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(54) **HAIR STYLING DEVICE**

(57) A hair styling device (1) comprises a hair styling component (11, 13), a heating mechanism (20) configured to heat the hair styling component (11, 13), a component temperature sensor (21) configured to detect a temperature of the hair styling component (11, 13), a hair temperature sensor (22) configured to detect a temperature of hair faced by the hair styling component (11, 13) during operation of the hair styling device (1), and a controller (23) configured to receive input from at least both temperature sensors (21, 22), and to process the inputs to control operation of the heating mechanism (20).

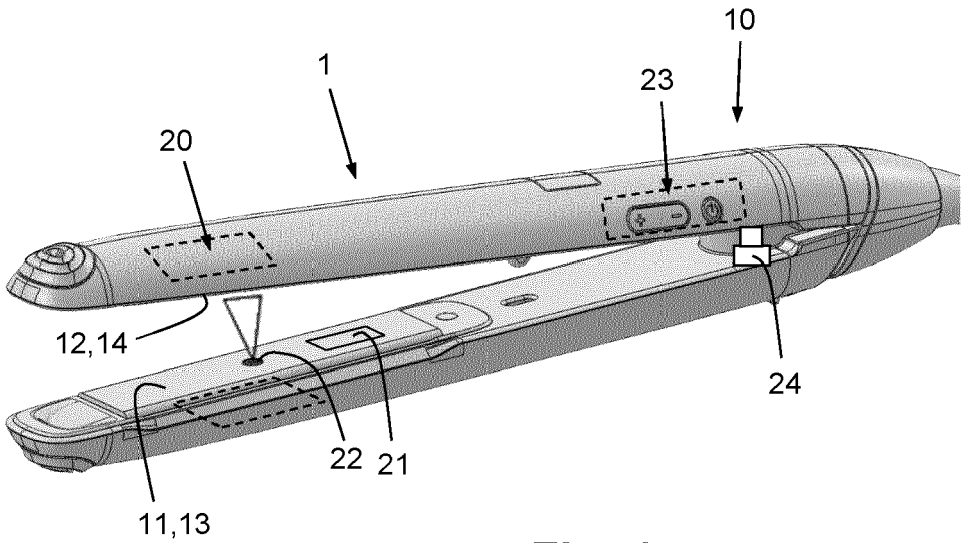

Fig. 1

EP 4 042 900 A1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a hair styling device comprising at least one hair styling component configured to face hair to be subjected to a styling action by means of the hair styling device, and a heating mechanism configured to heat the hair styling component.

BACKGROUND OF THE INVENTION

[0002] A practical example of such a hair styling device is a hair straightener. Generally speaking, a hair straightener comprises an arrangement of two hair styling components, which arrangement can be put to an opened position in which a distance between at least a portion of the hair styling surfaces of the hair styling components is sufficient to allow for insertion of hair between the hair styling surfaces, and to a closed position in which the distance between at least the portion of the hair styling surfaces of the hair styling components is minimal. Usually, in the arrangement as mentioned, the hair styling components are hingably connected to each other. Further, it is practical if the hair styling components have a generally plate-like appearance and if the hair styling surfaces of the hair styling components have a generally flat appearance.

[0003] When a hair straightener is put to an activated state, the hair styling components are put to a heated state. Carrying out a hair straightening action by means of the hair straightener in the activated state involves making sure that the arrangement is in the opened position, placing the hair straightener with respect to the hair such that a strand of hair is received in the arrangement at a position close to the scalp, putting the arrangement to the closed position as a result of which the strand of hair is caught between the hair styling surfaces of the hair styling components, and pulling the hair straightener downwards on the strand of hair. In this way, it is achieved that the strand of hair is subjected to a heating action while the hair straightener is moved to glide along the hair, as a result of which the strand of hair is straightened.

[0004] Many known hair straighteners are only configured to perform the function of hair straightening and are not configured to obtain and/or process any information about the hair. In respect of some advanced hair straighteners, it is suggested that the moisture content of the hair is measured, but this is done by using a component temperature sensor that is configured to detect a temperature of a hair styling component, which is not accurate due to unknown factors such as the clamping pressure prevailing between the hair styling surfaces, the stroking speed, and the ambient temperature. For example, when a hair straightener is used on a strand of hair with a normal amount of moisture, the component temperature sensor will observe a certain temperature drop after the straightening stroke has been performed. But when the same strand of hair would have been straightened at a lower ambient temperature, a larger temperature drop would be found despite of the fact that the moisture content of the hair is the same. Similarly, when the clamping pressure is higher, or the stroking speed is higher, the magnitude of the heat loss on the hair styling surfaces is increased, and the temperature drop that is observed by the component temperature sensor is higher, so that deviations are introduced to the calculation of the moisture content of the hair and an unreliable indication of the moisture content is obtained.

SUMMARY OF THE INVENTION

[0005] It is an object of the invention to provide an improved hair styling device. The invention is defined by the independent claims. The dependent claims define advantageous embodiments.

[0006] In view of the foregoing, the invention provides a hair styling device comprising at least one hair styling component having a hair styling surface configured to face hair to be subjected to a styling action by means of the hair styling device, a heating mechanism configured to heat the hair styling component, a component temperature sensor configured to detect a temperature of the hair styling component, a hair temperature sensor configured to detect a temperature of hair faced by the hair styling surface during operation of the hair styling device, and a controller configured to receive inputs from at least both the component temperature sensor and the hair temperature sensor, and to process the inputs to control operation of the heating mechanism.

[0007] It follows from the foregoing definition that the hair styling device according to the invention does not only comprise a component temperature sensor, but also a hair temperature sensor. The controller of the hair styling device is configured to receive inputs from at least both the component temperature sensor and the hair temperature sensor, and to process the inputs to control operation of the heating mechanism. In this way, it is achieved that a temperature setting of the hair styling component that is appropriate in view of the moisture content of the hair can automatically be chosen and realized, so that a user of the hair styling device does not need to think about the temperature setting.

[0008] The invention also covers the option that the hair styling device comprises an indicator configured to provide

a person with information including information related to the moisture content of the hair based on the inputs, and/or the option that the temperature setting can be manually adjusted. When a user is provided with information about the moisture level of his/her hair, the user can make well-founded decisions about which styling temperature setting to choose and which hair care products to use, for example.

[0009] It may be practical if the controller is configured to involve a look-up table in generating the output that is indicative of the moisture content of the hair. A look-up table as mentioned may reflect results from representative experiments performed in the context of the designing process of the hair styling device and aimed at linking detected values of parameters and/or calculated values of related parameters to a moisture content of hair under various circumstances, for example, for various known moisture levels of hair.

[0010] Detecting the hair temperature involves an interesting option of finding the start and the ending of a styling action, and to thereby find the duration of the styling action, assuming that sensible hair temperature values are only found during the time that hair is actually present on or in the vicinity of the hair styling surface of the hair styling component. In view thereof, the controller may be configured to derive from the input from the hair temperature sensor a value that is representative of the time duration of a styling action, and to involve the value to control operation of the heating mechanism.

[0011] Further, the controller may be configured to derive from the input from the component temperature sensor and the hair temperature sensor one or more of i) a value that is representative of the temperature of the hair styling component at the start of a styling action, ii) a value that is representative of a drop of the temperature of the hair styling component in the styling action, iii) a value that is representative of a drop of the temperature of the hair in the styling action, iv) a value that is representative of a peak temperature of the hair in the styling action, v) a value that is representative of a peak temperature of the hair styling component in the styling action, and vi) a difference between a value that is representative of a peak temperature of the hair in the styling action and a value that is representative of a peak temperature of the hair styling component in the styling action, and to involve the one or more of the values to control operation of the heating mechanism.

[0012] The component temperature sensor may be of any suitable type, and may be arranged at any appropriate location on or in the hair styling device, particularly any appropriate location on or in the hair styling component. In this respect, it is noted that it is possible that the component temperature sensor is arranged to detect a temperature of the hair styling component at the position of the hair styling surface thereof, but that it is also possible that the component temperature sensor is arranged to detect a temperature at the position of another area of the hair styling component. It is the temperature at the position of the hair styling surface that is a determining factor in the hair styling process, but it is not necessary to directly detect the surface temperature in view of the assumption that the temperature prevailing at another area of the hair styling component is linked to the surface temperature so that a trend of the temperature detected at the other area is representative of a trend of the surface temperature.

[0013] The hair temperature sensor may be of the non-contact type, but the invention also covers the possibility of using a hair temperature sensor that is configured to detect the temperature of hair actually contacting the sensor. Something similar is applicable to the hair styling surface of the hair styling component. It may be practical if the hair styling surface of the hair styling component is configured to actually contact hair in a styling action, but that does not alter the fact that it is also possible that the hair styling surface of the hair styling component is configured to subject hair that is at a small distance from the hair styling surface to a styling action, for example, by radiating heat towards the hair. The hair styling component may be of any suitable design. For example, the hair styling component may have a generally plate-like appearance and the hair styling surface may have a generally flat appearance.

[0014] In a practical embodiment, the hair styling device according to the invention comprises an arrangement of two hair styling components, which arrangement can be put to an opened position in which a distance between at least a portion of the hair styling surfaces of the hair styling components is sufficient to allow for insertion of hair between the hair styling surfaces, and to a closed position in which the distance between at least the portion of the hair styling surfaces of the hair styling components is minimal. In particular, the arrangement may be configured to realize a styling action aimed at straightening the hair, so that the hair styling device can be used as a hair straightener.

[0015] When the hair styling device comprises the arrangement as mentioned, it is possible that the hair styling device is equipped with a pressure sensor configured to detect a clamping pressure prevailing between the hair styling surfaces in the closed position of the arrangement, that the controller is configured to receive input from the pressure sensor, and that the controller is configured to derive from the input from the pressure sensor at least one value that is representative of at least one pressure parameter in a styling action, and to involve the value in generating the output that is indicative of the moisture content of the hair. In such a case, the accuracy of the moisture content estimation can be further increased by relying on the clamping pressure as a further factor besides the temperature of the hair styling component and the temperature of the hair, and possibly also the duration/speed of the styling action.

[0016] In the hair styling device, it is possible to have a position detector configured to detect the position of the hair styling component. In that case, it is advantageous if the controller is configured to receive input from the position detector, and to derive from the input from the position detector a value that is representative of the time duration of a styling

action, and to involve the value in generating the output that is indicative of the moisture content of the hair. Also, in that case, it is possible to have a configuration in which the hair temperature sensor is electrically coupled to the position detector so as to be activated only when the functional arrangement is in the closed position and to be shut off apart from that. In such a configuration, it is relatively easy to implement the option that is mentioned earlier and that involves deriving from the input from the hair temperature sensor a value that is representative of the time duration of a styling action. A practical example of the position detector is a detector comprising a switching mechanism configured to be in one of at least two different conditions and to be caused to switch from one condition to another as the position of the arrangement changes.

[0017] The above-described and other aspects of the invention will be apparent from and elucidated with reference to the following detailed description of a practical embodiment of a hair styling device that is an electronically controlled hair straightener configured to provide an indication of the moisture content of hair.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention will now be explained in greater detail with reference to the figures, in which:

Fig. 1 diagrammatically shows a perspective view of a practical embodiment of a hair styling device according to the invention,
Fig. 2 is a combined graph representing detected values of a hair styling component temperature and a hair temperature, respectively, against time, and
Figs. 3 and 4 are combined graphs representing detected values of a hair styling component temperature and a hair temperature, respectively, against time, for illustrating influence of the hair moisture level on the values under otherwise similar conditions.

DETAILED DESCRIPTION OF EMBODIMENTS

[0019] Fig. 1 shows a practical embodiment of a hair styling device 1 according to the invention.

[0020] The hair styling device 1 comprises an arrangement 10 of a first hair styling component 11 having a first hair styling surface 12 and a second hair styling component 13 having a second hair styling surface 14. The first hair styling component 11 and the second hair styling component 13 are hingably connected to each other to thereby be capable of realizing an opened position of the arrangement 10 for receiving hair between the first hair styling surface 12 and the second hair styling surface 14, and a closed position for styling hair between the first hair styling surface 12 and the second hair styling surface 14. Fig. 1 shows the hair styling device 1 with the arrangement 10 in the opened position. The hair styling device 1 as shown is particularly suitable to be used as a manual hair straightener, which does not alter the fact that the invention is applicable to other types of hair styling device as well.

[0021] The hair styling device 1 further comprises a heating mechanism 20 configured to heat both the first hair styling component 11 and the second hair styling component 13. The heating mechanism 20 is only diagrammatically indicated in Fig. 1, as two dashed boxes which are each associated with one of the hair styling components 11, 13. The present description is also applicable in the alternative case of the heating mechanism 20 being configured to heat only one of the hair styling components 11, 13. As is generally known from the field of manual hair straighteners, proper use of the hair styling device 1 as shown involves user's actions of i) picking up a strand of hair at a position near the scalp, which is done with the arrangement 10 in the opened position, ii) putting the arrangement 10 to the closed position with the hair being at a position of being clamped between the hair styling surfaces 12, 14, and iii) pulling the hair styling device 1 down on the strand of hair. Assuming that those actions are taken with the hair styling device 1 in an activated state, it is achieved that the hair styling surfaces 12, 14 are made to glide over the strand of hair while being in a heated state, wherein the strand of hair is sandwiched between the hair styling surfaces 12, 14, as a result of which the hair straightening effect is realized as desired.

[0022] The hair styling device 1 is equipped with two temperature sensors 21, 22 which are integrated in one of the hair styling components 11, 13. One of those temperature sensors 21, 22 is arranged and configured to detect a temperature of the respective hair styling component 11, 13, and is referred to as component temperature sensor 21. The other of those temperature sensors 21, 22 is arranged and configured to detect a temperature of hair, in a contactless fashion, and is referred to as hair temperature sensor 22. The detection range of the hair temperature sensor 22 is depicted as a cone-shaped area in Fig. 1. The hair styling device 1 is further equipped with a controller 23 that is configured to control operation of the heating mechanism 20 on the basis of input representing a desired temperature setting of the hair styling components 11, 13 and input from the component temperature sensor 21 representing an actual temperature of the hair styling components 11, 13. The controller 23 is only diagrammatically indicated in Fig. 1, as a dashed box. The controller 23 is also configured to make an analysis of the moisture content of hair that is subjected to a styling action by means of the hair styling device 1, as will be explained in more detail in the following. It is practical

if the controller 23 comprises a microprocessor, for example.

[0023] In the shown example, the hair styling device 1 does not only have a temperature detection functionality, but also a position detection functionality, that is to say, the hair styling device 1 is equipped with a position detector 24 configured to detect the position of the arrangement 10. The controller 23 is configured to receive and process input from both the temperature sensors 21, 22 and input from the position detector 24. When the arrangement 10 is in the opened position, and the position detector 24 is not triggered, the controller 23 will not use input from the temperature sensors 21, 22 for hair moisture analysis. Once the position detector 24 is triggered, the temperature data received from the temperature sensors 21, 22 will be recorded until the position detector 24 is untriggered. The recorded temperature data together with the recorded duration of the styling action/stroke of the hair styling device 1 on a strand of hair can be used for hair moisture analysis, as is now explained with reference to the graphs of Figs. 2, 3 and 4.

[0024] Fig. 2 is a combined graph representing detected values of a hair styling component temperature and a hair temperature, respectively, against time. The values are obtained during a typical straightening stroke on healthy Chinese hair with a normal moisture content, i.e. a moisture content of about 11%, with a temperature setting of 200 °C. In the combined graph, the temperature is expressed in degrees Celsius and the time is expressed in seconds. The detected values of the hair styling component temperature are the higher values in the combined graph, and the detected values of the hair temperature are the lower values in the combined graph. In the combined graph, the following values as can be used in the hair moisture analysis are indicated: stroke duration t, difference ΔT_p between the peak values of the hair styling component temperature and the hair temperature, hair styling component temperature drop ΔT_c over the stroke duration, and hair temperature drop AT_h over the stroke duration.

[0025] If only information about the hair styling component temperature would be available, it would be hard to estimate the level of hair moisture, because of all the unknown factors which also contribute to the way in which the hair styling component temperature drops during a straightening stroke. Accuracy of the estimation is largely improved by at least obtaining information about the hair temperature as well. Using a combination of the parameters as can be obtained by detecting both the hair styling component temperature and the hair temperature and making a comparison to reference values obtained from a laboratory characterization test, it is possible to estimate in an accurate fashion whether the moisture content of hair is higher than normal, normal, or lower than normal. In this respect, it is noted that Fig. 3 is a combined graph representing detected values of a hair styling component temperature and a hair temperature, respectively, against time, for a straightening stroke performed at normal speed and a temperature setting of 200 °C on hair having a normal moisture content. Fig. 4 is a combined graph representing detected values of a hair styling component temperature and a hair temperature, respectively, against time, for a straightening stroke performed at normal speed and a temperature setting of 200 °C on hair of which the moisture level has been increased by 5%. In the combined graphs of Figs. 3 and 4, similar to what is the case with the combined graph of Fig. 2, the temperature is expressed in degrees Celsius and the time is expressed in seconds. The scale at the left side of the combined graphs of Figs. 3 and 4 relates to the hair styling component temperature, and the scale at the right side of the combined graphs of Figs. 3 and 4 relates to the hair temperature. Further, in the combined graphs of Figs. 3 and 4, similar to what is the case with the combined graph of Fig. 2, the detected values of the hair styling component temperature are the higher values in the combined graphs, and the detected values of the hair temperature are the lower values in the combined graphs.

[0026] The following table is applicable to a comparison of the combined graph of Fig. 3 and the combined graph of Fig. 4, wherein the data relating to the situation to which the combined graph of Fig. 3 is applicable are regarded as baseline data. In the table, the hair styling component temperature is indicated as T_c, and the hair temperature is indicated as T_h.

Parameters	**Baseline data**	**Newly collected data**	**Data Direction Matrix**
T_c start value	212 °C +/- 5 °C	212 °C	Same as baseline
T_h peak value	175 °C +/- 5 °C	176 °C	Same as baseline
ΔT_c	11 °C +/- 5 °C	11 °C	Same as baseline
ΔT_h	43 °C +/- 5 °C	56 °C	Higher than baseline
ΔT_p	37 °C +/- 5 °C	36 °C	Same as baseline
t	6.5 seconds	5.5 seconds	Same as baseline
Indication derived from the newly collected data:			**High moisture content**

[0027] A characterization of parameters such as listed in the table could first be done in a laboratory with hair having a normal moisture content, hair having a low moisture content, and hair having a high moisture content. Ideally, factors related to user behavior such as difference stroke speeds and clamping pressure should also be considered. Once the

characterization is done, a data direction matrix can be obtained and preprogrammed in the controller 23 as a look-up table that is to be used in the process of generating output that is indicative of the moisture content of the hair. By collecting detection data during actual styling actions and comparing the data to the data direction matrix, the accurate indication of the moisture content of the hair subjected to the styling actions is obtained. This indication can be used for adjusting operation of the heating mechanism 20, for example, despite any temperature setting as may have been initially chosen by the user, and/or can be used for informing the user. In respect of the latter option, it is noted that the hair styling device 1 may be equipped with a display or another type of indicator, and/or may be configured to communicate the moisture content-related information to an external device such as a smartphone on which a suitable app is installed. The user can be informed by a simple message mentioning the percentage of the moisture content of the hair and/or by a more sophisticated message mentioning details of the best way to treat the hair, the products that may be used in doing so, etc.

[0028] It will be clear to a person skilled in the art that the scope of the invention is not limited to the examples discussed in the foregoing, but that several amendments and modifications thereof are possible without deviating from the scope of the invention as defined in the attached claims. For example, while the above embodiments relate to a hair straightener, the invention may be advantageously applied in a heated straightening brush. Instead of a position detector 24 as shown, an accelerometer can be used to detect a use condition. It is intended that the invention be construed as including all such amendments and modifications insofar they come within the scope of the claims or the equivalents thereof. While the invention has been illustrated and described in detail in the figures and the description, such illustration and description are to be considered illustrative or exemplary only, and not restrictive. The invention is not limited to the disclosed embodiments. The drawings are schematic, wherein details which are not required for understanding the invention may have been omitted, and not necessarily to scale.

[0029] Variations to the disclosed embodiments can be understood and effected by a person skilled in the art in practicing the claimed invention, from a study of the figures, the description and the attached claims. In the claims, the word "comprising" does not exclude other steps or elements, and the indefinite article "a" or "an" does not exclude a plurality. Any reference signs in the claims should not be construed as limiting the scope of the invention.

[0030] Elements and aspects discussed for or in relation with a particular embodiment may be suitably combined with elements and aspects of other embodiments, unless explicitly stated otherwise. Thus, the mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0031] The terms "comprise" and "include" as used in this text will be understood by a person skilled in the art as covering the term "consist of". Hence, the term "comprise" or "include" may in respect of an embodiment mean "consist of', but may in another embodiment mean "contain/have/be equipped with at least the defined species and optionally one or more other species". The expressions "configured to" and "arranged to" have the same meaning.

[0032] A reference to "the temperature of the hair styling component" or "the hair styling component temperature" in the present text is to be understood in relation to the temperature detection on or in the hair styling component by means of the component temperature sensor. Likewise, a reference to "the temperature of (the) hair" or "the hair temperature" in the present text is to be understood in relation to the hair temperature detection by means of the hair temperature sensor.

[0033] Notable aspects of the invention are summarized as follows. A hair styling device 1 comprises a hair styling component 11, 13, a heating mechanism 20 configured to heat the hair styling component 11, 13, a component temperature sensor 21 configured to detect a temperature of the hair styling component 11, 13, a hair temperature sensor 22 configured to detect a temperature of hair faced by the hair styling component 11, 13 during operation of the hair styling device 1, and a controller 23 configured to receive inputs from at least both temperature sensors 21, 22, and to process the inputs to control operation of the heating mechanism (20).

Claims

1. Hair styling device (1), comprising:

- a hair styling component (11, 13) configured to face hair to be subjected to a styling action by means of the hair styling device (1),
- a heating mechanism (20) configured to heat the hair styling component (11, 13),
- a component temperature sensor (21) configured to detect a temperature of the hair styling component (11, 13),
- a hair temperature sensor (22) configured to detect a temperature of hair faced by the hair styling component (11, 13) during operation of the hair styling device (1), and
- a controller (23) configured to receive inputs from at least both the component temperature sensor (21) and the hair temperature sensor (22), and to process the inputs to control operation of the heating mechanism (20).

2. Hair styling device (1) according to any of claims 1-2, wherein the controller is configured to derive from the input from the hair temperature sensor (22) a value that is representative of the time duration (t) of a styling action, and to involve the value in processing the inputs to control operation of the heating mechanism (20).

3. Hair styling device (1) according to any of claims 1-2, wherein the controller is configured to derive from the input from the component temperature sensor (21) and the hair temperature sensor (22) one or more of

- a value that is representative of the temperature of the hair styling component (11, 13) at the start of a styling action,
- a value that is representative of a drop (ΔT_c) of the temperature of the hair styling component (11, 13) in the styling action,
- a value that is representative of a drop (ΔT_h) of the temperature of the hair in the styling action,
- a value that is representative of a peak temperature of the hair in the styling action,
- a value that is representative of a peak temperature of the hair styling component (11, 13) in the styling action, and
- a difference (ΔT_p) between a value that is representative of a peak temperature of the hair in the styling action and a value that is representative of a peak temperature of the hair styling component (11, 13) in the styling action,

and to involve the one or more of the values in processing the inputs to control operation of the heating mechanism (20).

4. Hair styling device (1) according to any of claims 1-3, wherein the hair temperature sensor (22) is of the non-contact type.

5. Hair styling device (1) according to any of claims 1-4, comprising a pressure sensor configured to detect a clamping pressure between hair styling surfaces (12, 14) of the hair styling component, wherein the controller (23) is configured to receive a pressure signal from the pressure sensor, and wherein the controller is configured to involve the pressure signal in processing the inputs to control operation of the heating mechanism (20).

6. Hair styling device (1) according to any of claims 1-5, comprising a detector (24) configured to detect a use condition of the hair styling component, wherein the controller (23) is configured to receive a use signal from the detector (24), and to derive from the use signal a value that is representative of the time duration of a styling action, and to involve the value in processing the inputs to control operation of the heating mechanism (20).

7. Hair styling device (1) according to claim 6, wherein the position detector (24) comprises a switching mechanism configured to be in one of at least two different conditions and to be caused to switch from one condition to another as the position of the hair styling component changes.

8. Hair styling device (1) according to any of the preceding claims, comprising an indicator configured to provide a person with information including information related to a moisture content of the hair based on the inputs.

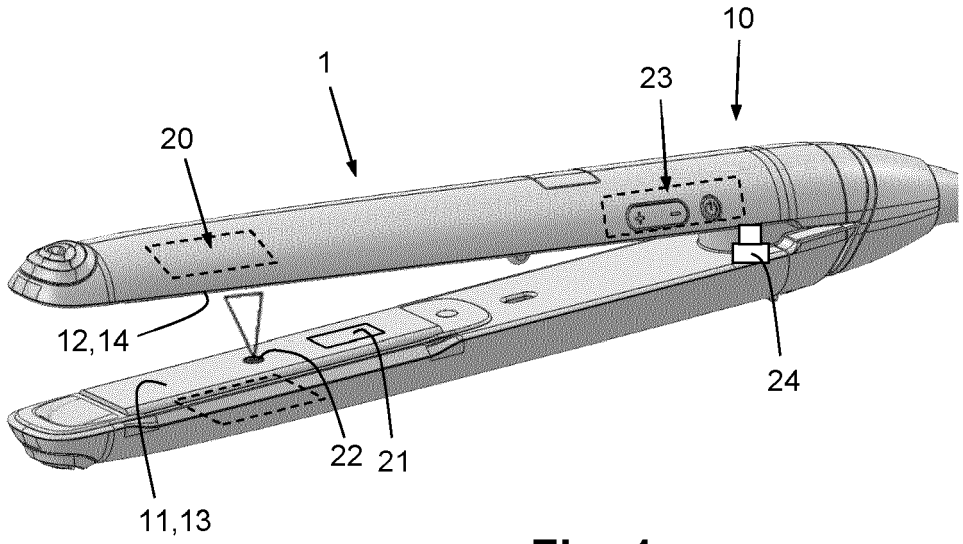
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Fig. 1

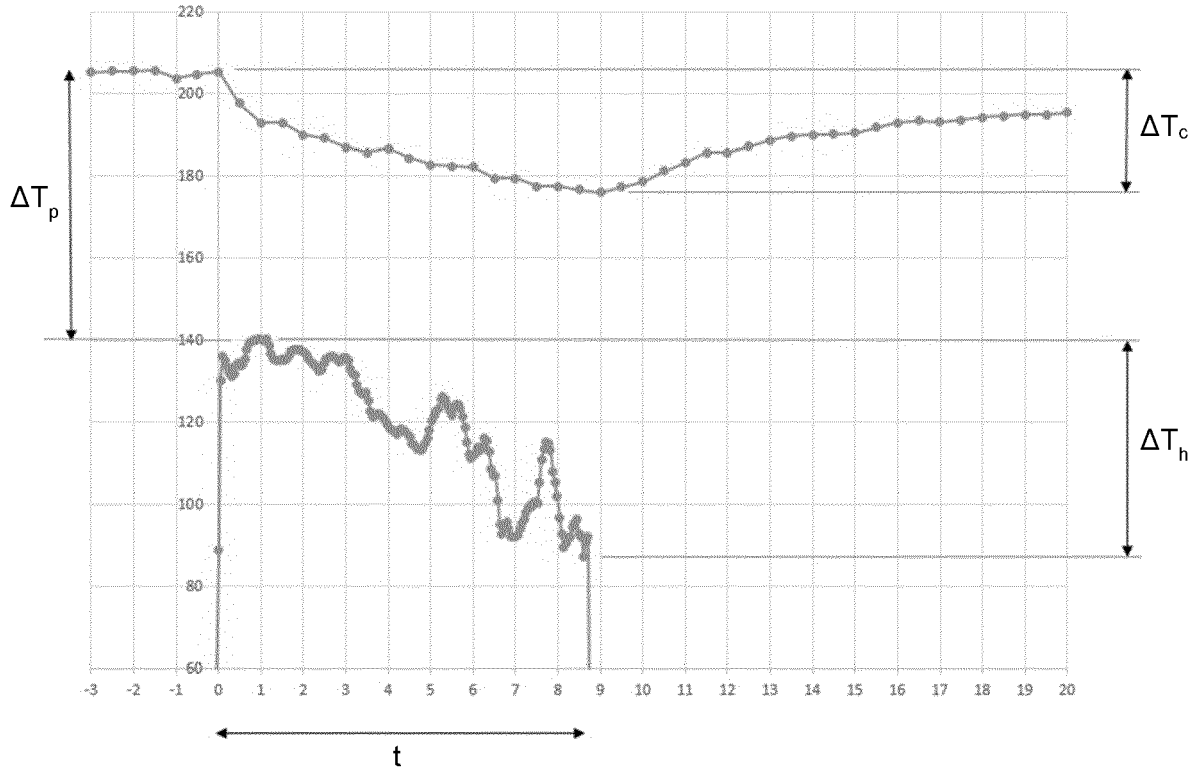
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Fig. 2

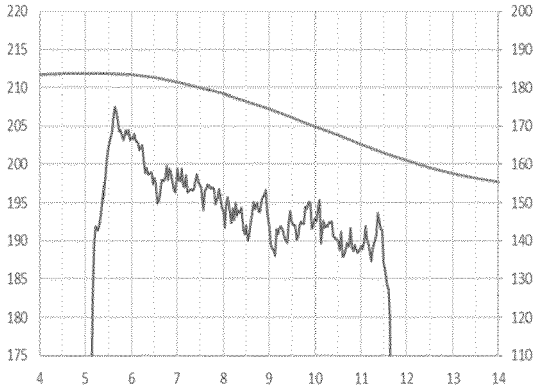
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Fig. 3


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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 7312

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	CN 108 065 562 A (KENFORD IND CO LTD) 25 May 2018 (2018-05-25) * the whole document * -----	1,3,4 5,8	INV. A45D1/06 A45D1/28 A45D2/00
X	WO 2020/120348 A1 (KONINKLIJKE PHILIPS NV [NL]) 18 June 2020 (2020-06-18) * the whole document * -----	1-8	
Y	KR 101 385 220 B1 (KOREA IND TECH INST [KR]) 15 April 2014 (2014-04-15) * abstract * -----	5	
Y	US 2018/075776 A1 (HEITMANN MELISSA [US] ET AL) 15 March 2018 (2018-03-15) * paragraph [0035] * * abstract * -----	8	

TECHNICAL FIELDS SEARCHED (IPC)
A45D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 May 2021	Nicolás, Carlos

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 15 7312

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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21-05-2021

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