eine Länge zwischen 0,5 und 2,0 cm aufweist.

7. Haartrockner nach einem der vorhergehenden Ansprüche, wobei der Auslass einen Heißluftauslass und einen Kaltluftauslass umfasst und das Gehäuse Folgendes umfasst: einen Heißluftkanal, durch den Luft von dem Einlass über den Heizer zum Heißluftauslass angesaugt wird, und einen Kaltluftkanal, durch den Luft von dem Einlass zum Kühlluftauslass angesaugt wird, und wobei optional der Kaltluftkanal in Form eines Außendurchgangs gebildet ist, der um den Heißluftkanal herum angeordnet ist, und wobei sich optional der Kaltluftkanal über den Heißluftkanal hinaus erstreckt.

8. Haartrockner nach einem der vorhergehenden Ansprüche, der ferner eine Düse (20) umfasst, die Folgendes aufweist: einen Einlass, der mit dem Auslass des Haartrocknergehäuses übereinstimmt, und einen Auslass, der einen im Wesentlichen rechteckigen Querschnitt aufweist, und wobei optional die Düse so geformt ist, dass sich der Querschnitt der Düse allmählich von dem Düseneingang zu dem Düsenauslass ändert, Wodurch eine Störung des Luftstroms innerhalb der Düse minimiert wird.

9. Haartrockner nach Anspruch 8, wenn abhängig von Anspruch 7, wobei die Düse (20) einen Heißluftkanal (22) aufweist, der mit dem Heißluftkanal im Haartrocknergehäuse und einem Kaltluftkanal (24) verbunden ist, der mit dem Heißluftkanal im Fonusgehäuse verbunden ist, wobei sich optional der Kaltluftkanal der Düse über den Heißluftkanal der Düse hinaus erstreckt und wobei optional der genannte Kaltluftkanal der Düse und/oder des Gehäuses eine Vielzahl von Stegen aufweist.

10. Haartrockner nach einem der vorhergehenden Ansprüche, der ferner einen Netzadapter (44) umfasst, der einen AC/DC-Wandler zum Antreiben mindestens des genannten Gleichstrommotors umfasst, und wobei der genannte Netzadapter optional außerhalb des genannten Handgehäuses liegt und mit dem genannten Handgehäuse durch ein Netzkabel gekoppelt ist.

11. Haartrockner nach Anspruch 10, wobei der genannte Netzadapter (44) so konfiguriert ist, dass er dem genannten Handgehäuse sowohl eine Wechselstromversorgung als auch eine Gleichstromversorgung bereitstellt, und wobei der genannte Netzadapter so konfiguriert ist, dass er die genannte Wechselstromversorgung und die genannte Gleichstromversorgung durch Kombinieren einer Signalschiene jeder der genannten Wechselstrom- und Gleichstromversorgung bereitstellt, und wobei eine neutrale Signalschiene der genannten Wechselstromversorgung optional mit einer der genannten Gleichstromsignalschienen, insbesondere mit einer 0-V-Schiene der genannten Gleichstromsignalschienen, gekoppelt ist.

12. Haartrockner nach einem der vorhergehenden Ansprüche, wobei die genannte Steuereinheit so konfiguriert ist, dass sie die Aktivierung des genannten Gleichstrommotors durch Erfassen eines Gleichstroms, der an den genannten Gleichstrommotor angelegt wird, erfasst.

13. Haartrockner nach Anspruch 10 oder 11, wobei der genannte Netzadapter die genannte Steuereinheit umfasst, und wobei optional die genannte Leistungssteuereinheit ferner einen Stromsensor umfasst, um die genannte Aktivierung des genannten Gleichstrommotors zu erfassen, und wobei optional die genannte Leistungssteuereinheit ferner ein Relais umfasst, das zwischen einer Stromquelle und dem genannten mit Strom versorgten Heizelement gekoppelt ist, und wobei die genannte Steuereinheit so konfiguriert ist, dass sie das genannte Relais als Reaktion auf die genannte Erfassung aktiviert.

14. Haartrockner nach einem der vorhergehenden Ansprüche, wobei der genannte Leistungsregler ferner einen Transistorschalter, der mit dem genannten Relais gekoppelt ist, und eine Schutzdiode, die an das genannte Relais angeschlossen ist, umfasst und/oder
wobei das genannte Heizelement mit Wechselstrom betrieben wird.

15. Haartrockner nach einem der vorhergehenden Ansprüche, wobei die genannte Luftströmungsbau-

gruppe ferner einen Nasenkonus (48) aufweist, der koaxial mit und stromabwärts von der genannten Luftströmungsbaugruppe angeordnet ist.

Revendications

1. Sèche-cheveux (10) ayant un corps portatif comprenant :

une entrée d'air et une sortie d'air ;
un ensemble de flux d'air entre ladite entrée d'air et ladite sortie d'air pour aspirer de l'air par ladite entrée d'air et expulser l'air par ladite sortie d'air, ledit ensemble de flux d'air comprenant un moteur alimenté par CC (51) ;
un élément chauffant situé dans ledit flux d'air entre ladite entrée d'air et ladite sortie d'air ; et
un contrôleur de courant conçu pour activer ledit élément chauffant en réponse à la détection de l'activation dudit moteur alimenté par CC.

2. Sèche-cheveux selon la revendication 1, dans lequel l'ensemble de flux d'air comprend un ensemble ventilateur et moteur intégré (50), et éventuellement dans lequel l'ensemble ventilateur et moteur intégré comprend le moteur alimenté par CC qui est monté concentriquement autour d'un arbre d'entraînement, et une roue axiale comportant une pluralité de pâles qui s'étend radialement autour du moteur et qui sont reliées à l'arbre d'entraînement en vue pour que celui-ci entraîne les pâles.

3. Sèche-cheveux selon la revendication 2, dans lequel l'ensemble ventilateur et moteur intégré (50) comprend un ventilateur et le moteur alimenté par CC monté concentriquement par rapport à un axe de rotation dudit ventilateur, dans lequel ledit ventilateur comprend une roue axiale ayant une pluralité de pâles qui s'étend radialement autour du moteur, et éventuellement dans lequel ledit moteur comprend en outre une culasse et un aimant accouplé à ladite culasse, ladite pluralité de pâles étant couplée à ladite culasse.

4. Sèche-cheveux selon la revendication 2 ou 3, dans lequel ledit ensemble ventilateur et moteur intégré est logé dans un corps généralement cylindrique, et éventuellement dans lequel une pluralité de virures (25) s'étend à partir d'une surface intérieure du logement cylindrique, de manière à réduire les courants d'air circulaires dans le logement.

5. Sèche-cheveux selon l'une quelconque des revendications précédentes, comprenant un élément laminaire (70) situé entre l'élément chauffant et la sortie d'air, l'élément laminaire étant conçu pour compenser les perturbations générées dans le flux d'air axial par l'élément chauffant, et dans éventuellement dans lequel ledit élément laminaire comprend un réseau de tubes allongés, et éventuellement dans lequel les tubes dudit réseau sont parallèles les uns aux autres, et dans lequel éventuellement au moins une partie des tubes dudit réseau a une section transversale hexagonale.

6. Sèche-cheveux selon la revendication 5, dans lequel ledit réseau de tubes est formé à partir de caoutchouc de silicone, et/ou dans lequel chaque tube a une longueur comprise entre 0,5 et 2,0 cm.

7. Sèche-cheveux selon l'une quelconque des revendications précédentes, dans lequel la sortie comprend une sortie d'air chaud et une sortie d'air frais, et le corps comprend un canal d'air chaud par l'intermédiaire duquel de l'air est aspiré depuis l'entrée après le chauffage vers la sortie d'air chaud, et un canal d'air frais par l'intermédiaire duquel de l'air est aspiré depuis l'entrée vers la sortie d'air frais, et éventuellement dans lequel le canal d'air frais se présente sous la forme d'un conduit extérieur qui circonscrit le canal d'air chaud, et éventuellement dans lequel le canal d'air frais s'étend au-delà du canal d'air chaud.

8. Sèche-cheveux selon l'une quelconque des revendications précédentes, comprenant en outre une buse (20) ayant une entrée qui correspond à la sortie du corps de sèche-cheveux, et une sortie ayant une section transversale généralement rectangulaire, et éventuellement dans lequel la buse présente une forme telle que la section transversale de la buse varie progressivement de l'entrée de buse à la sortie de buse, de manière à minimiser les perturbations du flux d'air dans la buse.

9. Sèche-cheveux selon la revendication 8, lorsqu'elle dépend de la revendication 7, dans lequel la buse (20) comprend un canal d'air chaud (22) relié au canal d'air chaud du corps de sèche-cheveux, et un canal d'air frais (24) relié au canal d'air chaud du corps de sèche-cheveux, éventuellement dans lequel le canal d'air frais de la buse s'étend au-delà du canal d'air chaud de la buse, et éventuellement dans lequel ledit canal d'air frais de la buse et/ou du corps comprend une pluralité de virures.

10. Sèche-cheveux selon l'une quelconque des revendications précédentes, comprenant en outre un adaptateur de courant (44) comprenant un adaptateur CA/CC afin d'entraîner au moins ledit moteur CC, ledit adaptateur de courant étant éventuellement externe audit corps portatif et couplé audit corps portatif par un cordon d'alimentation.

11. Sèche-cheveux selon la revendication 10, dans le-

quel ledit adaptateur de courant (44) est conçu pour fournir une alimentation CA ainsi qu'une alimentation CC audit corps portatif, et dans lequel ledit adaptateur de courant est conçu pour fournir ladite alimentation CA et ladite alimentation CC en combinant un rail de signal de chacune desdites alimentations CA et CC, et dans lequel un rail de signal neutre de ladite alimentation CA est éventuellement couplé à un desdits rails de signal CC, en particulier à un rail 0 V desdits rails de signal CC.

12. Sèche-cheveux selon l'une quelconque des revendications précédentes, dans lequel ledit contrôleur est conçu pour détecter l'activation dudit moteur CC en détectant un courant CC fourni audit moteur CC.

13. Sèche-cheveux selon la revendication 10 ou 11, dans lequel ledit adaptateur de courant comprend ledit contrôleur, et éventuellement dans lequel ledit contrôleur de courant comprend un détecteur de courant pour détecter ladite activation dudit moteur alimenté par CC, et éventuellement dans lequel ledit contrôleur de courant comprend en outre un relais couplé entre une source de courant et ledit élément chauffant alimenté, et dans lequel ledit contrôleur est conçu pour activer ledit relais en réponse à ladite détection.

14. Sèche-cheveux selon l'une quelconque des revendications précédentes, dans lequel ledit contrôleur de courant comprend en outre un commutateur à transistor couplé audit relais, et une diode de protection connectée aux bornes dudit relais, et/ou dans lequel ledit élément chauffant est alimenté par CA.

15. Sèche-cheveux selon l'une quelconque des revendications précédentes, dans lequel ledit ensemble de flux d'air comprend en outre un cône avant (48) monté coaxialement avec ledit ensemble de flux d'air et en aval dudit ensemble de flux d'air.

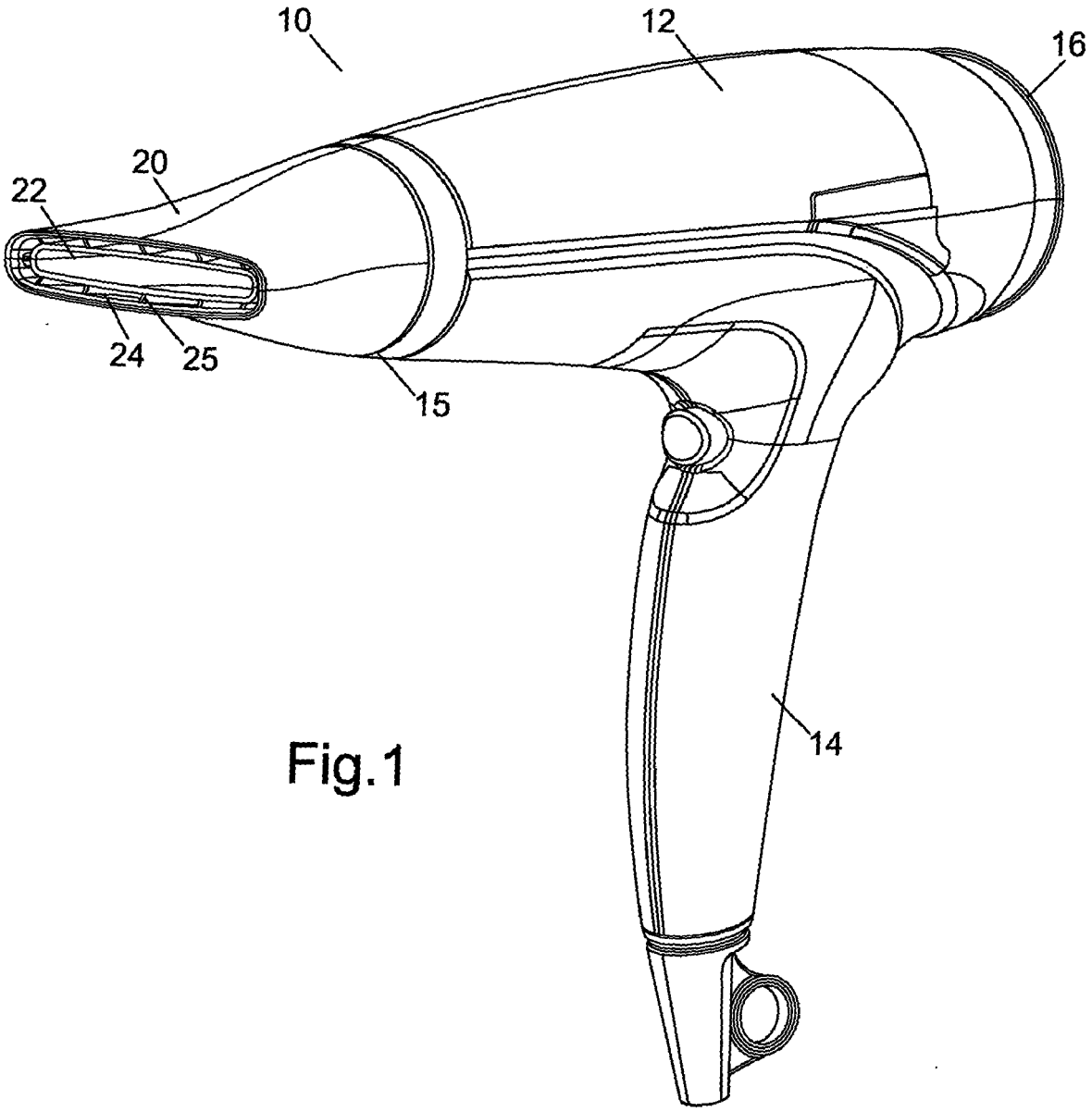


Fig.1

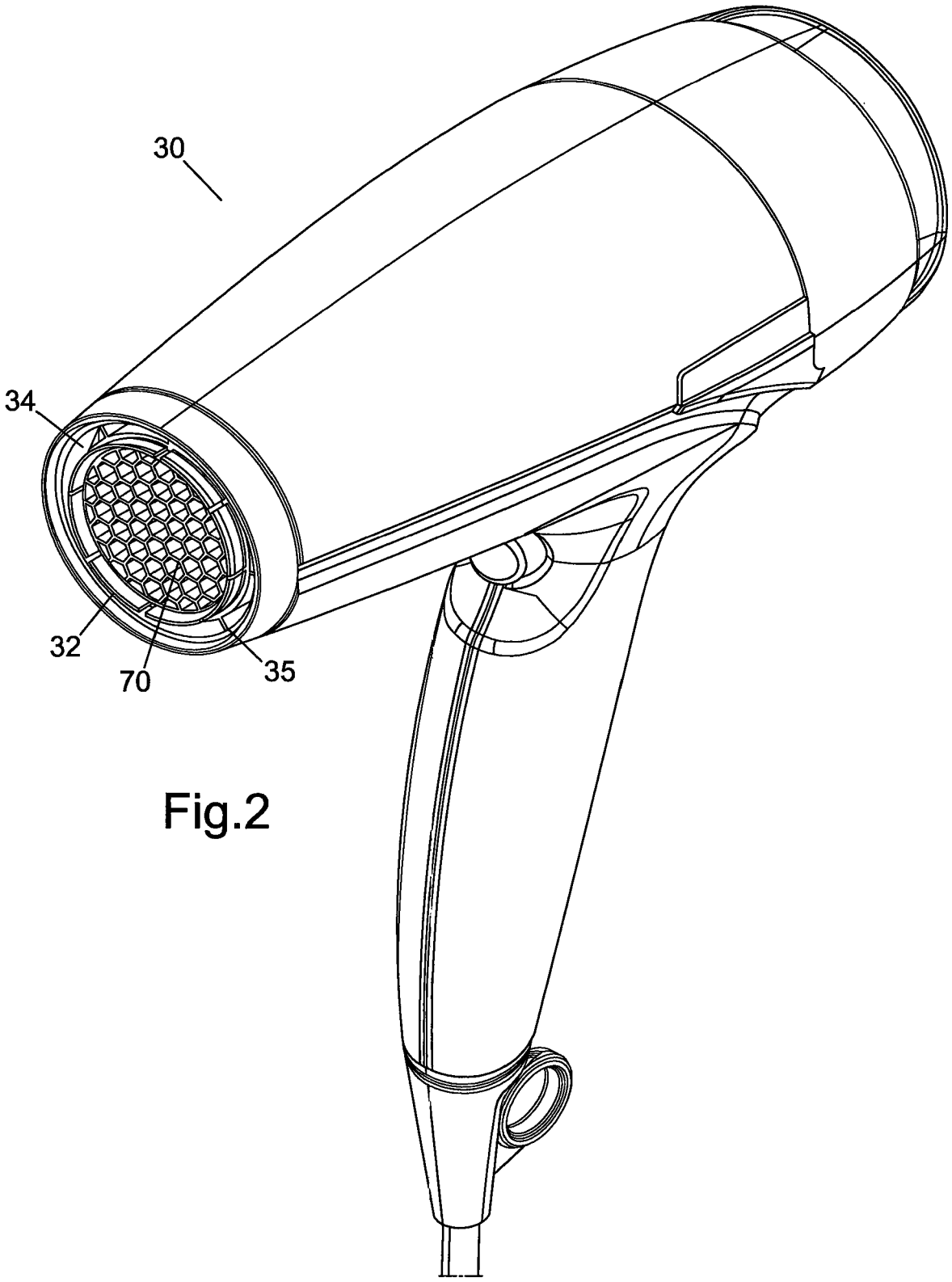


Fig.2

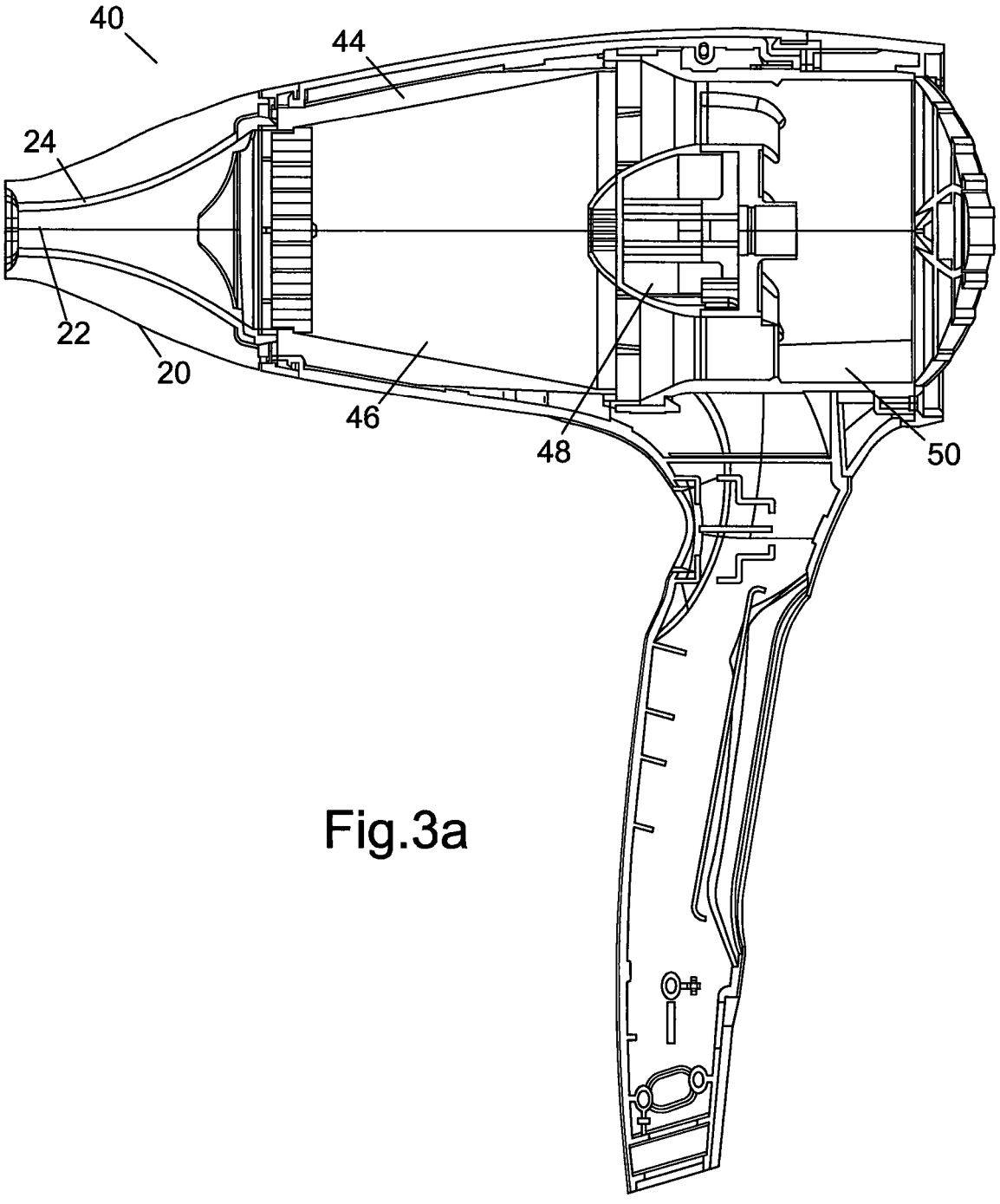


Fig.3a

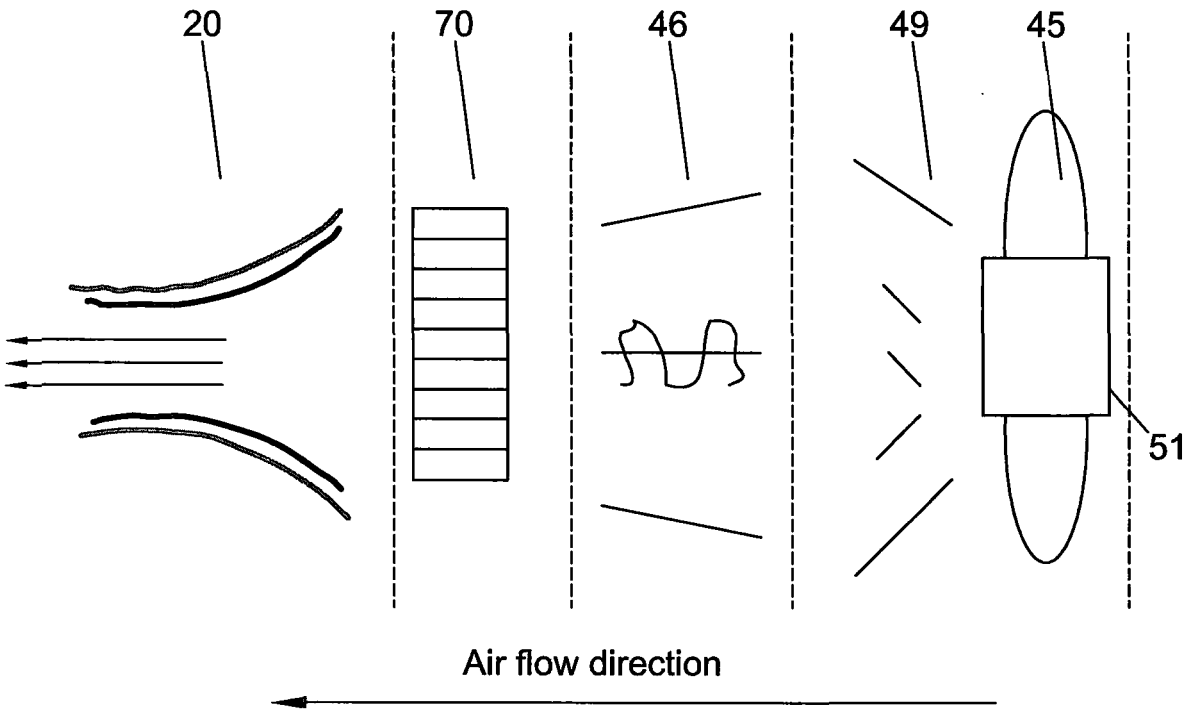


Fig.3b

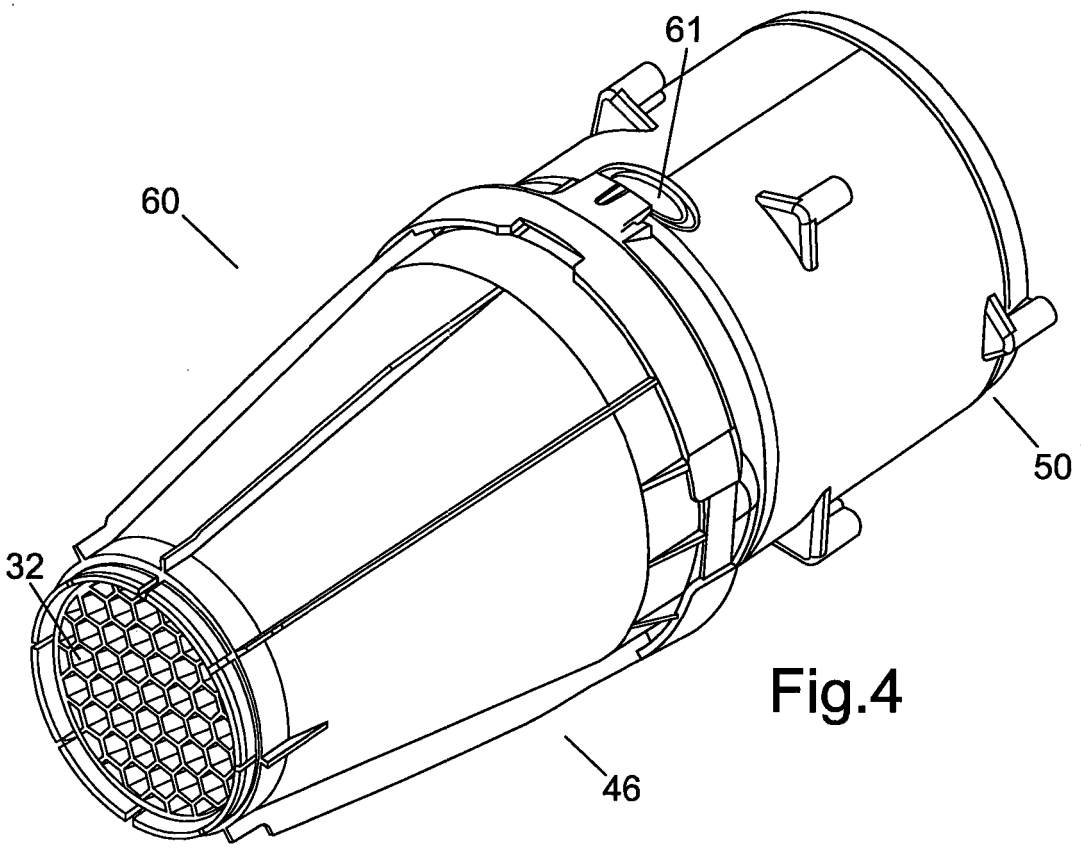


Fig.4

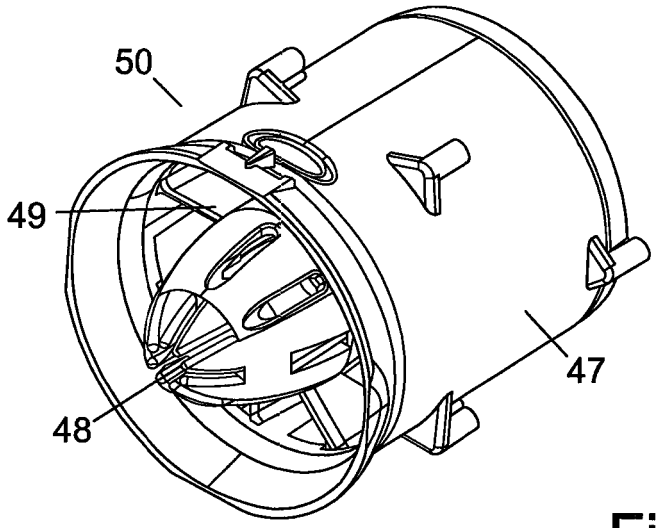


Fig.5

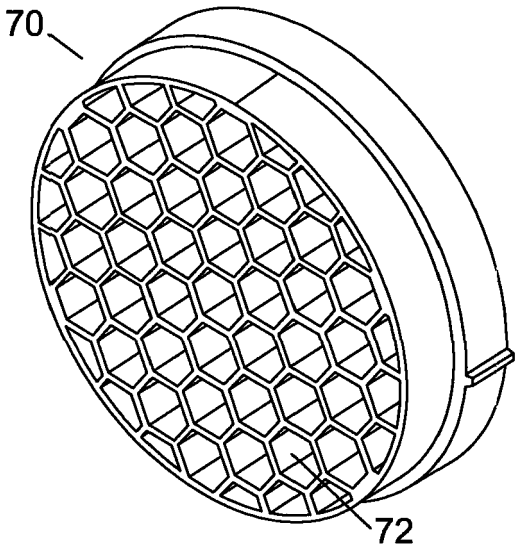


Fig.6a

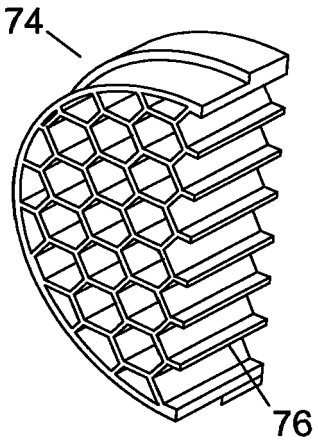


Fig.6b

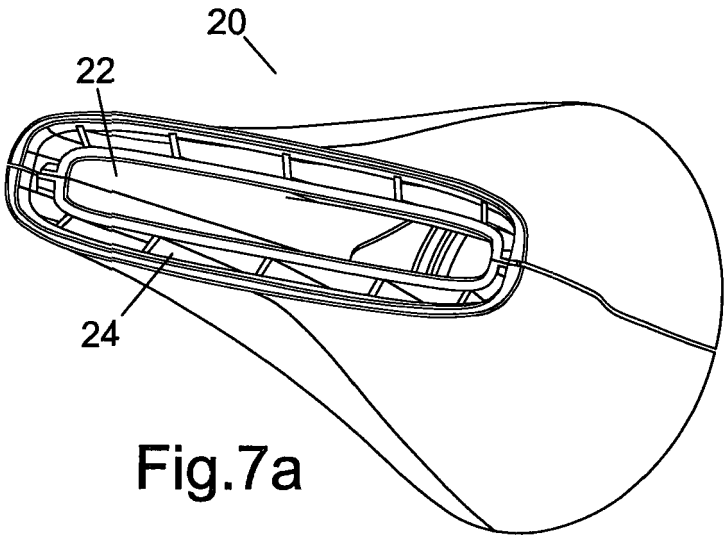


Fig.7a

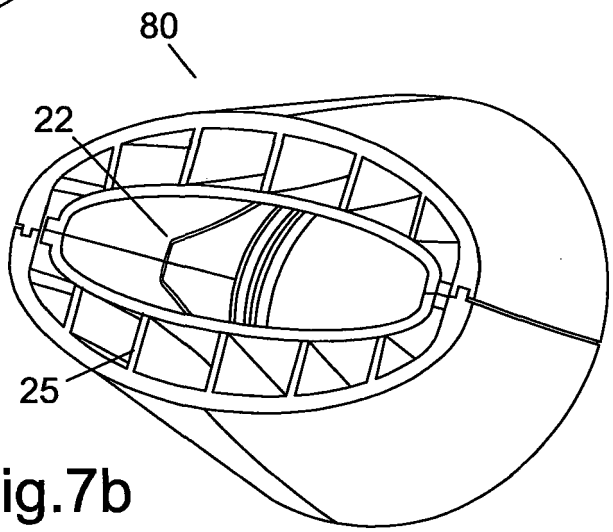


Fig.7b

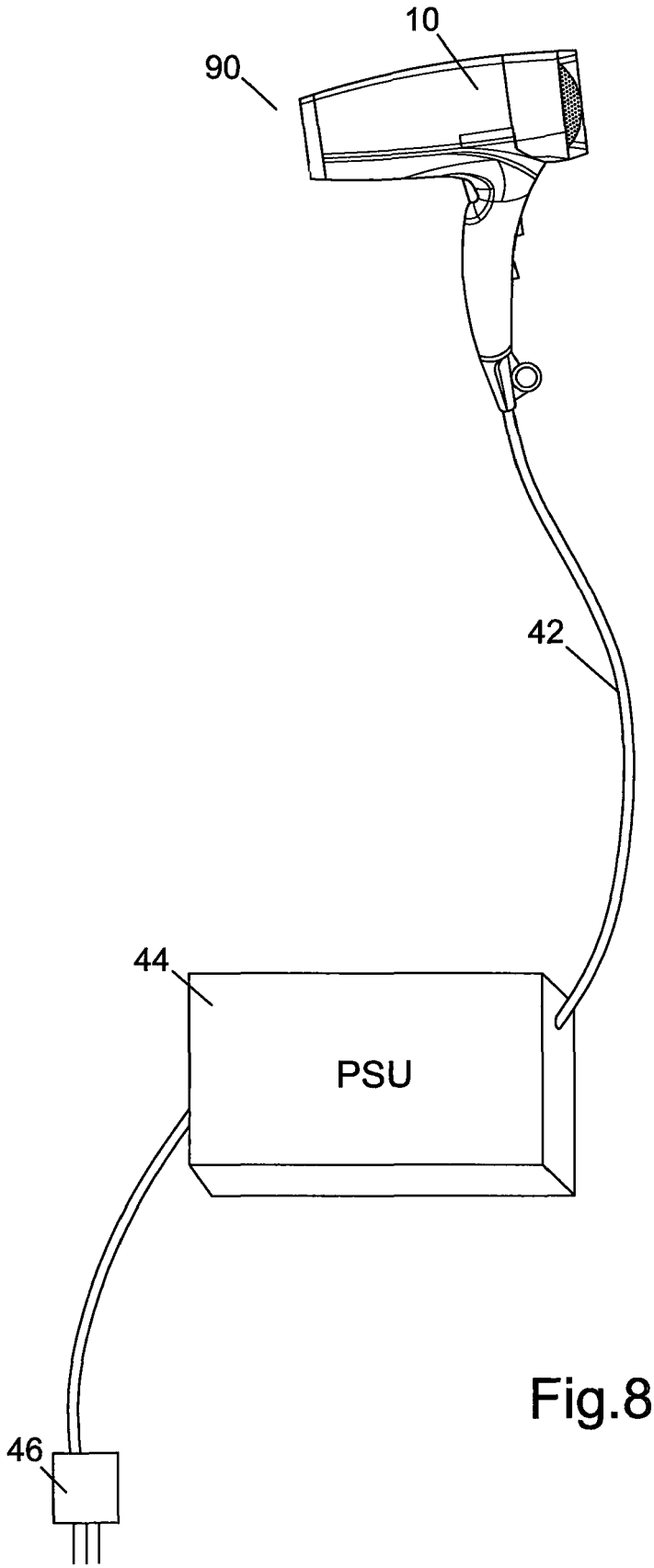


Fig.8

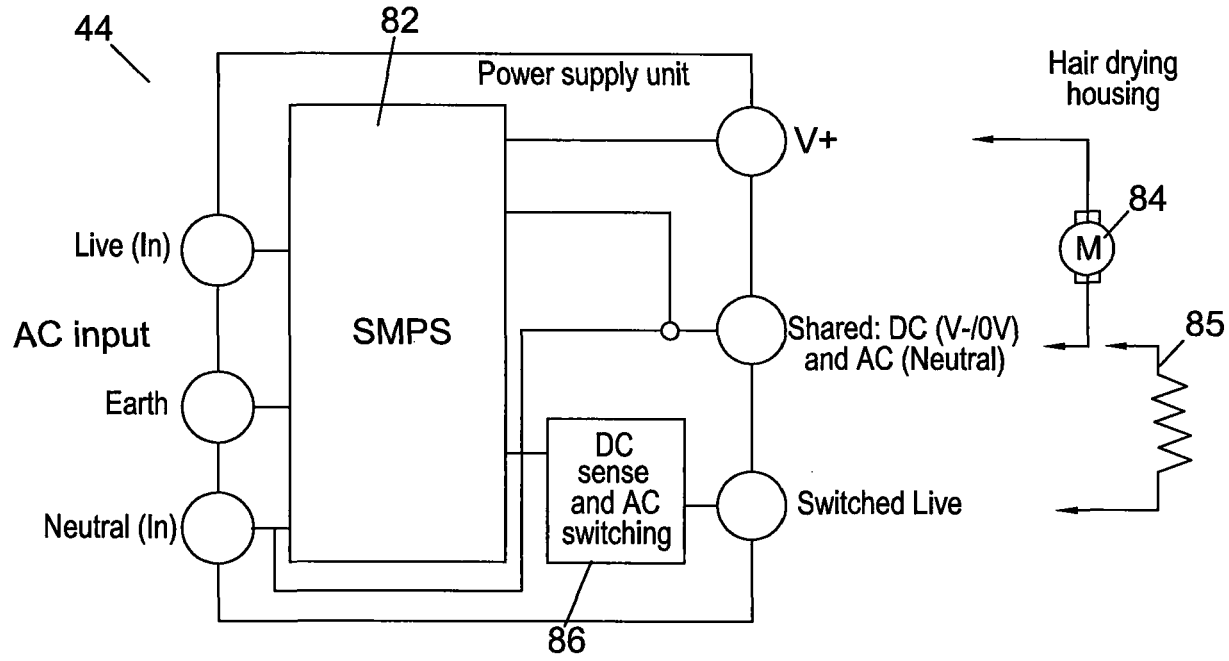

44
82
Power supply unit
Hair drying housing
V+
84
M
Live (In)
AC input
SMPS
Shared: DC (V-/0V) and AC (Neutral)
85
Earth
DC sense and AC switching
Switched Live
Neutral (In)
86

Fig.9

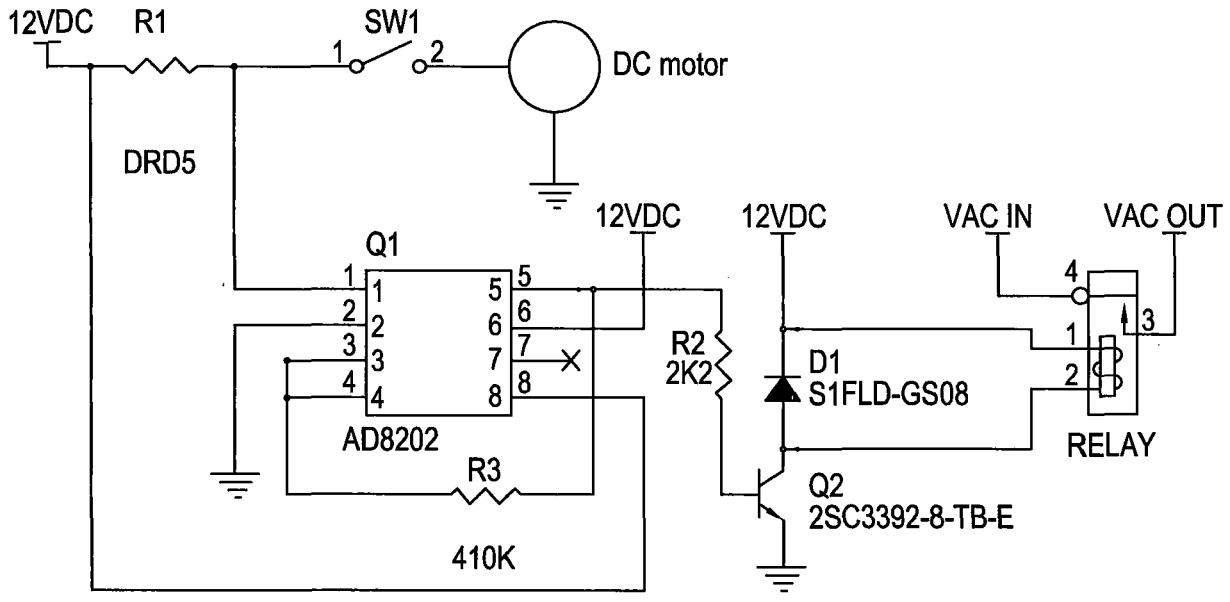

12VDC
R1
SW1
DC motor
DRD5
12VDC
12VDC
VAC IN
VAC OUT
Q1
AD8202
R2
2K2
D1
S1FLD-GS08
RELAY
R3
410K
Q2
2SC3392-8-TB-E

Fig.10

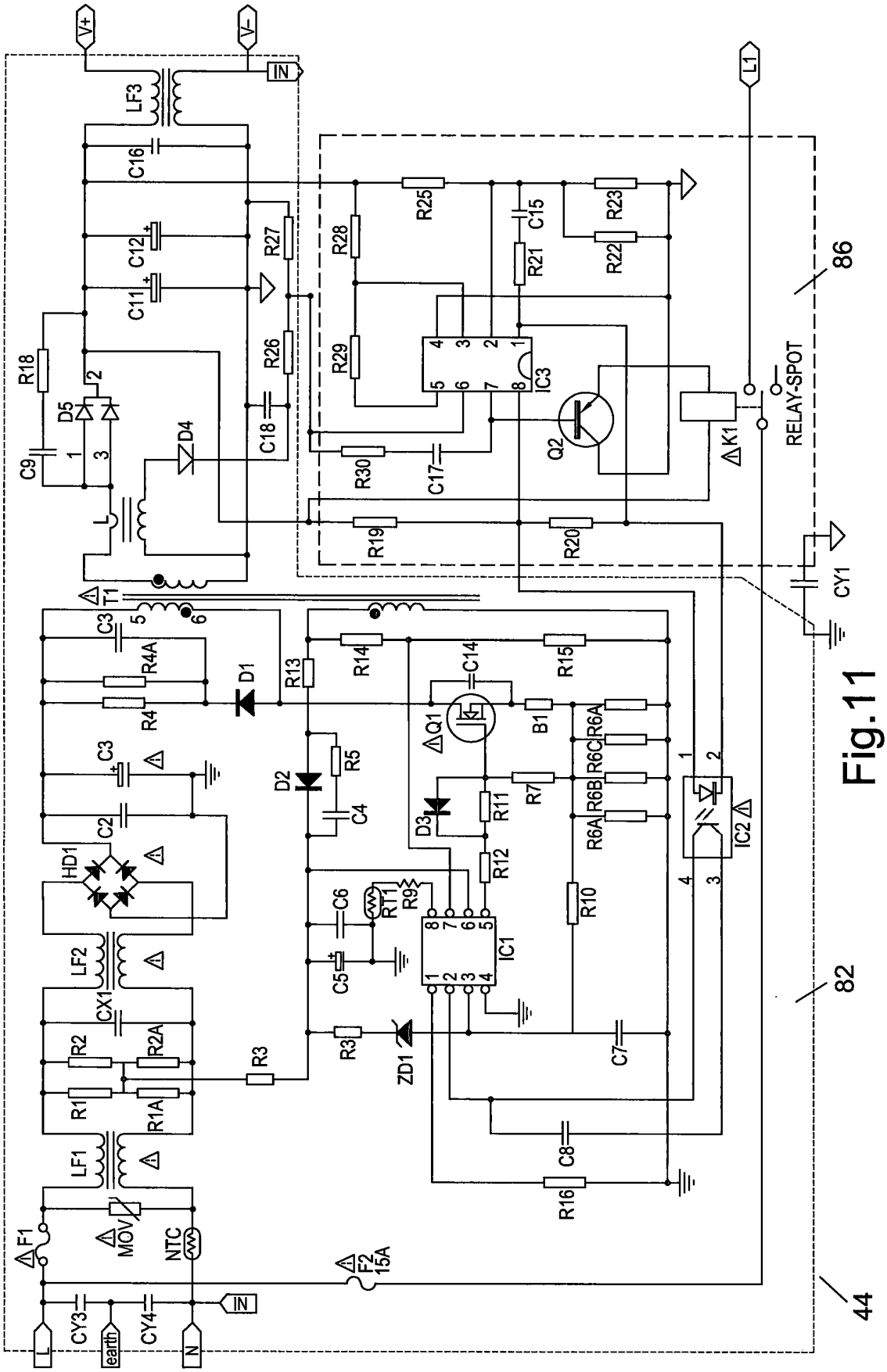

V+
V-
IN
L1
LF3
C16
C12
C11
R27
R26
C18
R18
D5
D4
C9
L
T1
R25
R28
R29
C15
R21
R23
R22
IC3
Q2
K1
RELAY-SPOT
R30
C17
R19
R20
86
CY1
C3
R4A
R4
D1
R13
R14
C14
R15
Q1
B1
R6A
R6C
R6B
R7
R11
R12
R10
IC2
C3
C2
D2
R5
C4
D3
HD1
C6
RT1
R9
C5
IC1
LF2
CX1
R2
R2A
R1
R1A
R3
ZD1
C7
C8
R16
LF1
F1
MOV
NTC
F2
15A
CY3
CY4
earth
L
N
IN
82
44

Fig.11

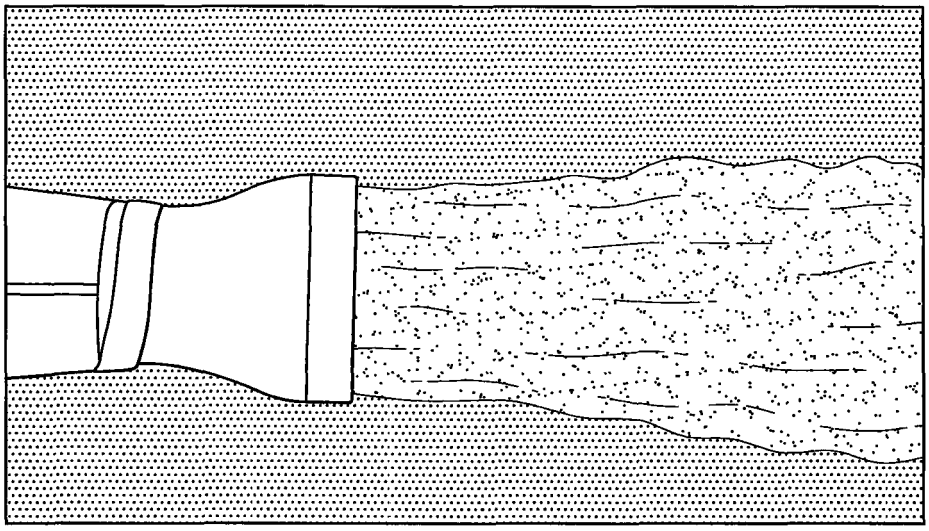


Fig.12a

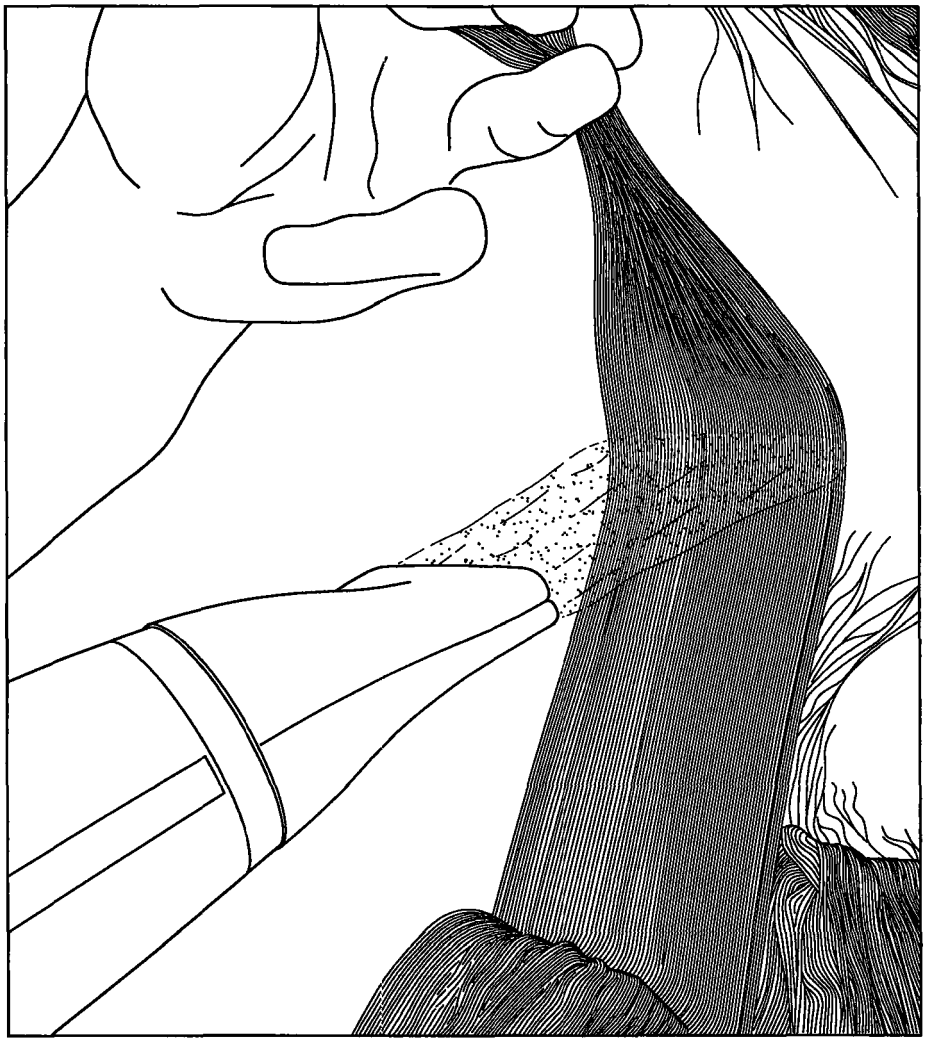


Fig.12b

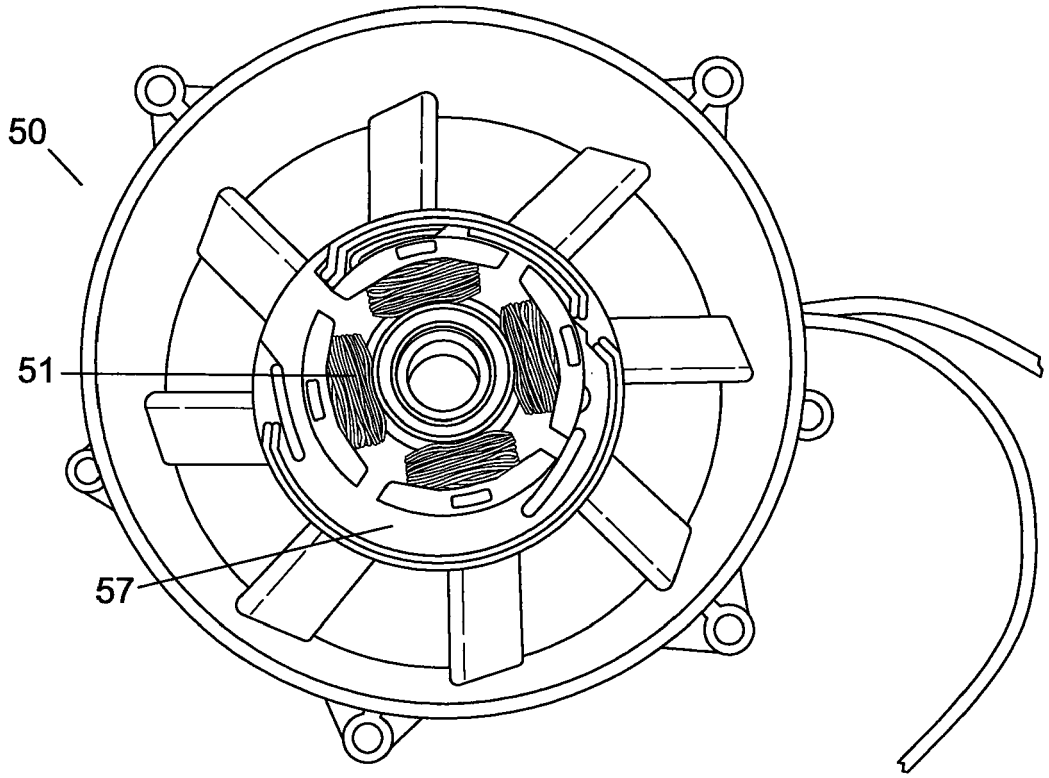


Fig.13a

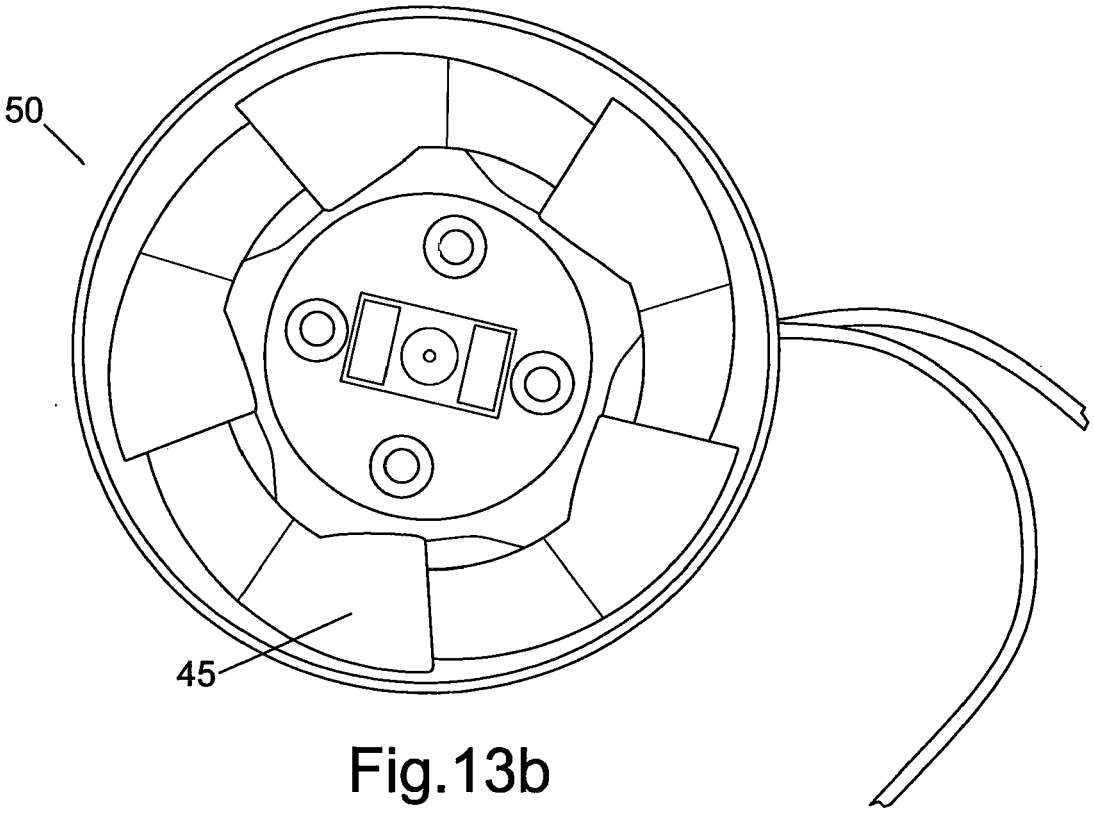


Fig.13b

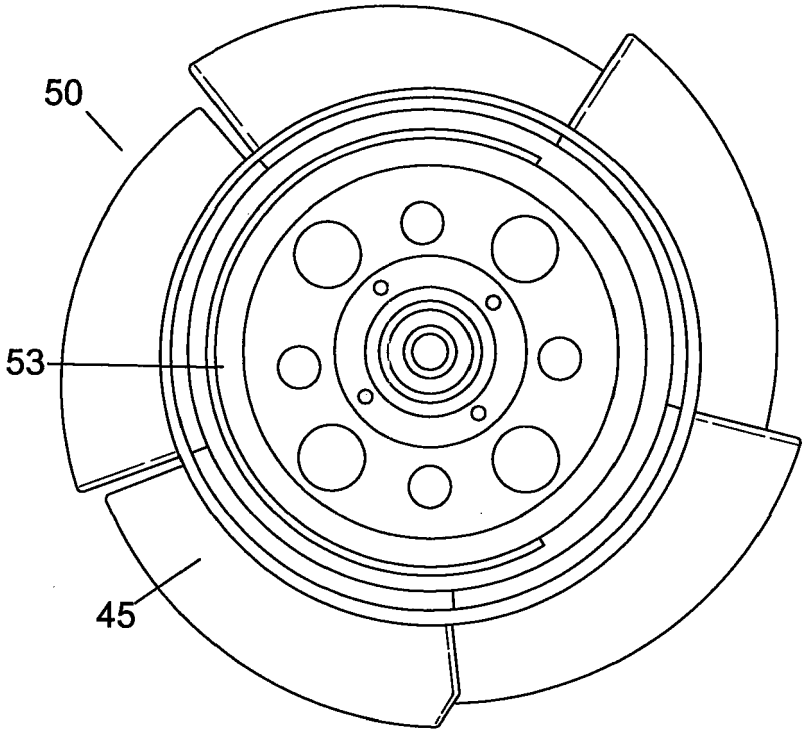


Fig.14a

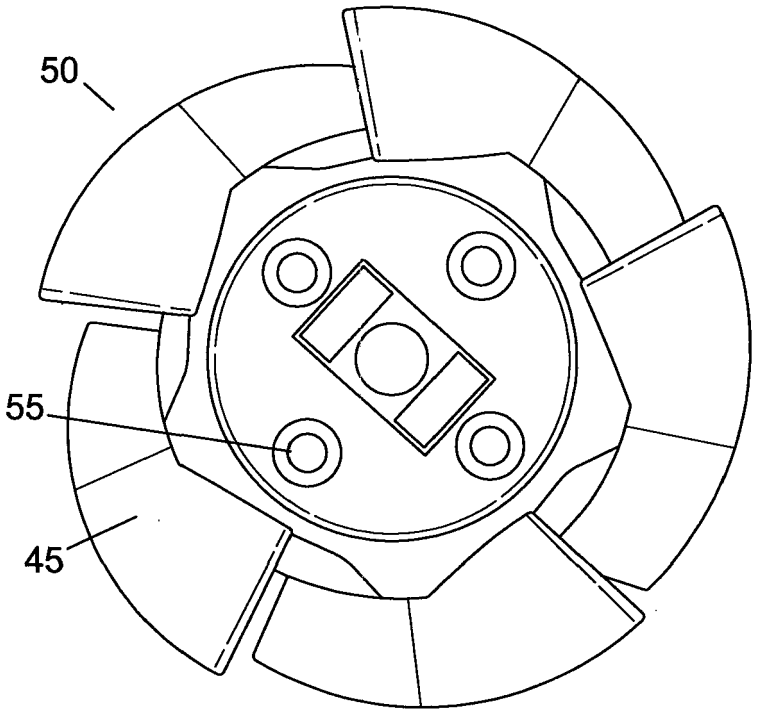


Fig.14b

REFERENCES CITED IN THE DESCRIPTION

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- US 6457953 B **[0064]**