US 20100237057A1

(19) **United States**

(12) **Patent Application Publication**

Hafemann

(10) **Pub. No.: US 2010/0237057 A1**

(43) **Pub. Date: Sep. 23, 2010**

(54) **RESISTANCE HEATING ELEMENT FOR A HAIR STYLING DEVICE AND A HAIR STYLING DEVICE EQUIPPED WITH SAID RESISTANCE HEATING ELEMENT**

(75) Inventor: **Klaus Hafemann**, Essen (DE)

Correspondence Address:
Oppedahl Patent Law Firm LLC (P&A)
P O Box 5940
Dillon, CO 80435-5940 (US)

(73) Assignee: **WIK FAR EAST, LTD**, North Point, Hong Kong (CN)

(21) Appl. No.: **12/161,299**

(22) PCT Filed: **Jan. 18, 2007**

(86) PCT No.: **PCT/EP07/50469**

§ 371 (c)(1),
(2), (4) Date: **Oct. 14, 2008**

(30) **Foreign Application Priority Data**

Jan. 18, 2006 (DE) 20 2006 000 670.2

Publication Classification

(51) **Int. Cl.**
A45D 1/04 (2006.01)

(52) **U.S. Cl.** **219/225**

(57) **ABSTRACT**

Resistance heating element **1** for a hair styling device comprises a resistance heating wire arrangement held by a support body **2**, and a layer **4** which covers and electrically insulates the heating wire. The resistance heating wire arrangement has at least one heating wire **3**. The support body **2** is formed solely by a shape-stable hollow body consisting of an electrically insulating and heat resistant flexible material, and the outside of the resistance heating element **1** is formed by a layer covering the heating wire **3**.

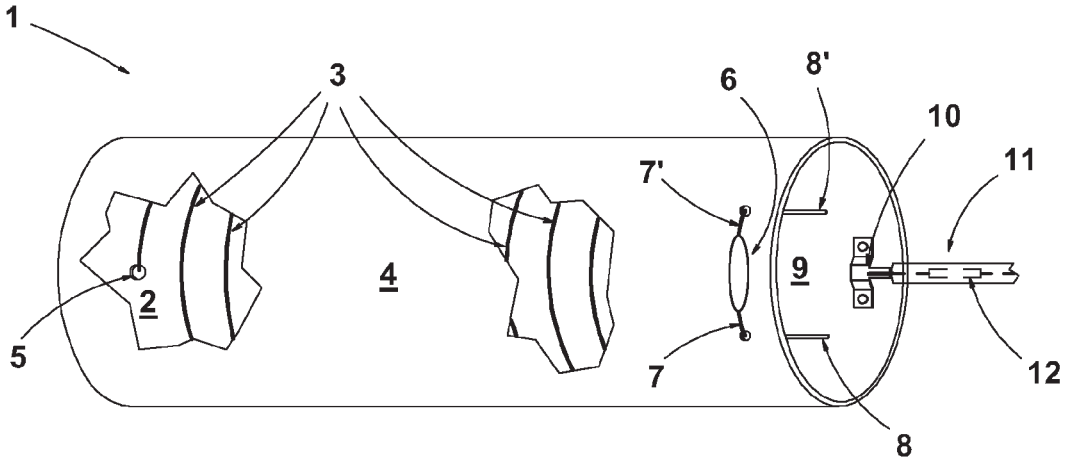

Fig. 1

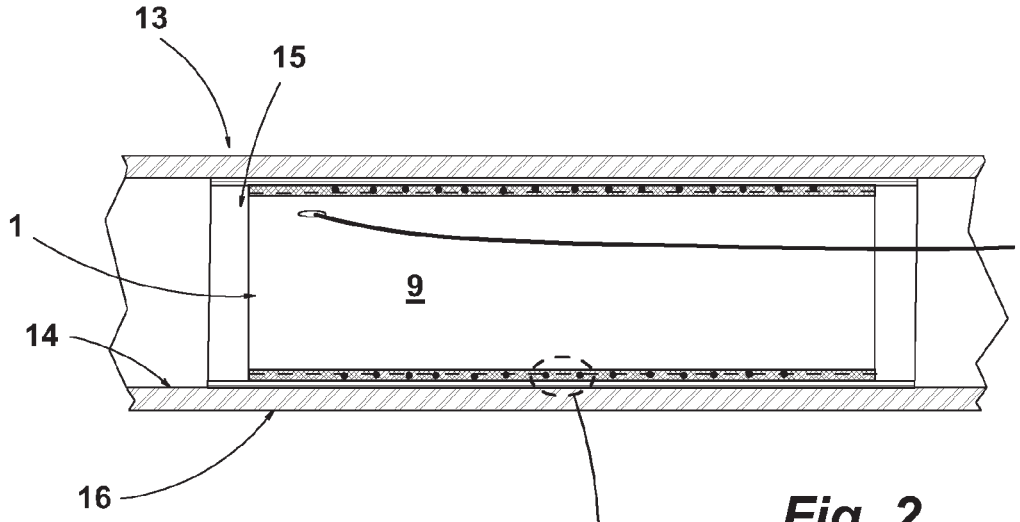

Fig. 2

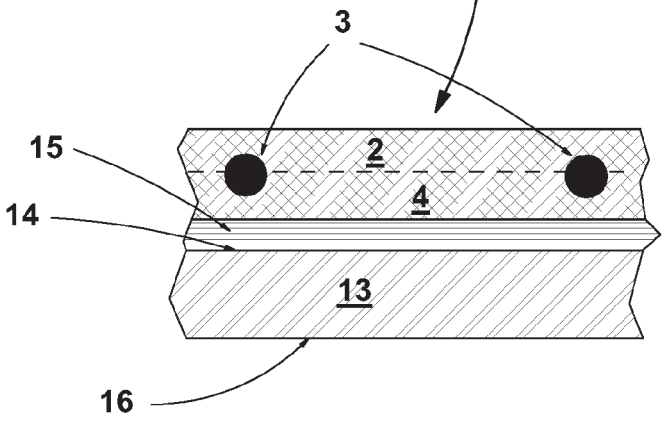

Fig. 3

RESISTANCE HEATING ELEMENT FOR A HAIR STYLING DEVICE AND A HAIR STYLING DEVICE EQUIPPED WITH SAID RESISTANCE HEATING ELEMENT

CROSS REFERENCE APPLICATIONS

[0001] This application is a national stage application of PCT application no. PCT/EP2007/050469 filed on Jan. 18, 2007 and claiming priority from German application 20 2006 000 670.2 filed on Jan. 18, 2006.

BACKGROUND

[0002] The invention relates to a resistance heating element for a hair styling device with a resistance heating wire arrangement having at least one heating wire held by a support body, and a layer covering and electrically insulating the one heating wire.

[0003] Hair styling devices, such as crimpers or curling irons, have hair styling tools with which hair. Crimpers have hair styling plates arranged on one arm. Curling irons have a heated rod to wind the hair around to form a curl. In all hair styling devices, heat is needed to style the hair. Therefore, the hair styling tools the need to be heated. Other than hair styling devices which use a hot air flow to provide heat, hair styling devices can have one or more resistance heating elements integrated in the hair styling tool. The resistance heating elements can be so-called PTC heating elements or a resistance heating wire. PTC heating elements are so-called flat heating elements, which are arranged in an aluminum envelope. The aluminum envelope surrounding the actual heating element distributes the heat over the required surface and transports the heat from the heating element to the inside of the hair styling tool. Resistance heating elements with a heating wire are used in similar way. Such heating elements are typically integrated in an aluminum envelope as heating cartridges or tubular heating bodies to distribute the generated heat and transport it to the inside of the heated surface or surfaces of the hair styling tool.

[0004] In hair styling devices with resistance heating elements a certain time is required for the heat from the heating element to be transferred to the surface of the hair styling tool. This is due to the aluminum envelope needed to transfer the heat from the heating element to the hair styling tool also having to be heated. Due to the heated mass at operating temperature, the hair styling tool also cools down relatively slowly after being turned off. The heat transporting and distributing envelope is made of aluminum, both because of the good thermal conduction properties and the relatively low specific weight of aluminum. Finally, the hair styling tool and thus the entire hair styling device should be as light as possible.

[0005] A curling rod with an electric heating is disclosed in EP 0 218 797 A2. A foil heating element is provided as the resistance heating element of this curling rod. The resistance heating foil is in direct contact with the inside of the tube of the curling rod described in this document. A slotted tubular spring element is used to attach the heating foil. The outside of the foil heating lies under pretension against the inside of the tube of the curling rod due to the spring element. This arrangement is required to carry away the heat generated by the resistance heating wire of the heating foil, otherwise there is a risk of destroying the heating foil. The heating foil itself is a flexible, sheet like component, which is placed against the inside of the tube of the curling rod during the assembly process, before the desired surface pressure is applied by the spring element. Therefore, the assembly of such a resistance heating foil needs to be done with special care if it is to be inserted into a tube of a hair styling tool.

[0006] Starting from the above discussed prior art, the basic problem of the invention is to modify the aforementioned resistance heating element so that, an appliance, especially a hair styling appliance, with one or more of these resistance heating elements has a faster heating and cooling response time, and it can be easily assembled.

[0007] The foregoing example of the related art and limitations related therewith are intended to be illustrative and not exclusive. Other limitations of the related art will become apparent to those of skill in the art upon a reading of the specification and a study of the drawings.

SUMMARY

[0008] The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tool and methods which are meant to be exemplary and illustrative, not limiting in scope. In various embodiments, one or more of the above described problems have been reduced or eliminated, while other embodiments are directed to other improvements.

[0009] This problem is solved according to the invention by a resistance heating element where the support body is formed by a shape-stable hollow body consisting of an electrically insulating and heat resistant flexible material, and the outside of the resistance heating element is formed by a layer covering the heating wire.

[0010] The resistance heating element has material electrically insulating only the heating wires. Therefore, the support body holding the heating wires is formed from such a material. Advisedly, this material is one with a mineral base, in the disclosed embodiment mica is used as the base material. This resistance heating element has no metal lining. The layer covering and electrically insulating the heating wire, also typically consisting of such a material, can additionally be coated on the outside by one or more polyimide foil layers if an improved electrical insulation is needed between the resistance heating wire and the hair styling tool being heated. A polyimide layer can be provided in the form of a thin coating or a foil deposition.

[0011] The actual support for this resistance heating element is formed by the heated tool itself, for example, the hair styling tool. If this is a curling iron, the resistance heating element is integrated into the tubular curling iron and its outside directly borders on the inside of the curling iron. The two elements—resistance heating element and curling iron—can be joined together by gluing. Thus, this resistance heating element is ultimately borne by the tool being heated. The generally flexible properties of an electrically insulating material formed on a mineral base, especially a mica base, allow the resistance heating element to easily be adapted to the inner contour of a hair styling tool. Therefore, it is unnecessary for the resistance heating element to have a firmly defined outside contour, especially one which is adapted to the heating element holder of the tool. Only the circumference of the resistive heating element needs correspond to the circumference of the inner envelope surface of the hair styling tool. The arrangement of the resistance heating element and especially the resistance heating wire in immediate proximity to the surface of the hair styling tool being heated has the

benefit that the heat is produced where it is actually needed. Therefore, very little to no heat distributing or heat transporting shapes are required. This results in a very quick response time, so that the desired heat is available on the hair styling tool almost immediately after turning on the resistance heating element. The slight heated mass, which is basically only the mass comprised of the heated surface of the hair styling tool, also cools down the tool quickly. The quicker response time of the hair styling tool in terms of its warm-up and cool-down brings benefits both in the handling of the hair styling device and in energy consumption.

[0012] The support body for the at least one heating wire of the resistance heating wire arrangement is stable in shape. The support body can have various shapes. For example, it can be configured as a piece of cylindrical pipe. This has the benefit that the support body or the resistance heating element can be a support for other components at the same time. The components are then placed in a definite arrangement to the support body and particularly its resistance heating wire arrangement. This involves the arranging of a thermal fuse, which remains in the same arrangement for a temperature detection due to the shape-stable properties of the support body, even after the resistance heating element has been placed on a tool, such as in the tube of a curling iron.

[0013] The heating wire can be arranged in various ways on the support body. In particular, when the support body is a ring body, such as an annular cylinder segment, one will wind the heating wire about the cylindrical support body.

[0014] Making the support body a hollow body also has the benefit that the required leads for the heating wire and possibly other elements, such as a thermal fuse and/or a sensor element, can be arranged on the interior. Due to the interior contacts, the entire outside of the resistance heating element can be used as a heating surface.

[0015] In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. **1** is a schematized perspective view of a resistance heating element for a curling iron as a hair styling device.

[0017] FIG. **2** is a schematized longitudinal section through the resistance heating element of FIG. **1**, integrated in a curling iron.

[0018] FIG. **3** is an enlarged cutout from FIG. **2**.

[0019] Before explaining the disclosed embodiment of the present invention in detail, it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown, since the invention is capable of other embodiments. Exemplary embodiments are illustrated in referenced figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered illustrative rather than limiting. Also, the terminology used herein is for the purpose of description and not of limitation.

DETAILED DESCRIPTION OF THE DRAWINGS

[0020] A resistance heating element **1** comprises a support body **2**, on which a resistance heating wire **3** is wound in several turns. The resistance heating wire **3** wound around the support body **2** in several turns constitutes the resistance heating wire arrangement in the depicted sample embodiment. The heating wire **3** is covered on the outside by a heat distributing and electrically insulating layer **4** in the manner of an envelope. The turns of the heating wire **3** on the support body **2** can be seen through the cut-outs in the layer **4**. The support body **2** and the layer **4** forming the outer envelope are a material made from a mica base in the depicted embodiment, such as is known by the name micanite. The support body **2** in the depicted embodiment consists of a thin micanite sheet. The support body **2** is formed into the annular cylindrical shape recognizable in FIG. **1** before the heating wire **3** is wound on the outside of the support body **2**. Therefore, the support body **2** has a shape stability consistent with the requirements.

[0021] The leads for making contact with the heating wire **3** are located inside the support body **2**. For this purpose, the two ends of the resistance heating wire **3** are each fed through an opening into the interior of the support body **2**. One of the two openings is indicated by **5** in FIG. **1**, through which one end of the resistance heating wire **3** is fed through the support body **2**.

[0022] On the outside of the resistance heating element **1** there is a standard temperature sensor **6**. The two lead pins **7**, **7'** of the temperature sensor **6** reach through the layer **4** and the support body **2** and are likewise fed into the interior of the support body **2**. Thus, the temperature sensor **6** is located immediately on the outside of the resistance heating element **1**. When the resistance heating element **1** is used to heat a tubular object, such as a curling iron, it lies against the inside of the tool. Therefore, it is not necessary to provide and electrically connect an additional temperature sensor in the resistance heating element **1** as a self-standing unit independent of the heating element **1**. The resistance heating element itself can serve as support for the temperature sensor **6** due to the direct arrangement of the outside of the resistance heating element **1** on the inside of the tool being heated. The contact pins **7**, **7'** of the temperature sensor **6** are connected to electrical plug contacts **8**, **8'**. The plug contacts **8**, **8'** protrude from the support body **2** in the lengthwise direction and make contact with a complementary mating plug to hook up the temperature sensor **6**. In the depicted embodiment, the plug contacts **8**, **8'** are fastened on the inner lateral surface **9** of the support body **2**.

[0023] A holder **10** for a standard thermal fuse **11** is riveted on the inner lateral surface **9** of the support body **2**. The thermal fuse **11** is set in a glass silicone sleeve **12** and protects against overheating

[0024] The arrangement of the electrical contacting of the heating wire **3**, which lies inside the support body **2**, can be seen in FIG. **2**. The resistance heating element **1** is inserted in a tube **13** of an otherwise not further represented curling or hairdressing iron, while only a segment of the curling iron tube **13** being heated is shown in FIG. **2**. To assure the necessary electrical insulation between the resistance heating element **1** and the tube **13**, three layers of a polyimide foil are placed on the outside of the resistance heating element **1** in the depicted embodiment. This is somewhat longer in its lengthwise dimension than the length of the support body **2**.

[0025] The enlarged cutout from FIG. **2**, presented in FIG. **3**, shows the arrangement of the heating wire **3** provided in immediate proximity to the inner lateral surface **14** of the tube **13**. The support body **2** and the layer **4** serving as the outer envelope are shown in FIG. **3** as a combined body since these

are identical in material. Thus, the layer **4** which forms the envelope is also a shaped piece of micanite. The shaped micanite piece strengthens the shape stability of the resistance heating element **1**. The separating surface between the support body **2** and the layer **4** is shown by broken line in this figure. The heating wires **3** have been wound on the original outer side of the support body **2** and are embedded in electrically insulating manner in this body formed from support body **2** and layer **4** due to the enveloping by the layer **4**. The heating wire **3** wound around the support body **2** is pressed into the support body **2** and into the layer **4** forming the outer envelope.

[0026] The resistance heating wire **3** in the depicted embodiment is separated from the inner lateral surface **14** of the tube being heated solely by the layer **4** forming the outer envelope of the resistance heating element and the layers of the polyimide foil **15**. Therefore, the path of the heat generated by the heating wire **3** to the outer envelope surface **16** of the tube **13**, against which the hair lies for the hair styling, is reduced to a necessary minimum. This figure also illustrates that the heating wire **3** only needs to heat the tube **13** serving as the hair styling tool, to provide the desired heat on this outer lateral surface **16** to carry out the hair styling process. Thus, the tube **13** serves not only as an outer rigid support body for the resistance heating element **1**, but also as a further heat distributor. The resistance heating element **1** does not need to extend for the entire length of the tube **13** of the curling iron due to the heat distributing properties of the tube **13**. The resistance heating element **1** lies with its outside peripherally against the inside of the tube **13** because of its annular cylindrical structure, so that the tube **13** has a uniform heat distribution over the outside circumference.

[0027] While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations therefore. It is therefore intended that the following appended claims hereinafter introduced are interpreted to include all such modifications, permutations, additions and sub-combinations are within their true sprit and scope. Each apparatus embodiment described herein has numerous equivalents.

LIST OF REFERENCE NUMBERS

[0028] **1** Resistance heating element
[0029] **2** Support body
[0030] **3** Resistance heating wire
[0031] **4** Layer
[0032] **5** Opening
[0033] **6** Temperature sensor
[0034] **7**, **7'** Connection pins
[0035] **8**, **8'** Plug contacts
[0036] **9** Inner lateral surface of the support body
[0037] **10** Holder
[0038] **11** Thermal fuse
[0039] **12** Glass silicone sleeve
[0040] **13** Tube
[0041] **14** Inner lateral surface of the tube
[0042] **15** Polyimide foil
[0043] **16** Outer lateral surface of the tube

1-10. (canceled)

11. A resistance heating element for a hair styling device comprising:

at least one heating wire held by a support body and a layer which covers and electrically insulates the at least one heating wire;

wherein the support body is formed from a shape-stable hollow body consisting of an electrically insulating and heat resistant flexible material; and

an outer surface of the resistance heating element is formed by the layer covering the heating wire.

12. The resistance heating element of claim **11**, wherein the support body is an annular body, especially an annular cylinder.

13. The resistance heating element as claimed in claim **11** or **12**, wherein the electrically insulating and heat resistant material of the support body and the layer covering heating wire is a mineral based material.

14. The resistance heating element as claimed in claim **11** or **12**, wherein electrical leads for making contact with the heating wire are arranged on an interior of the support body.

15. The resistance heating element as claimed in claim **13**, wherein electrical leads for making contact with the heating wire are arranged on an interior of the support body.

16. The resistance heating element as claimed in claim **11** or **12**, wherein the resistance heating element is associated with a thermal fuse arranged on an interior of the support body.

17. The resistance heating element as claimed in claim **13**, wherein the resistance heating element is associated with a thermal fuse arranged on an interior of the support body.

18. The resistance heating element as claimed in claim **11** or **12**, wherein a temperature sensor is arranged on the outer surface of the resistance heating element with electrical connection contacts of the temperature sensor lying inside the support body.

19. The resistance heating as claimed in claim **11** or **12**, wherein the outer surface of the resistance heating element is arranged in almost direct contact with a tubular tool being heated, with the interpositioning of at least one foil layer serving as electrical insulation.

20. The resistance heating as claimed in claims **13**, wherein the outer surface of the resistance heating element is arranged in substantially direct contact with a tubular tool being heated, with the interpositioning of at least one foil layer serving as electrical insulation.

21. The resistance heating as claimed in claims **14**, wherein the outer surface of the resistance heating element is arranged in substantially direct contact with a tubular tool being heated, with the interpositioning of at least one foil layer serving as electrical insulation.

22. The resistance heating element as claimed in claim **21**, wherein one or more layers of a polyimide foil are arranged between the outer surface of the resistance heating element and the surface of the tool being heated, for the electrical insulation of the resistance heating element relative to the tool being heated.

23. The resistance heating as claimed in claim **11** or **12** further comprising:

a hair styling appliance with a heated hair styling tool wherein the hair styling tool comprises a tube having an outer lateral surface for use in a hair styling process; and

wherein one or more resistance heating elements are arranged in the tube.

24. The resistance heating element of claim **23**, wherein the hair styling appliance is a curling iron.

* * * * *