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(54) VARIABLE DIAMETER ADJUSTABLE HAIR TOOL

(71) Applicant: **Sutra Beauty Inc.**, Van Nuys, CA (US)

(72) Inventors: **Liam Ben-David**, Woodland Hills, CA (US); **Deng Zhiyong**, Dongguan City (CN)

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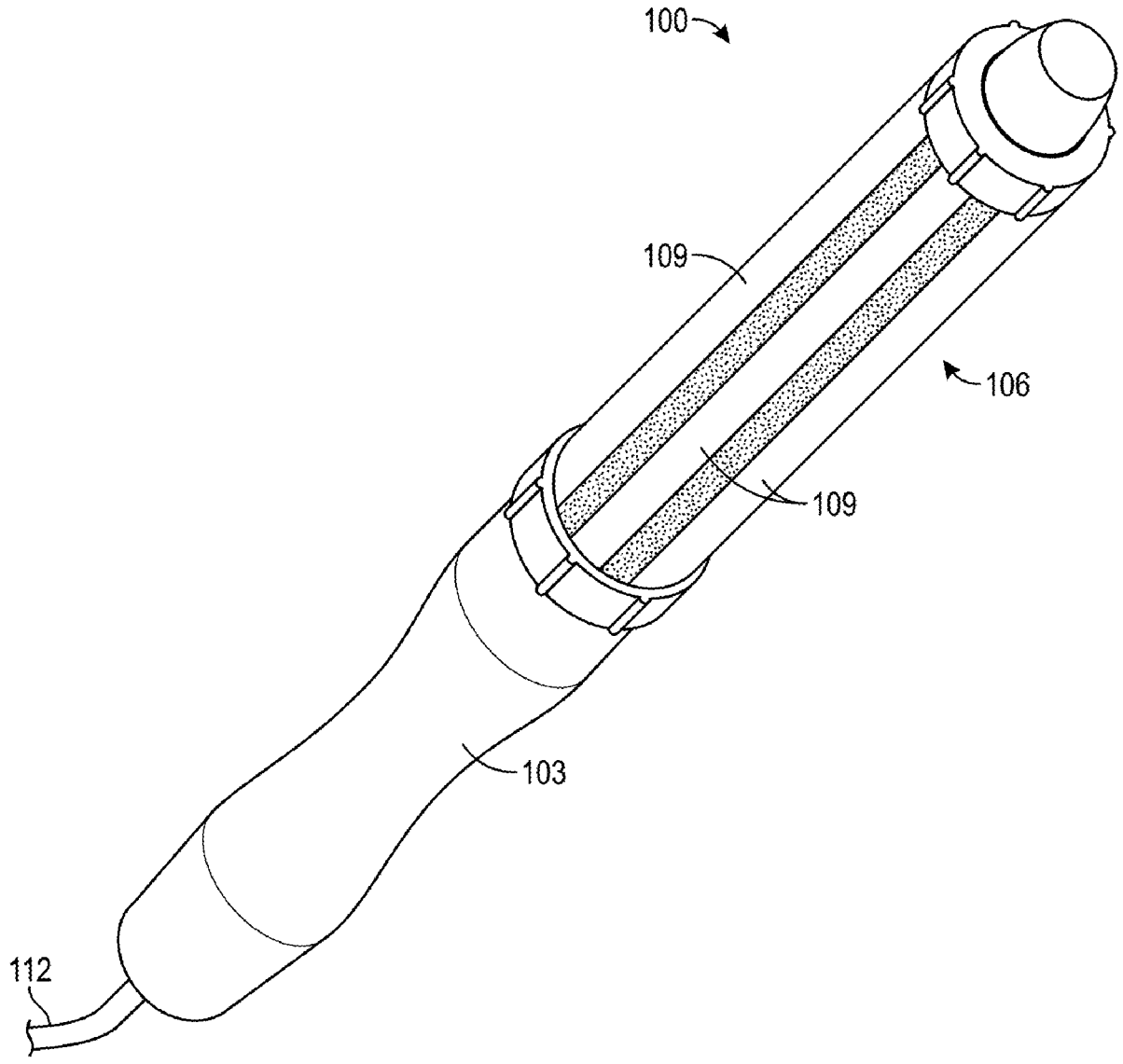
(57) **ABSTRACT**

A variable diameter adjustable hair tool that includes a barrel with a number of plates. A heater included in the hair tool may transfer heat at a specified temperature to the plates. The heater may draw power from a power unit. The hair tool has a handle connected to the barrel that allows the user to hold the tool. The adjustable diameter is achieved by an actuator that alters the outer diameter of the barrel by changing the distance between a surface of the plates and a central axis of the barrel. The actuator may controlled by a control component that converts a user action into an action of the actuator. Other aspects are also described and claimed.



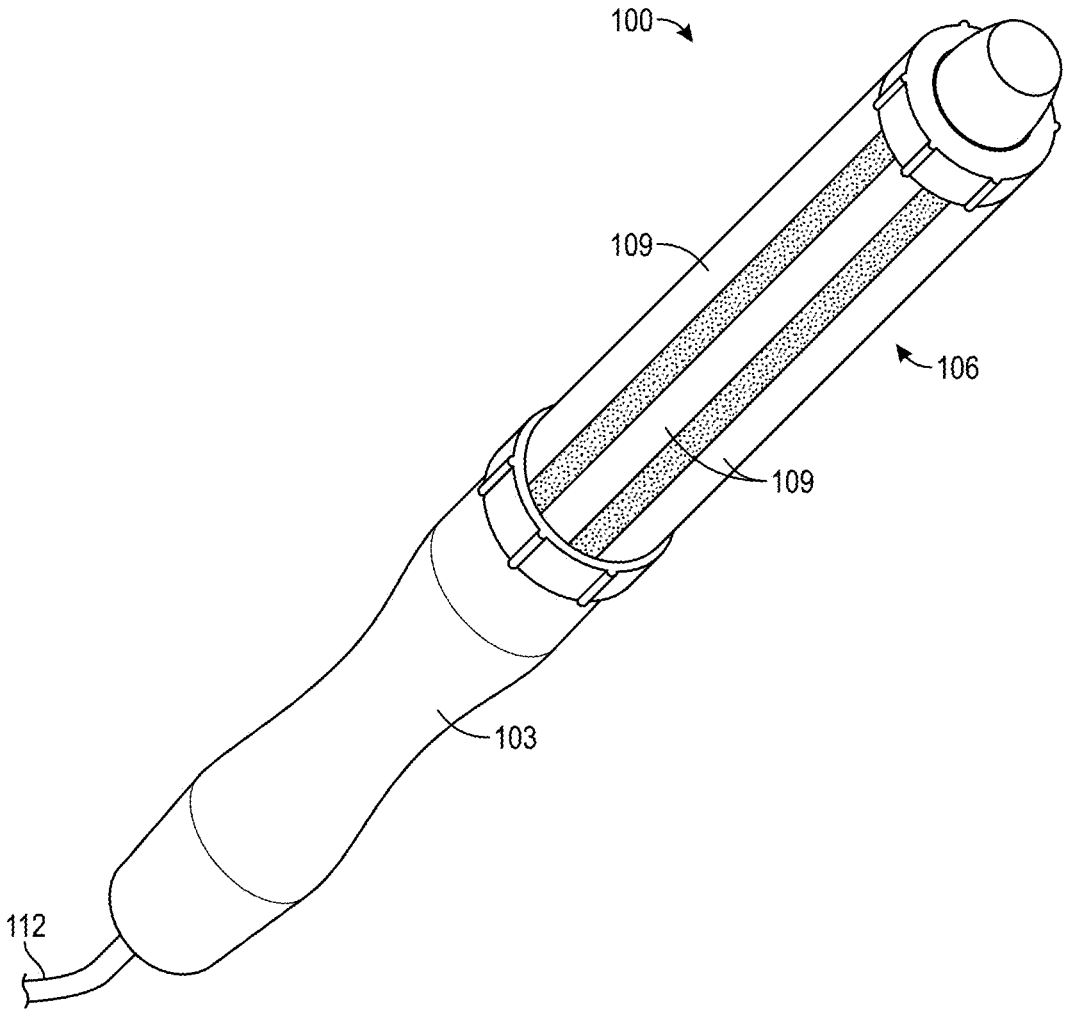


FIG. 1

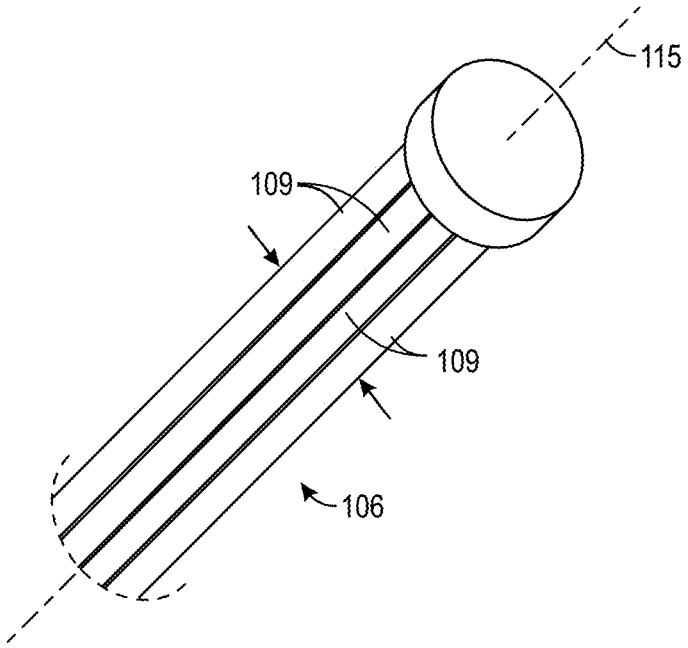


FIG. 2A

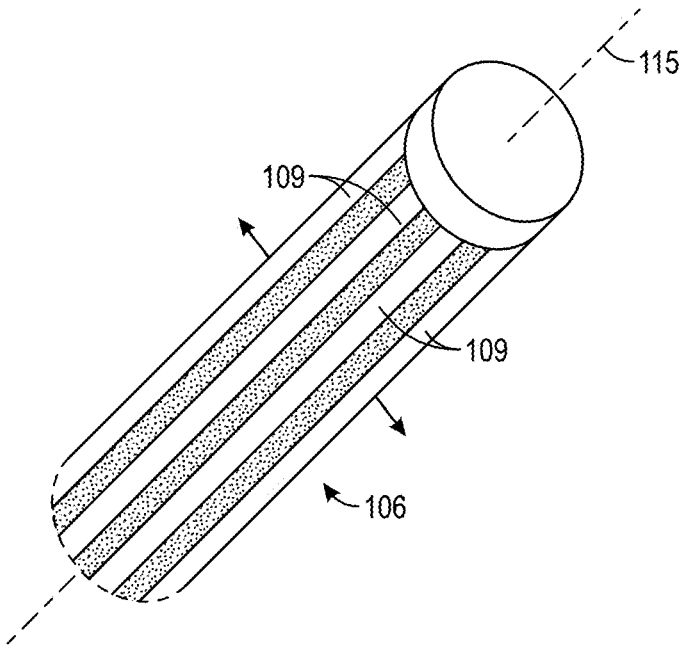


FIG. 2B

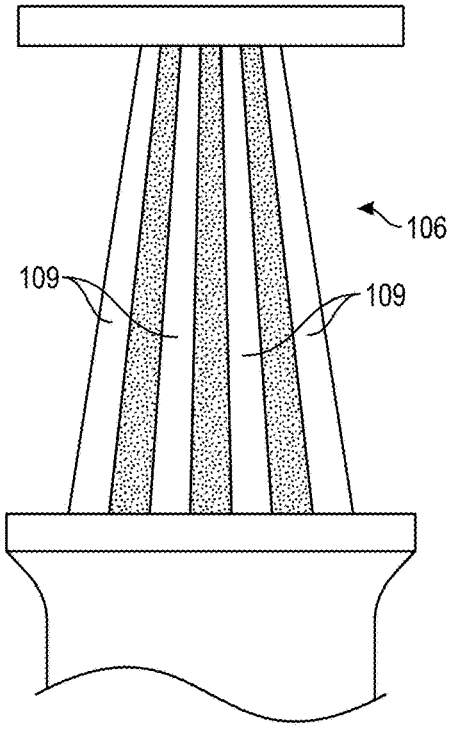


FIG. 3A

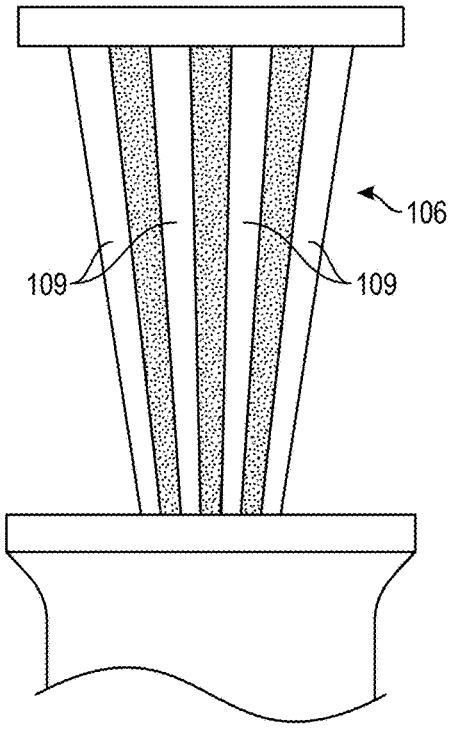


FIG. 3B

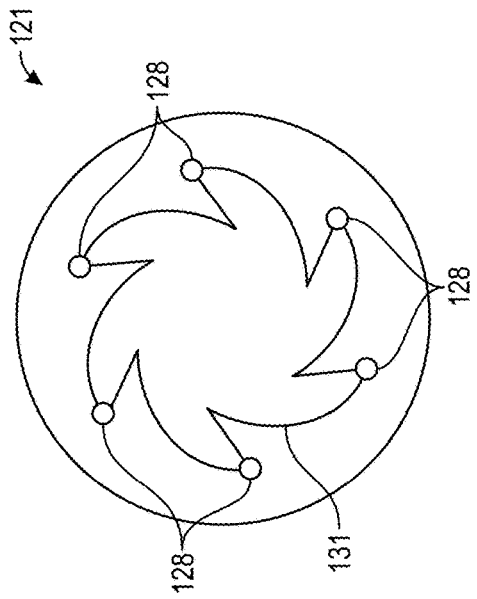

121
128
128
128
131

FIG. 4

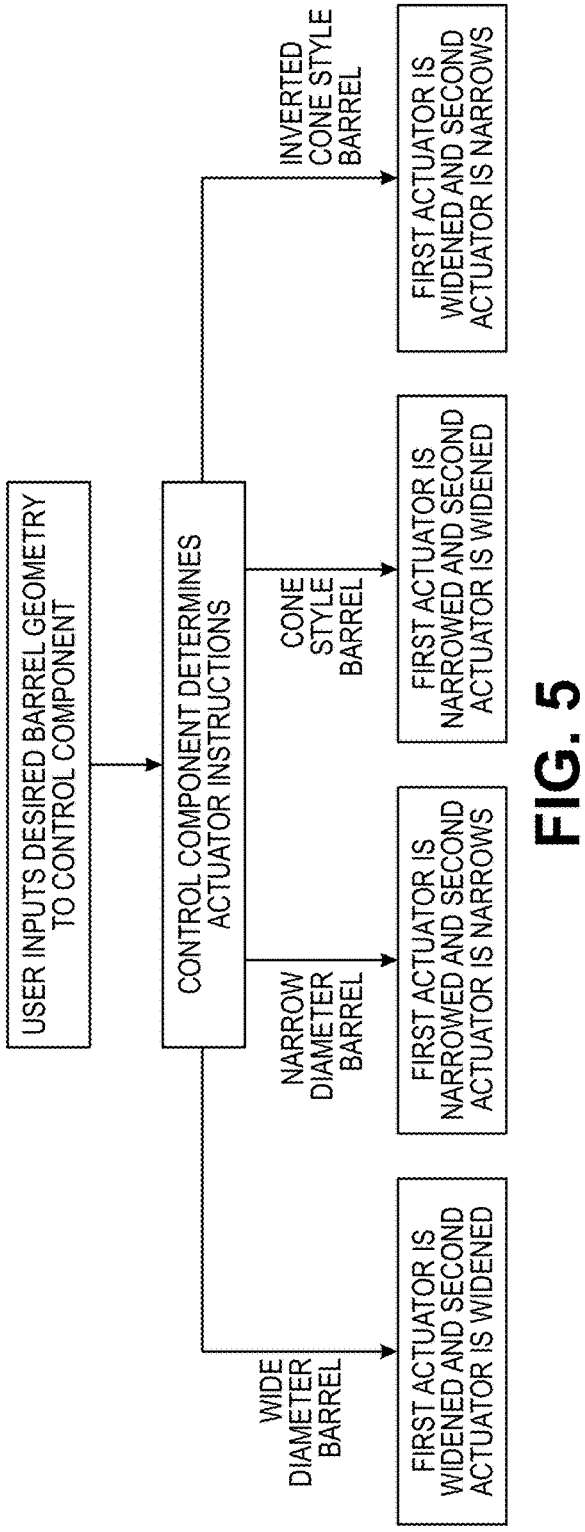

USER INPUTS DESIRED BARREL GEOMETRY TO CONTROL COMPONENT
CONTROL COMPONENT DETERMINES ACTUATOR INSTRUCTIONS
WIDE DIAMETER BARREL
FIRST ACTUATOR IS WIDENED AND SECOND ACTUATOR IS WIDENED
NARROW DIAMETER BARREL
FIRST ACTUATOR IS NARROWED AND SECOND ACTUATOR IS NARROWS
CONE STYLE BARREL
FIRST ACTUATOR IS NARROWED AND SECOND ACTUATOR IS WIDENED
INVERTED CONE STYLE BARREL
FIRST ACTUATOR IS WIDENED AND SECOND ACTUATOR IS NARROWS

FIG. 5

VARIABLE DIAMETER ADJUSTABLE HAIR TOOL

FIELD

[0001] An aspect of the disclosure here relates to a tool for curling hair. Other aspects are also described.

BACKGROUND

[0002] Hair tools may achieve various styling effects by applying heat to the hair. For instance, if the heat is applied when the hair is wrapped in a circular fashion, then curls may be produced. Different varieties of curling effects may be introduced by a hair tool that the hair is being wrapped around with one geometry than by a hair tool with a different geometry, and so it is often desirable for a user to own several different hair tools.

SUMMARY

[0003] Aspects of the present disclosure are directed to a hair tool that can provide similar benefits that may be provided by several different hair tool geometries within a single device. One aspect is a variable diameter adjustable hair tool that includes a barrel with a number of plates. A heater included in the hair tool may transfer heat at a specified temperature to the plates. The heater may draw power from a power unit. The hair tool has a handle connected to the barrel that allows the user to hold the tool. The adjustable diameter is achieved by an actuator that alters the outer diameter of the barrel by changing the distance between a surface of the plates and a central axis of the barrel. The actuator may controlled by a control component that converts a user action into an action of the actuator.

[0004] Another aspect discussed the barrel itself. The barrel of the hair tool may have more than one actuator, such that different parts of the barrel may have different diameters. This allows configurations of the barrel where the barrel may have a slope, such as a cone or inverted cone style barrel.

[0005] An aspect also considers a barrel with a mechanical actuator. The mechanical actuator may include a nozzle that by rotating, a user can control the diameter of the barrel.

[0006] The above summary does not include an exhaustive list of all aspects of the present disclosure. It is contemplated that the disclosure includes all systems and methods that can be practiced from all suitable combinations of the various aspects summarized above, as well as those disclosed in the Detailed Description below and particularly pointed out in the Claims section. Such combinations may have particular advantages not specifically recited in the above summary.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Several aspects of the disclosure here are illustrated by way of example and not by way of limitation in the figures of the accompanying drawings in which like references indicate similar elements. It should be noted that references to "an" or "one" aspect in this disclosure are not necessarily to the same aspect, and they mean at least one. Also, in the interest of conciseness and reducing the total number of figures, a given figure may be used to illustrate the features of more than one aspect of the disclosure, and not all elements in the figure may be required for a given aspect.

[0008] FIG. **1** shows an exemplary variable diameter adjustable hair tool.

[0009] FIG. **2***a* shows an exemplary variable diameter adjustable hair tool in a narrow diameter setting.

[0010] FIG. **2***b* shows an exemplary variable diameter adjustable hair tool in a wide diameter setting.

[0011] FIG. **3***a* shows an exemplary variable diameter adjustable hair tool in a cone setting.

[0012] FIG. **3***a* shows an exemplary variable diameter adjustable hair tool in a cone setting.

[0013] FIG. **3***b* shows an exemplary variable diameter adjustable hair tool in a inverted cone setting.

[0014] FIG. **4** shows an inside view of a nozzle for an exemplary viable diameter adjustable hair tool.

[0015] FIG. **5** shows an exemplary flowchart for a method for operating an adjustable variable diameter hair tool.

DETAILED DESCRIPTION

[0016] Several aspects of the disclosure with reference to the appended drawings are now explained. Whenever the shapes, relative positions and other aspects of the parts described are not explicitly defined, the scope of the invention is not limited only to the parts shown, which are meant merely for the purpose of illustration. Also, while numerous details are set forth, it is understood that some aspects of the disclosure may be practiced without these details. In other instances, well-known circuits, structures, and techniques have not been shown in detail so as not to obscure the understanding of this description.

[0017] FIG. **1** illustrates a hair tool **100**. The hair tool **100** includes a heater (not shown), a barrel **106**, a handle **103** and a means for altering the outer diameter of the barrel. The heater may generate heat by through an exothermic process, such as by electric heating or chemical heating. An electric heater may convert electric energy into heat energy. For example, the electric heater may draw power from a power source, such as a battery or an electrical grid via a converter and a power cord **112**, and may pass the electricity through a heating element such as a resistor, which converts electricity into heat through a process known as Joule heating. In another example, a chemical heater may use a controlled ignition of a flammable substance, such as butane and methane, to convert the flammable substance into heat energy. In an aspect, the amount of heat generated by the heater may be selected by a user. For example, the heater may be connected to an adjustable dial with various heat settings, such as different possible temperatures.

[0018] In an aspect, the heater is thermally coupled to the barrel **106**, such that heat energy produced by the heater may be conducted to an outer surface of the barrel **106**. For example, the heater may be substantially enclosed by and in contact with the barrel **106**, such that the heat produced by the heater passes outward to the barrel **106**. In another example, the heater may be outside the barrel **106**, such as located in the handle **103**, and pass heat to the barrel **106** through a thermally conductive path.

[0019] The handle **103** may be connected to the barrel **106**, such that a user may be able to hold the hair tool by the handle **103**. The handle **103** may be substantially insulated from the heat. The handle **103** may be designed ergonomically, such that the handle **103** is of a length and shape that is comfortable for a user to hold during operation. For example, the handle **103** may be cylindrical with a diameter that allows an average person to hold. The handle **103** may

be hollow, and thus capable of containing various components of the hair tool **100**. In one example, the heater may be located within the handle **103**. In another example, components necessary for the operation of the heater may be located within the handle **103**, such as the power source for an electric heater or the chemicals for a chemical heater.

[0020] In an aspect, the means for altering the outer diameter of the barrel **106** may include a plurality of plates connected to an actuator. The plates may form an outer surface of the barrel **106** and the barrel **106** may be hollow, such that the barrel **106** may act as a housing for a thermal conduction path member that extends from the heater. In another aspect, the barrel **106** may house the heater. In a further aspect, the barrel may have a solid core that can serve many purposes, such as acting as an attachment point for the plates and actuators and for conducting heating. The plates may be made from any of known materials with thermally conductive properties, such as Teflon, ceramic, tourmaline, metal, or titanium. The barrel **106** may be substantially cylindrical, such that hair may be wrapped about the barrel **106** by a user. The barrel **106** may be capable of passing heat to hair that is in contact with or in close proximity to the barrel **106**, such as by passing heat generated by a heater that has a thermally conductive path to barrel **106** to an outer surface of the barrel.

[0021] Each plate **109** may be a portion of the circumference of the outer surface of the barrel **106**. The plate **109** may be the length of the barrel. The plate **109** may be rectangular. The plate **109** may have any geometry that allows for a substantially round barrel **106** circumference, such as, for example, a spiral configuration, such that each plate **109** of the plurality of plates wraps at an angle around the circumference of the barrel **106** from a first end of the barrel **106** to a second end of the barrel **106**. The plate **109** may have a curvature in its width when viewed from a distal end of the barrel **106**, such that several plates that are adjacent may combine to form the circumference of the barrel **106**.

[0022] FIG. **2** shows an aspect where the actuator is connected to an end of the barrel **106** such that the actuator is able to change the diameter of the barrel **106**. The actuator may be connected to a control component that can convert a user's action into an action of the actuator. The actuator may facilitate diameter adjustment of the barrel **106** by any of various methods. For example, FIG. **2***a* illustrates a segment of a hair tool **100** where each plate **109** of the barrel **106** may be connected to the actuator at an end. When the actuator moves in a first direction, such as toward the center point of the diameter **115** of the barrel **106**, the plate **109** may be forced inward, bringing the plates closer together. FIG. **2***b* shows a segment of a hair tool **100** where the actuator moves in a second direction, such as away from the center point of the diameter **115** of the barrel **106**. The plate **109** may be forced outward, bringing the plates farther apart. In one instance, a smallest diameter may be determined by when the plates are unable to move closer to the center point of the diameter **115** of the barrel **106**, for example, by forming a substantially contiguous outer surface or hitting a preset limit. The largest diameter may be determined by when the plates have reached an outer limit allowed by the actuator. The barrel **106** may be designed to have a predetermined smallest diameter and largest diameter. For example, a ⅜ inch diameter barrel **106** may be desirable for some applications, yet a 2 inch diameter barrel **106** may be desirable for other applications. A barrel **106** configuration can be designed such that the barrel has a ⅜ inch diameter when at its smallest diameter and can be expanded to 2 inches when at its largest diameter. These sizes are given for illustrative purposes and are not limiting.

[0023] In an aspect shown by FIG. **3**, the actuator could include a first actuator connected to a first end of the barrel and a second actuator connected to a second end of the barrel. When the first actuator is utilized, it may adjust the distance between the plates at the first end without affecting the distance between the plates at the second end, such that the second end is fixed. When the second actuator is utilized, it may adjust the distance between the plates at the second end without affecting the distance between the plates at the first end, such that the first end is fixed. In this way, the first actuator may be utilized to adjust the diameter at the first end of the barrel and the second actuator may be utilized to adjust the diameter at the second end of the barrel independently. Different barrel **106** end diameters produced by actuator adjustments at the first actuator and the second actuator can produce different barrel **106** configurations. For example, setting a first actuator to a wide diameter and a second actuator to a wide diameter can produce a wide diameter barrel **106**. In another example, setting a first actuator to a narrow diameter and the second actuator to a wide diameter can produce a cone-style barrel, as shown in FIG. **3**(*a*). In yet another example, setting a first actuator to a wide diameter and a second actuator to a narrow diameter can produce an inverted cone-style barrel, as shown in FIG. **3**(*b*). In a different example, setting a first actuator to a narrow diameter and the second actuator to a narrow diameter can produce a narrow diameter barrel **106**. The barrel **106** may be configured into any desired shape and diameter size that can be produced by using the first actuator to adjust the diameter of the first end of the barrel **106** to any point between and including the largest and smallest diameter of the first end and utilizing the second actuator to adjust the diameter of the second end of the barrel **106** to any point between and including the largest and smallest diameter of the second end.

[0024] In an aspect, the actuator could be mechanical or electrical. A mechanical actuator could be connected to a mechanical control component. In an aspect, the mechanical control component may be a mechanical component capable of translating rotational movement to linear movement, such as a nozzle. The nozzle may be connected to an end of the barrel **106**, such that the nozzle is connected to an end of each plate **109**. When the nozzle is rotated in a first direction, the nozzle may increase the distance between the end of each plate **109** and the center point of the diameter **115** of the barrel **106** by any of several means. For instance, the nozzle may have an inner wall **121** that varies in radius from the center point of the diameter **115** at different points around the circumference of the nozzle. FIG. **4** shows the inside of a nozzle. The plates may be connected or in contact with the inner wall of the nozzle, such that when the nozzle is rotated, the plates may move, such as, for instance, by a roller **128** connected to an end of each plate **109**. In another example, springs may press the plates into the inner wall **131** of the nozzle **121** to maintain contact. In another example, the plates may have a rail that is connected to a track on the inner wall **131**. When the nozzle is rotated in a second direction, the nozzle may decrease the distance between the plate and the center point of the diameter **115** of the barrel.

[0025] In another example, an electrical actuator could be a motor. The motor may push or pull the plates to a desired distance from the center point of the diameter **115** of the barrel **106** to produce a desired barrel **106** diameter. For example, the motor could be connected to a switch that allows a user to set the diameter size. If the user wishes to set the barrel **106** to a desired diameter, the user may set the switch to the configuration that represents the desired diameter. The switch could be, and is not limited to, at least one of a dial and a set of buttons. In another instance, the switch may include options for at least one of preset barrel **106** styles and preset barrel **106** diameters. For example, there may be an option for an inverted cone barrel. When selected, the first actuator may adjust the diameter of the barrel **106** at the proximal end to the handle **103** to be narrower than the diameter of the barrel **106** at the distal end to the handle **103**. The second actuator may adjust the diameter of the barrel **106** at the distal end to be wider than the diameter of the barrel **106** at the proximal end. In another example, there may be an option for a cone barrel. When selected, the second actuator may adjust the diameter of the barrel **106** at the distal end to be narrower than the diameter of the barrel **106** at the proximal end. The first actuator may adjust the diameter of the barrel **106** at the proximal end to be wider than the diameter of the barrel **106** at the distal end. In another example, there may be an option for a plurality of barrel **106** diameters, such as, but not limited to, ½ inch, 1 inch, 1½ inches, and 2 inches. When an option is selected, such as 1½ inches, the first actuator may adjust the diameter of the barrel **106** at the proximal end to be 1½ inches, and the second actuator may adjust the diameter of the barrel **106** at the distal end to be 1½ inches.

[0026] In some aspects, a controller may act as an intermediary for electrical components. For example, when a user changes an adjustable gauge controlling temperature, the adjustable gauge may send a signal to the controller, which sends a corresponding signal to the heater indicating that the heater should produce more or less heat, depending on the temperature that is selected in relation to the current temperature. In another example, if a user changes a switch controlling diameter size of the barrel **106**, the switch may send a signal to the circuit board, which spends a corresponding signal to the actuator to increase the diameter of the barrel or decrease the diameter of the barrel, depending on the selected size relative to the current size.

[0027] An aspect is directed to a method for operating an adjustable variable diameter hair tool. A user determines what size and style barrel they require. The user then directs the control component to produce the desired barrel style. The control component directs the actuator to act on the plates of the barrel in a direction necessary to produce the desired barrel geometry. For example, a user may desire an inverted cone style barrel. The user may direct the control component to produce the inverted cone style barrel. The control component may direct the actuator at the proximal end to narrow the diameter of the barrel and the actuator at the distal end of the barrel widens the diameter of the barrel. In another example, the user may desire a cone style barrel. The user may direct the control component to produce the cone style barrel. The control component may direct the actuator at the distal end of the barrel to narrow the diameter of the barrel and the actuator at the proximal end of the barrel to widen the diameter of the barrel. In another example, the user may desire a wide diameter barrel. The user may direct the control component to produce the wide diameter barrel. The control component may direct the actuator at the proximal end to widen the diameter of the barrel and the actuator at the distal end of the barrel to widen the diameter of the barrel. In a further example, the user may desire a narrow diameter barrel. The user may direct the control component to produce the narrow diameter barrel. The control component may direct the actuator at the proximal end to narrow the diameter of the barrel and the actuator at the distal end of the barrel to narrow the diameter of the barrel.

[0028] Some aspects consider various attachments that may be included with the hair tool. For instance, the hair tool may have a clip for maintaining contact between the user hair and the barrel surface, such as a Marcel style clip. The hair tool may include a handhold that is on a distal end of the barrel that is insulated against heat.

[0029] While certain aspects have been described and shown in the accompanying drawings, it is to be understood that such are merely illustrative of and not restrictive on the broad invention, and that the invention is not limited to the specific constructions and arrangements shown and described, since various other modifications may occur to those of ordinary skill in the art. For example, while FIG. **1** depicts a device in which the plates of the barrel extend vertically from one end to the other, it is also possible to have plates that curve around the barrel. The description is thus to be regarded as illustrative instead of limiting.

What is claimed is:

1. A variable diameter adjustable hair tool, comprising:
- a barrel that hair can be wound around, and transfer heat to said hair, that includes a plurality of plates;
- a heater that can transfer heat at a specified temperature to an outer surface of the barrel;
- a power unit to provide power to the heating unit;
- a handle connected to the barrel that does not conduct heat from the barrel;
- an actuator that alters the outer diameter of the barrel by changing the distance between a surface of the plates and a central axis of the barrel; and
- a control component that converts a user action into an action of the actuator.

2. The barrel of claim **1**, further comprising a first actuator on a first end of the barrel and a second actuator on a second end of the barrel.

3. The barrel of claim **2**, wherein the first actuator and the second actuator are independent, such that the first actuator may adjust the diameter at the first end of the barrel and the second actuator may adjust the diameter at the second end of the barrel.

4. The barrel of claim **1**, wherein the actuator is mechanical or electrical.

5. The barrel of claim **1**, wherein the control component is a nozzle that changes the distance between the plates and the central axis of the barrel when rotated.

6. The barrel of claim **1**, wherein the barrel contains a core that creates a thermal path between the plates and a heater.

7. A barrel for a variable diameter adjustable hair tool, comprising:
- a plurality of plates that form the outer surface of the barrel;
- an actuator that alters the outer diameter of the barrel by changing the distance between a surface of the plates and a central axis of the barrel; and

a control component that converts a user action into an action of the actuator.

8. The barrel of claim **7**, further comprising a first actuator on a first end of the barrel and a second actuator on a second end of the barrel.

9. The barrel of claim **8**, wherein the first actuator and the second actuator are independent, such that the first actuator may adjust the diameter at the first end of the barrel and the second actuator may adjust the diameter at the second end of the barrel.

10. The barrel of claim **7**, wherein the actuator is mechanical or electrical.

11. The barrel of claim **7**, wherein the control component is a nozzle that changes the distance between the plates and the central axis of the barrel when rotated.

12. The barrel of claim **7**, wherein the barrel contains a core that creates a thermal path between the plates and a heater.

13. A variable diameter adjustable hair tool, comprising:

a barrel that hair can be wound around, and transfer heat to said hair;

a heater that can transfer heat at a specified temperature to an outer surface of the barrel;

a power unit to provide power to the heater;

a handle connected to the barrel that does not conduct heat from the barrel;

a means for altering the outer diameter of the barrel; and

a control component that converts a user action into an action of the actuator.

14. The hair tool of claim **13**, wherein the means for altering the outer diameter of the barrel comprises an actuator that is connected to a plurality of plates.

15. The hair tool of claim **14**, further comprising a nozzle connected to the actuator, wherein rotating the nozzle in a first direction increases the circumference of the barrel and rotating the nozzle in a second direction decreases the circumference of the barrel.

16. The hair tool of claim **15**, further comprising a first nozzle on a first end of the barrel and a second nozzle on a second end of the barrel.

17. The hair tool of claim **16**, wherein the first nozzle and the second nozzle may be independently rotated such that rotating the first nozzle alters the diameter at the first end of the barrel and rotating the second nozzle alters the diameter at the second end of the barrel.

18. Hair tool of claim **17**, wherein rotating a first nozzle and a second nozzle produces a cone shaped barrel.

19. Hair tool of claim **17**, wherein rotating a first nozzle and a second nozzle produces an inverted cone shaped barrel.

20. The hair tool of claim **13**, further comprising a clip for holding the hair against the outer surface of the barrel.

* * * * *