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(71) Applicant: **Tai Wah Distributors Pte Ltd**
Singapore 349563 (SG)

(72) Inventor: **Toh, Kok Swee**
349563 Singapore (SG)

(74) Representative: **Hocking, Adrian Niall et al**
Albright Patents LLP
Eagle Tower
Montpellier Drive
Cheltenham
Gloucestershire GL50 1TA (GB)

(54) Induction heated hair styling appliances and the heating unit therefor

(57) A heated hair-styling appliance for styling hair through heat is provided. The heated hair-styling appliance comprises a heating head having an outer shell covering at least part of the surface thereof, and an inner heat source core disposed within the inner part of the heating head, and a handle attached to a distal end of the heating head. The heated hair-styling appliance works in conjunction with an independent heating unit to heat up the inner heat source core, and the heat source core operationally supplies heat to heat up the outer shell for styling hair after it is being heated. A induction heating unit therefor is also provided.

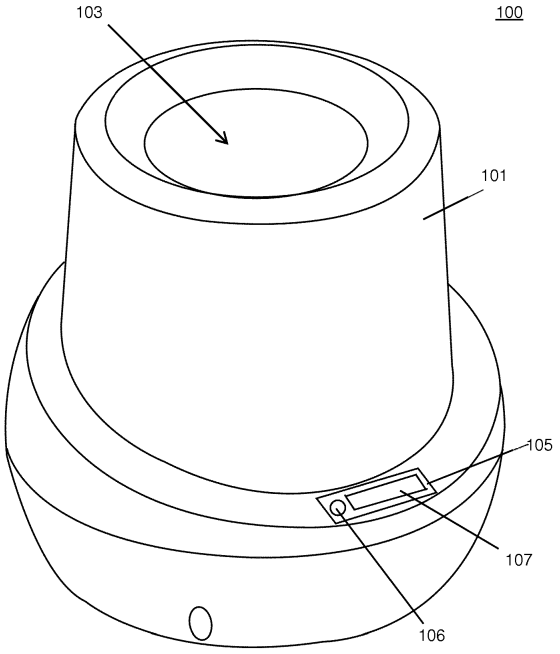

FIG. 1A

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Description

Field of the Invention

[0001] The present invention generally relates to heated brush. More particularly, the present invention relates to a heated brush for hair styling and a heating unit for heating up the heated brush.

Background

[0002] Hair styling often requires heating up hair to style it. Depending on the used, different hair styling appliances have different ways of heating up. For example, curling tongs and hair straightening device, such devices requires electrical power to continuously heating up the heating elements thereon. Most commonly, the electrical power is supplied through a power cord/wire connected thereto. Such power cord/wire often get in the users' way when they operate these appliances.

[0003] Another hair styling appliance includes thermal brush that is commonly used in conjunction with a hair blower/dryer. The hair blower/dryer serves as a heat source to heat up hair as well as the thermal brush operationally. It is recognized that ordinary users may face challenges to operate several appliances simultaneously. Further, such appliances do not retain heat within the appliances itself; as soon as the hair blower stops blowing heated air to the thermal brush, it cools down very quickly.

Summary

[0004] There is a desire to provide user a cordless and handheld appliance that is easy and convenience to use. Preferably, the cordless and handheld is easy to operate, fast heating up,

[0005] In one aspect of the present invention, there is provided a heated hair-styling appliance for styling hair. The hair-styling appliance comprises a heated head having an outer shell covering at least part of the surface thereof, and an inner heat source core disposed within the inner part of the heating head, a handle attached to a distal end of the heating head. The hair-styling appliance works in conjunction with an independent induction-heating unit to heat up the inner heat source core, wherein the heat source core supplies heat to heat up the outer shell for styling hair after it is being heated.

[0006] In one embodiment, the handle is detachable from the heating head.

[0007] In another embodiment, wherein the outer shall is made up of metal. Possibly, the outer shell is cover by a thermal insulation layer, such as ceramic coating or any thermal insulation material. In yet another embodiment, the inner heat source core is made up of a thermal conducting material, such as ferrous metal.

[0008] In a further embodiment, the hair-styling appliance is a thermal brush. The thermal brush may have the outer shell covered with a thermal insulation layer, and bristles are formed on the thermal insulation layer.

[0009] In yet a further embodiment, the hair-styling appliance is a curling tong or a hair-straightening iron.

[0010] In another aspect of the present invention, there is provided a hair styling appliance comprises an induction heating unit having a container, the container defines a well that is surrounded by a induction coil winding, the induction coil winding is connected to a circuitry operationally generates electromagnetic induction within the well through the coil winding and the aforesaid hair-styling appliance. The hair-styling appliance is heated up within the well through the electromagnetic induction for usage.

Brief Description of the Drawings

[0011] Preferred embodiments according to the present invention will now be described with reference to the figures accompanied herein, in which like reference numerals denote like elements;

[0012] **FIG. 1A** illustrates an overall appearance of a heating unit in accordance with one embodiment of the present invention;

[0013] **FIG. 1B** illustrates the heating unit of **FIG. 1A,** with a portion of the housing cut out, exposing the components mounted within the heating unit;

[0014] **FIG. 1C** illustrates a heating pot in accordance with an alternative embodiment of the present invention;

[0015] **FIG. 2** illustrates a schematic diagram of the circuitry of the heating unit in accordance with one embodiment of the present invention;

[0016] **FIG. 3** shows an operation flow of the induction-heating unit of **FIG. 1**A in accordance with one embodiment of the present invention;

[0017] **FIG. 4** illustrates a thermal hairbrush in accordance with one embodiment of the present invention;

[0018] **FIG. 5A** illustrates a thermal hairbrush in accordance with another embodiment of the present invention;

[0019] **FIG. 5B** illustrates a thermal hairbrush in accordance with a further embodiment of the present invention;

[0020] **FIG. 6** illustrates a curling iron in one embodiment of the present invention; and

[0021] **FIG. 7** illustrates a hair-straightening appliance in accordance with one embodiment of the present invention.

Detailed Description

[0022] Embodiments of the present invention shall now be described in detail, with reference to the attached drawings. It is to be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which

the invention relates.

[0023] **FIG. 1A** illustrates an overall appearance of a heating unit **100** in accordance with one embodiment of the present invention. The heating unit **100** is adapted to heat up a thermal brush (not shown in **FIG. 1A).** Preferably, the heating unit **100** is adapted with induction heating assembly for heating up the thermal brush placing therein. The heating unit **100** includes a housing **101** for accommodating components therein. An upper portion of the housing **101** incorporates a well **103** adapted for loading the heated brush. The size and depth of the well **103** is catered to be large enough for loading multiple sizes thermal brushes. The heating unit **100** is adapted for heating up thermal brush that generally adapted with handle. It is also desired that the well is adapted to receive only the brush portion of the thermal brush, while exposing the handle for outside of the heating unit for handling. Accordingly, a thermal brush can easily be placed into the well **103** so that the heated brush can be heated through the heating unit **100** for subsequent usage. Further, the thermal brush, regardless of the sizes, can be effortlessly placed or dropped the heated brush into the well **103** at any orientations while the heating unit is heating up the heated brush within the cavity of the well **103.** A control panel **105** can be disposed on an external surface of the housing **101.** The control panel **105** may further include a button **106** and a display screen **107** for providing the necessarily operation control. The button **106** may be an on/off switch, or multi-triggering button for controlling the operation of the heating unit.

[0024] It is understood that an induction heating unit is desired in this embodiment as it offers quick heat up time and it allows the hair styling appliances to be reheated with minimal or no downtime. However, other heating unit may be desired without departing from the scope of the present invention.

[0025] **FIG. 1B** illustrates the heating unit **100** of **FIG. 1A,** with a portion of the housing **101** cut out, exposing the components mounted under the housing **101.** The heating unit **100** comprises two parts, an upper part that includes the well **103,** and a bottom part that accommodates the circuitry of the heating unit **100.**

[0026] The upper part of the heating unit **100** includes the well **103,** a winding roller **111** and a coil **112.** The winding roller **111** is an inner cylinder adapted to wrap around the circular surface of the well **103** within housing **101.** The winding roller **111** facilitates a means for supporting the coil **112,** such that the coil of wire, preferably copper wire, can be disposed around the perimeter of the winding roller **111.**

[0027] The coil **112** is electrically connected to the circuitry of the heating unit **100,** which is mounted beneath the upper part of the heating unit **100.** The circuitry comprises a PCB board **114** and components adapted for driving the coil **112** to generate the electromagnetic induction to heat up the heated brush. Beneath the PCB board **114,** there is further provided a heat sink **116** attached to the components that operationally produce heat. In another embodiment, the heating unit **100** may further provide a fan for increase the heat dissipation efficiency.

[0028] **FIG. 1C** illustrates an induction-heating pot **150** in accordance with another embodiment of the present invention. The induction heating pot **150** has a similar configuration as that of the induction-heating unit **100.** The induction heating pot **150** further comprises a guiding pole **152** extending upwardly from the bottom of the well. The guiding pole **152** has a tapered end and along the length of the guiding pole **152,** there is provided a thermal sensor **155.** The induction heating pot **150** works in conjunction with a thermal brush or hair-styling appliances adapted with a corresponding slot configured for receiving the guiding pole **152.** Preferably, the guiding pin **152** is supported through a flexible member allowing the guiding pin to be able to swivel in all direction.

[0029] **FIG. 2** illustrates a schematic diagram of the circuitry of the heating unit in accordance with one embodiment of the present invention. The circuitry **300** includes a microcontroller **302,** an insulated gate bipolar transistor (IGBT) driver **304,** one or more IGBT **306,** a power source **310,** an interface panel **314,** sensors **316,** and optionally a fan **320.** The power supply **310** operationally supplies power to the entire heating unit. It may be a multi-voltage power supply. Depending on the design and specification, the power supply may further include a switch mode power supply (SMPS) circuit, to transforms the DC bus voltage into several different DC low voltage outputs.

[0030] The microcontroller **302** is adapted for controlling the entire operations and processes of the induction-heating unit. The microcontrollers **302** suitable for the induction heating equipment can be any suitable microcontroller available in the market.

[0031] The IGBT **306** is the main power component and is provided to drive the coil **308** that are winded around the well of the induction heater. The IGBT **306** is driven by the IGBT driver **304** that provides a voltage transfer interface between the microcontroller **302** and the IGBT **306.** It is well known in the art that, when desire, the IGBT **306** can be replaced several bipolar transistors.

[0032] The microcontroller is further connected to the interface panel **314** for receiving control input from user and display some operating status to the user. The interface panel **314** may include switches and a display panel. User may control the operations of the induction heater through the switches provided on the control panel, and monitor the operating status through the display panel. The interface panel **314** may further include LED lights for showing the operating status.

[0033] The sensors **316** include a thermal sensor for detecting the temperature within the well of the induction heater, or more specifically the temperature of the thermal brush heated therein. These sensors detect the necessary operating status automatically, and the microcontroller **302** responds according. For example, the weight sensor can be placed at the bottom of the well as a switch

covering the entire bottom surface, and when a thermal brush is placed within the well, the induction heating unit would recognize so in order to carrying our further operation. This can prevent that the induction heating being turned on unintentionally without any thermal brush presents therein. In another embodiment, the weight sensor can be used to detect the presence of the thermal brush to automatically trigger the induction-heating unit to heat up the thermal brush as it is placed within the well of the heating unit.

[0034] For safety purpose, it would be desired that the thermal sensor be provided for detecting the heating condition. Preferably, the thermal sensor is adapted to be able to detect at least the temperature of the thermal brush. When the thermal brush is detected overheating, the induction-heating unit will cut off automatically. For example, when a heated thermal brush that has not been cooled down is placed within well, the induction heater may overheat the thermal brush. Accordingly, it is desired that the temperature of the thermal brush that is placed within the well can be detected before the induction heating operation starts.

[0035] The thermal sensor may be a thermopile, or thermopile infrared sensor or the like. It may also be thermocouples or the like. Most preferably, the thermal sensor is able to detect the temperature of the thermal brush contactlessly.

[0036] The induction-heating unit may further adapt with the fan **320** to dissipate heat during the heating operation. The heat generating components may further attach with heat sink to work in conjunctions with the fan to effectively dissipate the heat operationally.

[0037] It is understood to a skilled person that the above circuitry is illustrated by way of example only, not limitations. There are many other suitable configurations that can be adapted for the induction-heating unit. Preferably, the induction-heating unit shall be able to heat up the heated element of the thermal brush to a desired working temperature suitable for practical hair styling. The thermal sensor can be adapted to control or cut off heating to prevent overheating.

[0038] The induction heater is heated by controlling the coil power. To control it, a synchronous signal is needed to be detected.

[0039] For safety protection, the induction may provide an overvoltage (OV) and overcurrent (OC) detection means. Operationally, when the induction heater is running, it may generate an over voltage or a high level of voltage noise created by the repeatedly switching (i.e. on/off) IGBT **306,** which may damage the IGBT **306.** A potentiometer OV may be facilitated to the microcontroller **302** to regulate the voltage. When current flowing through the IGBT **306** is higher than the expected current, the IGBT **306** can also be damaged. A current transformer can be adapted to prevent OC.

[0040] **FIG. 3** shows an operation flow of the induction-heating unit of **FIG. 1**A in accordance with one embodiment of the present invention. The operation starts with pressing a power switch to turn on the induction-heating unit at step **352.** At this stage, the induction-heating unit is placed at a standby mode. At step **354,** the thermal brush can be inserted into the well of the induction-heating unit. Once the thermal brush is placed in the induction-heating unit, the induction-heating unit will detect the presence of the thermal hairbrush through the weight sensor at step **356.** The presence of thermal hairbrush will trigger a thermal sensor to detect whether the temperature of the thermal hairbrush is detected to be higher than a predefined level. If the detected temperature is higher than the predefined level, the induction-heating unit will not function to heat up the thermal hairbrush. Such detection is provided to prevent overheating. If the detected temperature is below the predefined level, the LED light indicator may light up to indicate that the induction-heating unit is ready for operation. At step **358,** the user may press a start button to start heating up the thermal hairbrush. At step **360,** the induction-heating unit may determine the heating time require. The time determination may be based on the temperature detected at step **356,** or it triggers the sensor to detect the temperature again after the start button is pressed. The thermal hairbrush is being heated up in step **362,** and once the heating operation is completed at step **364,** users may remove the thermal hairbrush from the induction-heating unit at step **366** for hair styling.

[0041] **FIG. 4** illustrates a thermal hairbrush **400** in accordance with one embodiment of the present invention. The thermal hairbrush **400** is adapted with a capability of storing and self-releasing heat without any power source or external heat source. The thermal hairbrush **400** is adapted for heating up through induction heating unit, and once heated up it can be used immediately out from the induction-heating unit. The thermal hairbrush **400** has a brush head **402** with a brush handle **404** thereto for allowing users to handle the thermal hairbrush **400.** The brush head **402** is shown in a preferred embodiment as a round vented brush of a generally elongated cylindrical shape. However, one skilled in the art should appreciate that the thermal hairbrush **400** may be used with a round brush, a cylindrical shaped brush, a flat hairbrush, a paddle brush, a spinning brush, a half round brush, a vent brush with a specific configuration adapted to suit the present application. When in use, user may hold on to the brush handle **404** and place it into the well of the induction-heating unit of **FIG. 1.** Once it is heated, the heated thermal hairbrush **400** may assist with curling the hair being brushed with the heat emitted therefrom. The advantage of the thermal hairbrush **400** is, once heated, it can be use immediately. It also does not require external power source to heat it up, therefore, no cable is adapted thereon, therefore, it is easier to handle.

[0042] Referring back to the **FIG. 4,** the brush head **402** may be formed in a variety of diameters. Relatively narrow diameters are especially effective for creating curls while conversely relatively larger diameters create looser curls. The brush head **402** is extends about half

way on the heated hairbrush **400** from an end to about a midpoint on the thermal hairbrush **400.** The brush head **402** has a length suitable to comb or style hair in a comfortable manner and further to have a adequate number of bristles **406** disposed in surrounding fashion thereon. As illustrated by the thermal hairbrush **400,** the bristles **406** are extended from the inner side of the brush head **402.**

[0043] The brush head **402** has a outer shell **408** that disposed around the brush head **402** in concentric relation to the brush head **402.** The outer shell **408** further defines through holes **408,** through which, the bristles **406** extend outwardly from the inner space of the brush head **402.**

[0044] Still referring to **FIG. 4,** the thermal hairbrush **400** is being shown with a cut out portion exposing the inner part of the brush head **402** and the constructions of the outer shell **408.** Generally, the outer shell **408** is adapted as a heat retainer. The outer shell **408** is made up of two layers **412, 414.** The layer **412** is made up of thermal insulation material and the layer **414** is made up of thermally conductive material. For layer **412,** materials such as ceramic material, polymer may be adapted. In an alternative embodiment, it may also be a thin layer of thermally insulation coating coated on top of the layer **414.** The layer **414** on the other hand, is made up of thermally conductive material such as metal, copper, aluminum, or any other thermally conductive material known in the art. Through the cut out potion, it can be seen that the thermal brush **400** further comprises a heat source core **420,** of which, the bristles are extended therefrom. Preferably, the heat source core **420** is also made up of heat conducting materials. More preferably, the heat source core **420** can be made up of ferrous metals or alloys. The preferred materials for the heat source core **420** shall be easily heated up through induction heating, and preferably, the material used is able to retain heat as long as possible. The heat source core **420** may further be quoted with heat retaining coating, such as ceramic coating.

[0045] Operationally, the thermal brush **400** is placed in an induction-heating unit, such as the one illustrated in **FIG. 1A.** Once the induction-heating unit is turned on, the thermal brush **400** is being heated up through electromagnetic induction. More specifically, the conducting materials, i.e. the outer shell **408** and the heat source core **420** will be heated up to a desired temperature. The induction heating may be stopped through a timer, and once the time is up and the thermal brush **400** is heated up, it is ready to be used. When in used on hair, the outer shell **408** heats up the hair directly because it is in direct contact with hair. The thermally conductive layer **414,** which is heated up by the induction-heating unit, releases the heat through the thermal insulation layer **412** slowly. The thermal insulation layer **412** serves as a thermal retainer for holding the heat onto the thermally conductive layer **414** as long as possible.

[0046] Similarly, once the heat source core **420** is heated up by the induction heating unit, it serves as a heat source to the thermal brush **400** for supplying heat continuously to heat up the outer shell **408** as it looses heat to the ambient operationally.

[0047] In yet another embodiment, the thermal insulation material can be a layer of insulating coating, for example, ceramic coating. Such insulation material can also be applied onto the heat course core **420,** in accordance with another embodiment of the present invention.

[0048] **FIG. 5A** illustrates a thermal hairbrush **500** in accordance with another embodiment of the present invention. The thermal hairbrush **500** comprises a brush head **502** with a brush handle **504** attached thereto at one end. The brush head **502** has a outer shell **508** that disposed around the brush head **502** in concentric relation to the brush head **502.** The outer shell **508** is formed by two layers, a sleeve **510** and a metal layer **512.** The metal layer **512** is an inner cylinder defining an inner cavity. The metal layer is made up of thermal conductive material, such as copper, aluminum or the like. Preferably, it is made up of a material that can be heated up through induction heater. The sleeve **510** is an outer layer wrapping around the metal layer **512.** Bristles **514** of the thermal hairbrush **500** are extending directly from the sleeve **510.** The sleeve **510** together with the bristles **514** are made up of thermal insulation material, for example, nylon.

[0049] Within the cavity of the inner cylinder, the brush head **502** is further provided with a heat source core **520** disposed along the concentric axis of the brush head **502.** In this embodiment, the heat source core **520** is configured as a solid component, though it is possible to make the heat source core **520** with a hollow cylinder. Similarly, the heat source core **520** is made up of thermal conducting material; more preferably, it is made up of material that can be heated up through induction heating.

[0050] As shown in **FIG. 5A,** the heat source core **520** is disposed within the cavity spaced apart from the sleeve **510.** In another embodiment, it is possible that the heat source core **520** can be made as an inner cylinder disposed beneath the metal layer **512,** with or without space. In yet a further embodiment, the heat source core **520** may also be covered by a thermal insulating material (i.e. between the metal layer **512** and the heat source core **520)** aims for slowing down the heat transfer from the heat source core **520** to the metal layer **512.**

[0051] Operationally, the thermal hairbrush **500** is heated up with a same or substantially the same way as the thermal hairbrush **400,** and as the thermal hairbrush **500** does not have holes on the outer shell as the thermal hairbrush **400,** it is expected that the heat can be retained longer within the thermal hairbrush **500.**

[0052] Although, the outer shells shown above are completely surrounding the respective brush head, alternatively the outer shells may only surround a radial portion of the brush head such as three quarters of the brush head, half of the brush head or a quarter of the brush head.

[0053] Further, the brush heads of the thermal hairbrushes illustrated above are fixed to the handle. In other embodiments, these thermal hairbrushes may be adapted with the brush head detachable from the handle, when desire. In such case, the handle may adapt a quick release latch for securing the brush head onto the handle.

[0054] **FIG. 5B** illustrates a thermal brush in accordance with an alternative embodiment of the present invention. The thermal brush is substantially the same as the thermal brush **500** except that the heat source core **520** is made a hollow core and the top of the thermal brush is adapted with an aperture leading up to the hollow space of the hollow core. Such configuration allows the thermal brush to be placed into the induction heating pot through inserting the guiding pole **152** into a hollow space of the hollow heat source core **520** as shown in **FIG. 5B.** Preferably, the thermal sensor **155** is made slightly bigger than the diameter of the guiding pole **152** to give a tight fit when it is inserted into the heat source core of the thermal brush. Such configuration allows the thermal sensor to effectively measure the temperature of at least the heat source core **520.**

[0055] **FIG. 6** illustrates a curling iron **600** in one embodiment of the present invention. The curling iron **600** comprises a handle **602** and an heating rod **604** attached to the handle **602.** The curling iron **600** further has a clamp **606** pivoted at the proximal end of the handle **602** with a clamping plate **607** covers a portion of the heating rod **604,** and a actuator **608** on the other side of the pivot projecting over the handle **602.**

[0056] In **FIG. 6,** the front end of heating rod **604** is cut out to show the inner configurations of the heating rod **604.** As shown, the heating rod **604** includes a heat source core **612** and a heating shell **614.** The heating shell **614** forms the outer shell of the heating rod **604.** When in used, it is directly contacting the hair to style the hair. The heating shell **614** may be coated with a layer of thermal insulating material for prolonging the heating process. The heat source core **612** is a concentric tubular component that disposed within the heating shell in a telescopic manner. When possible, a space may be provided between the heat source core **612** and the heating shell.

[0057] It is to be noted that the curling iron **600** does not require any power source to operate, therefore, no cord is attached thereto.

[0058] **FIG. 7** illustrates a hair-straightening appliance **700** in accordance with one embodiment of the present invention. The hair-straightening appliance **700** includes two opposing tongs **702** that are being hinged together at one distal end. Opposite the hinge, the opposing tongs **702** holds a heating plate **704** on each tong **702.** The heating plate **704** is removable from the tong **702.** The heating plate can be a flat panel for straightening hair, or a profiled panel defining zigzag profile for crimping hair.

[0059] As shown in **FIG. 7,** the front end of the lower tong **702** is cut out to show the inner configurations of the hair-straightening appliance **700.** As shown, the tong **702** has a heat source core **712** disposed beneath the heating plate **704** with a space apart.

[0060] It is understood that the hinge of the two opposing tongs **702** can be configured at the middle, i.e. class 2 lever, in accordance with another embodiment of the present invention.

[0061] When in used, the curling iron **600** and the hair-straightening appliance 700 illustrated above can be placed into an induction-heating unit for heating up. Once it is heated up to a desired temperature, it can be remove from the induction-heating unit for immediate usage. The outer plate or shell directly heats up the hair as it is in direct contact with the hair. The inner core, which was also heated up through the induction heating unit, dissipates it heat slowly to the outer plate or shell, thereby prolonging the heating capability.

[0062] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations, and combinations thereof could be made to the present invention without departing from the scope of the invention.

Claims

1. A heated hair-styling appliance for styling hair through heat, the heated hair-styling appliance comprising:

   a heating head having an outer shell covering at least part of the surface thereof, and an inner heat source core disposed within the inner part of the heating head,
   a handle attached to a distal end of the heating head;
   wherein the hair-styling appliance works in conjunction with an independent heating unit to heat up the inner heat source core, wherein the heat source core operationally supplies heat to heat up the outer shell for styling hair after it is being heated.

2. The hair-styling appliance in accordance with claim 1, wherein the handle is detachable from the heating head.

3. The hair-styling appliance in accordance with claim 1, wherein the outer shall is made up of metal.

4. The hair-styling appliance in accordance with claim 1, wherein the outer shell is cover by a thermal insulation layer.

5. The hair-styling appliance in accordance with claim 1, wherein the outer shell is coated with a ceramic coating.

6. The hair-styling appliance in accordance with claim

1, wherein the inner heat source core is made up of a thermal conducting material.

7. The hair-styling applicant in accordance with claim 6, wherein the inner heat source core is made up of ferrous metal.

8. The hair-styling appliance in accordance with claim 1, wherein the hair-styling appliance is a thermal brush.

9. The hair-styling appliance in accordance with claim 8, wherein the thermal brush has the outer shell covered with a thermal insulation layer, and bristles are formed on the thermal insulation layer.

10. The hair-styling appliance in accordance with claim 1, wherein the hair-styling appliance is a curling tong.

11. The hair-styling appliance in accordance with claim 1, wherein the hair-styling appliance is a hair-straightening iron.

12. The hair styling appliance in accordance with claim 1, wherein the heating unit is an induction-heating unit.

13. A hair styling appliance comprising:

an induction heating unit having a container, the container defines a well that is surrounded by a induction coil winding, the induction coil winding is connected to a circuitry operationally generates electromagnetic induction within the well through the coil winding;
a heated hair-styling appliance in accordance with claim 1, wherein the hair-styling appliance is heated up within the well through the electromagnetic induction for usage.

14. The hair styling appliance in accordance with claim 13, wherein the induction heating unit comprising a guiding pole extending upwardly from a bottom surface of the well and a thermal sensor disposed along the length of the guiding pole; and the heated hair-styling appliance comprises a hollow inner heat source core and an aperture leading up to the hollow space of the inner heat source core, wherein the hollow space is adapted to receive the guiding pole such that the thermal sensor is able to measure the temperature of at least the inner heat source core.

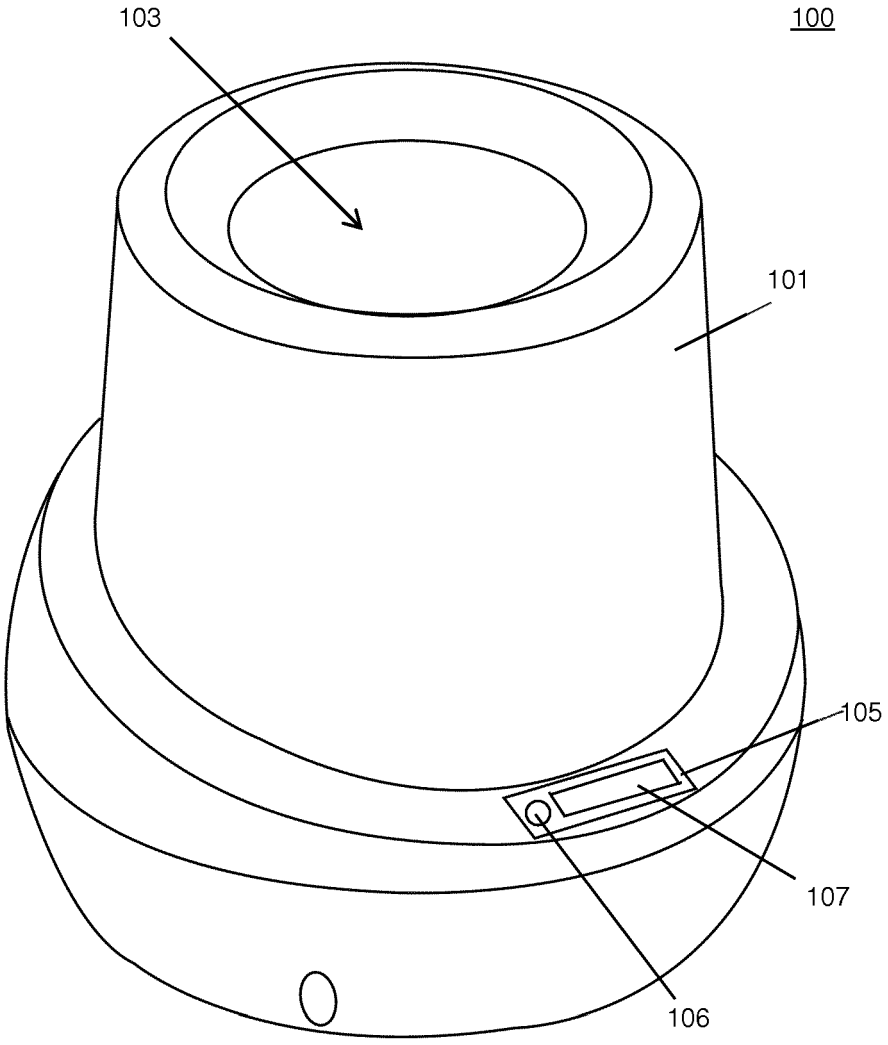

FIG. 1A

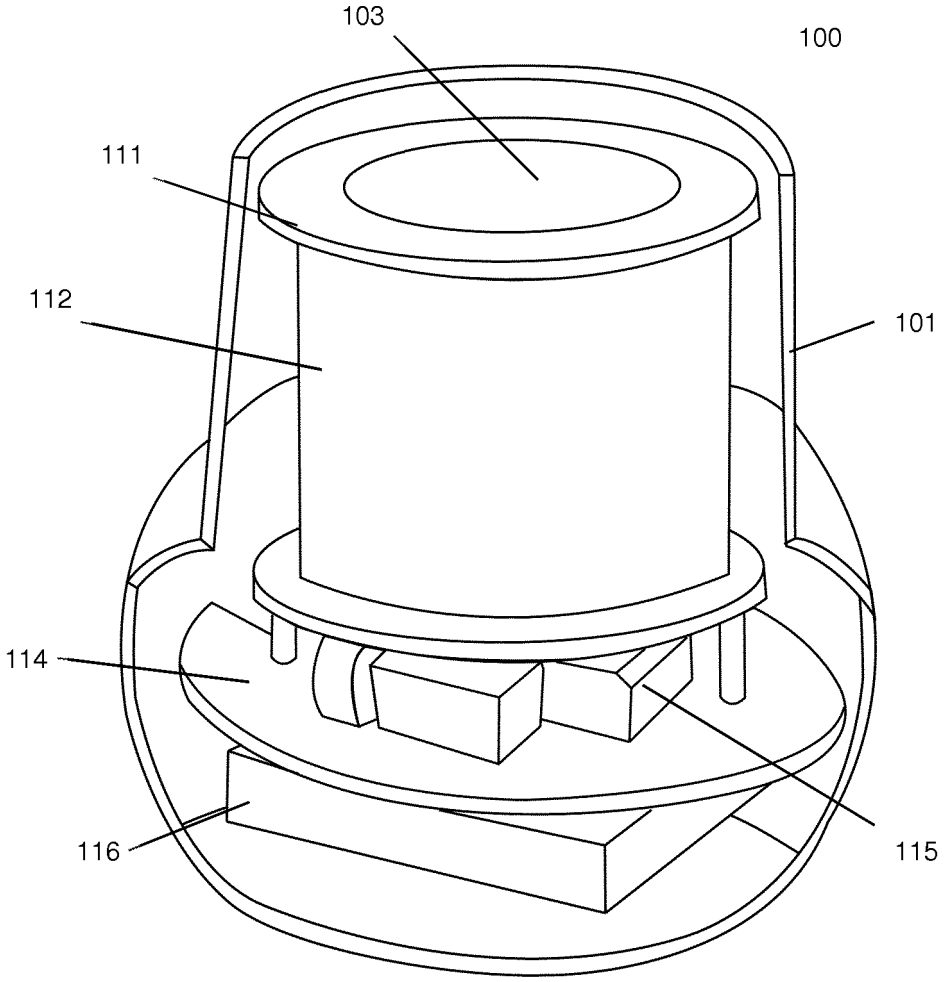

FIG. 1B

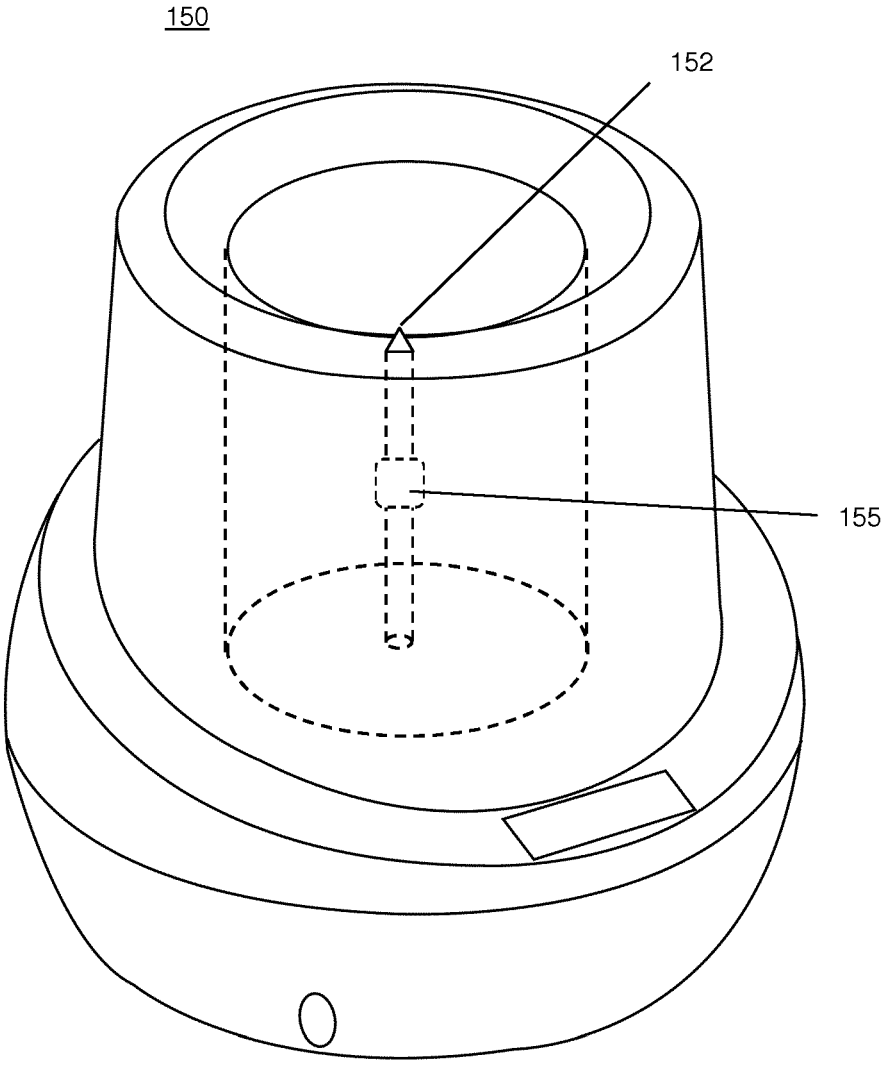

FIG. 1C

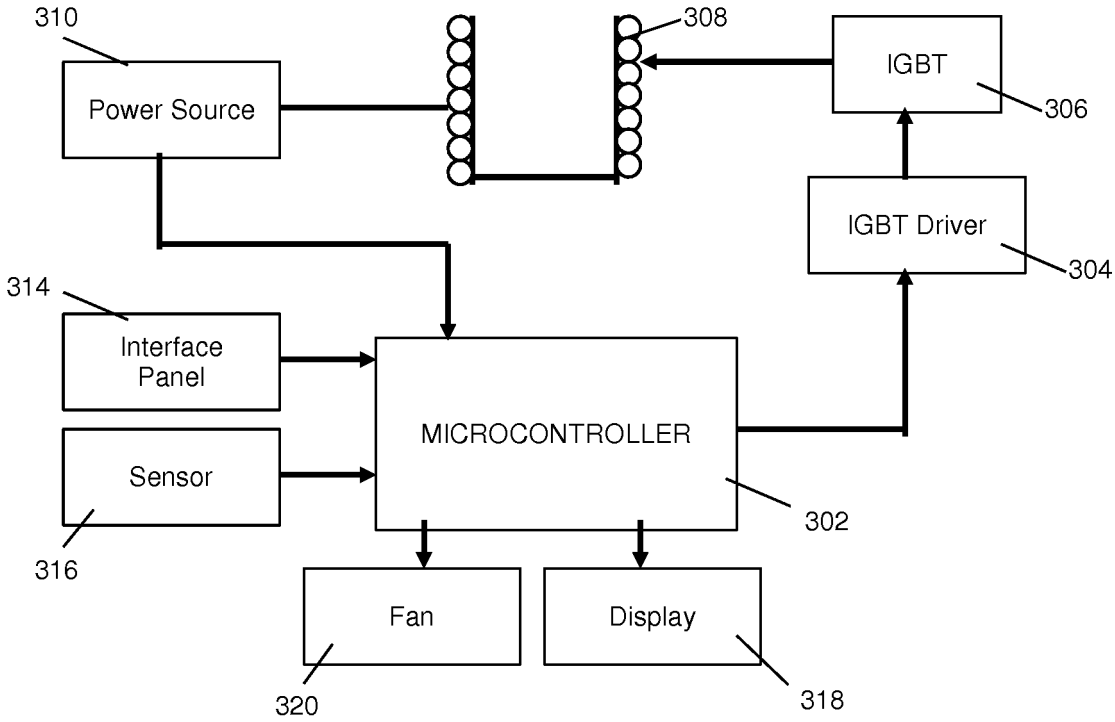
310
Power Source
308
IGBT
306
IGBT Driver
304
314
Interface Panel
MICROCONTROLLER
302
Sensor
316
Fan
320
Display
318

FIG. 2

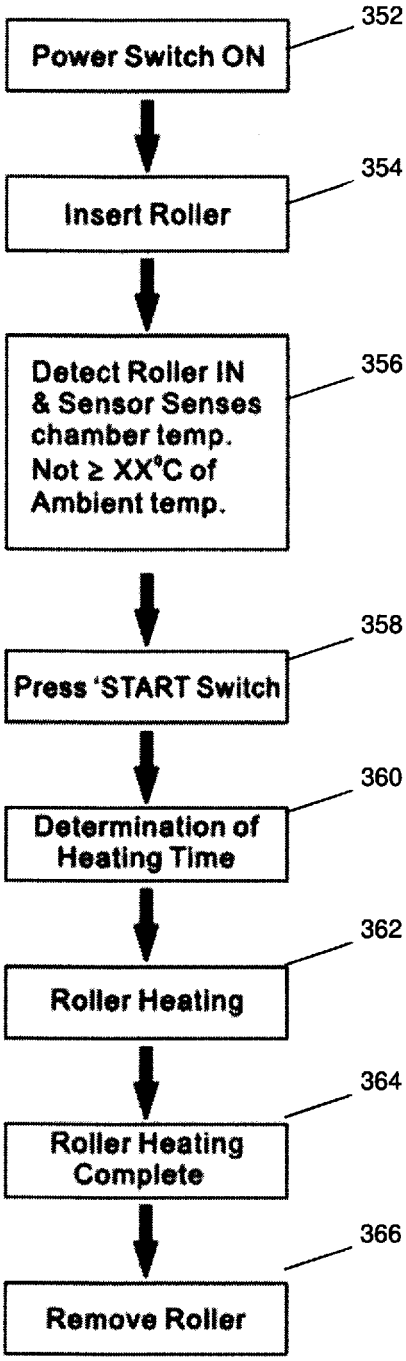
Power Switch ON
352
Insert Roller
354
Detect Roller IN & Sensor Senses chamber temp. Not ≥ XX°C of Ambient temp.
356
Press 'START Switch
358
Determination of Heating Time
360
Roller Heating
362
Roller Heating Complete
364
Remove Roller
366

FIG. 3

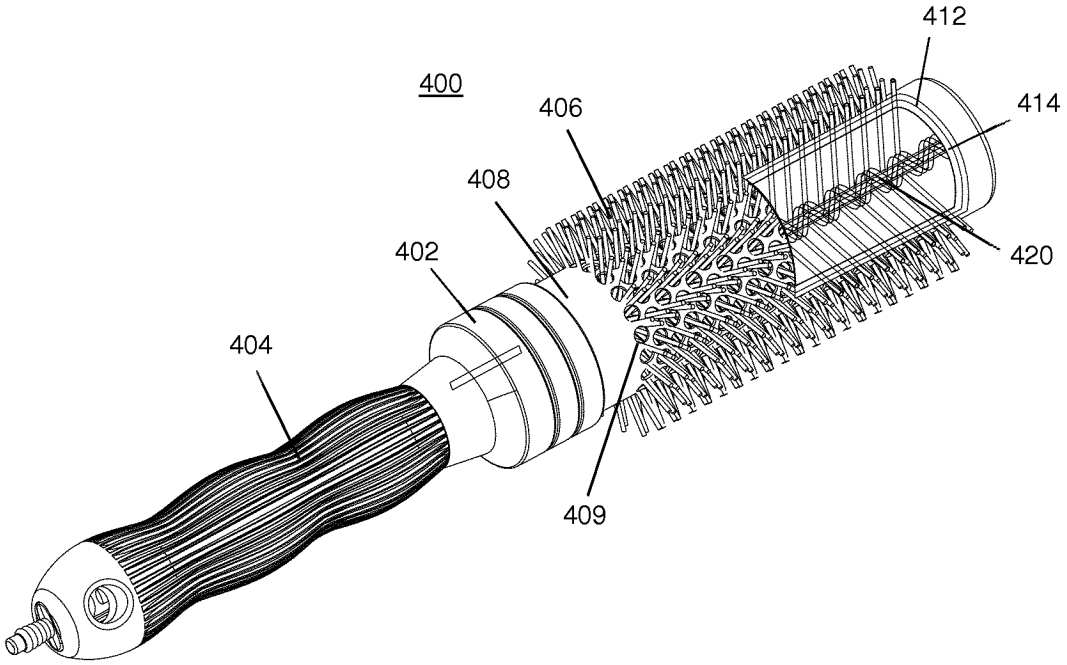

FIG. 4

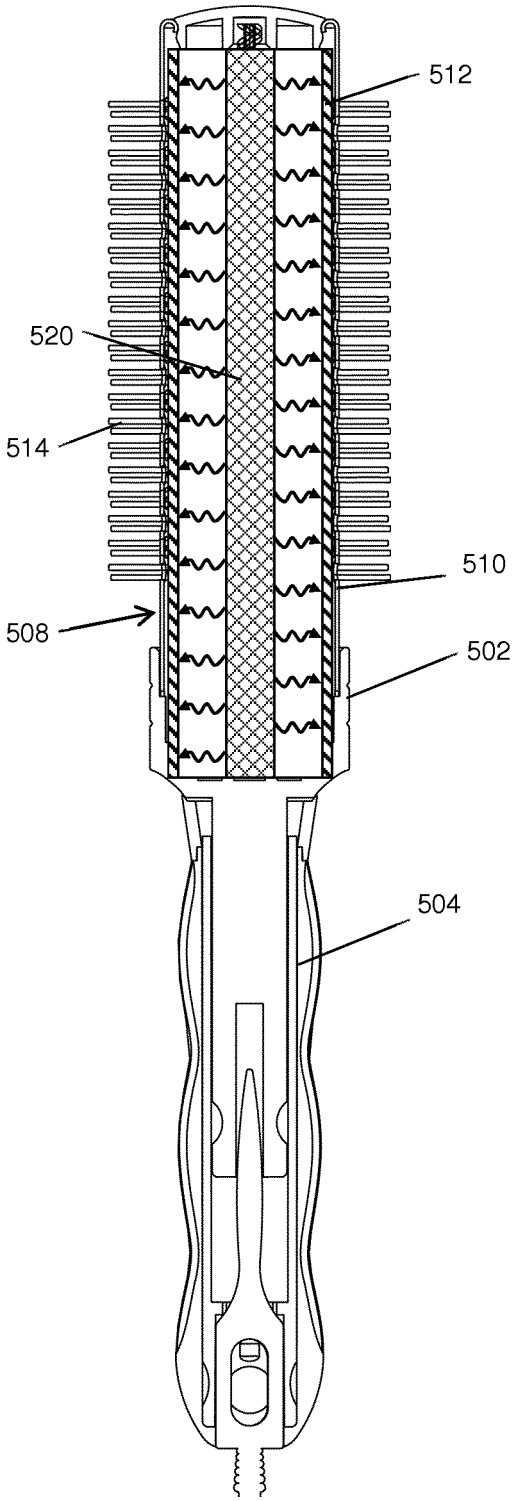

FIG. 5A

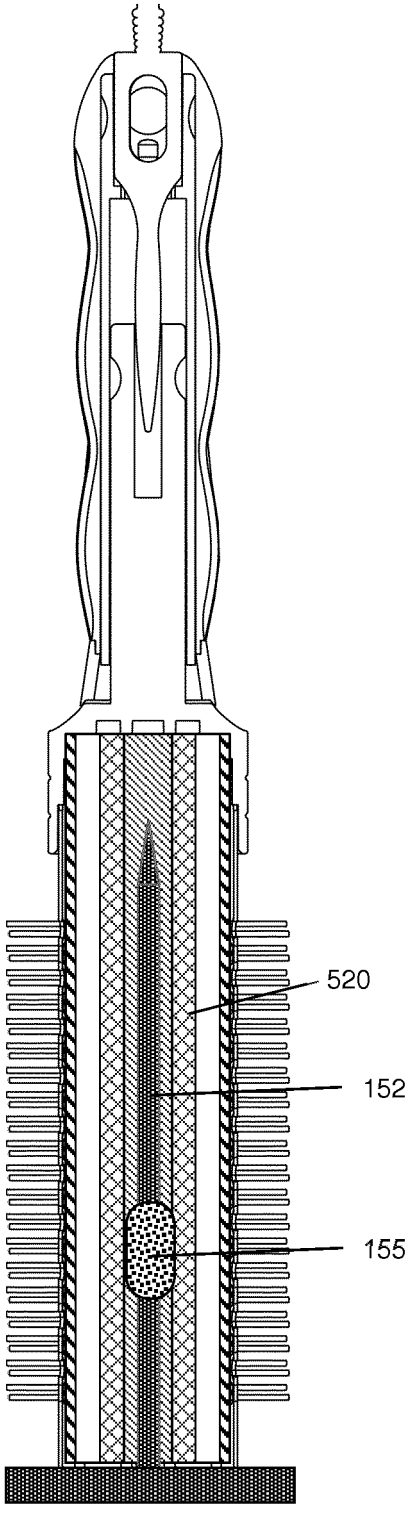

FIG. 5B

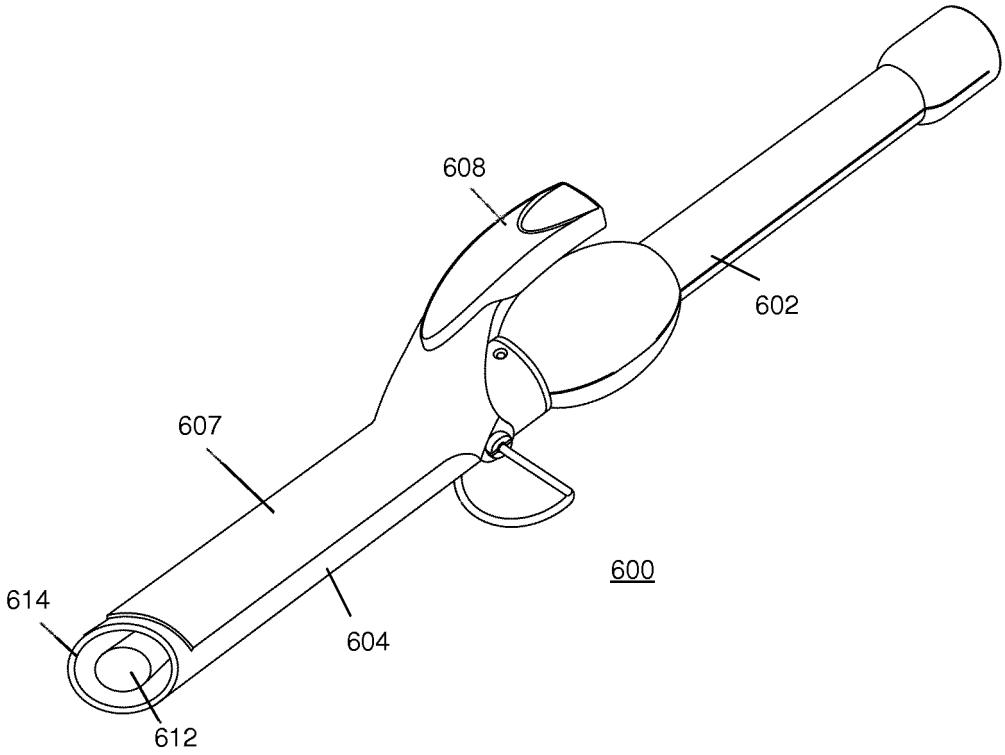

FIG. 6

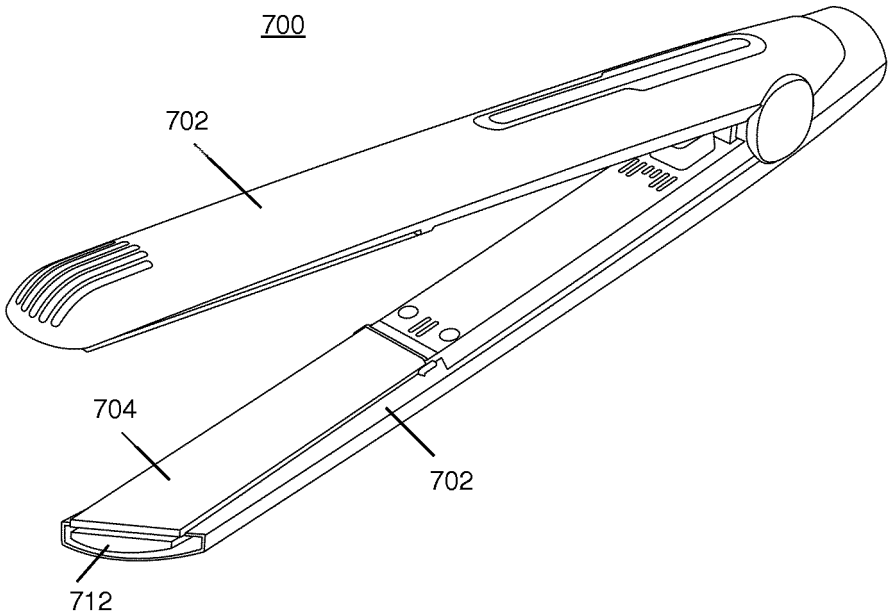

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 0770

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A45D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 October 2013	Ionescu, C

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