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(57) A hair styling apparatus includes first and second arms, each having respective first and second ends. The first and second arms are pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to configure the hair styling apparatus between an opened position and a closed position. A heating assembly has a first and second end. The second end of the heating assembly is pivotably coupled to the second end of the first arm. The heating assembly includes a heat plate having a hair-heating surface. The heat plate is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define an air gap therebetween.



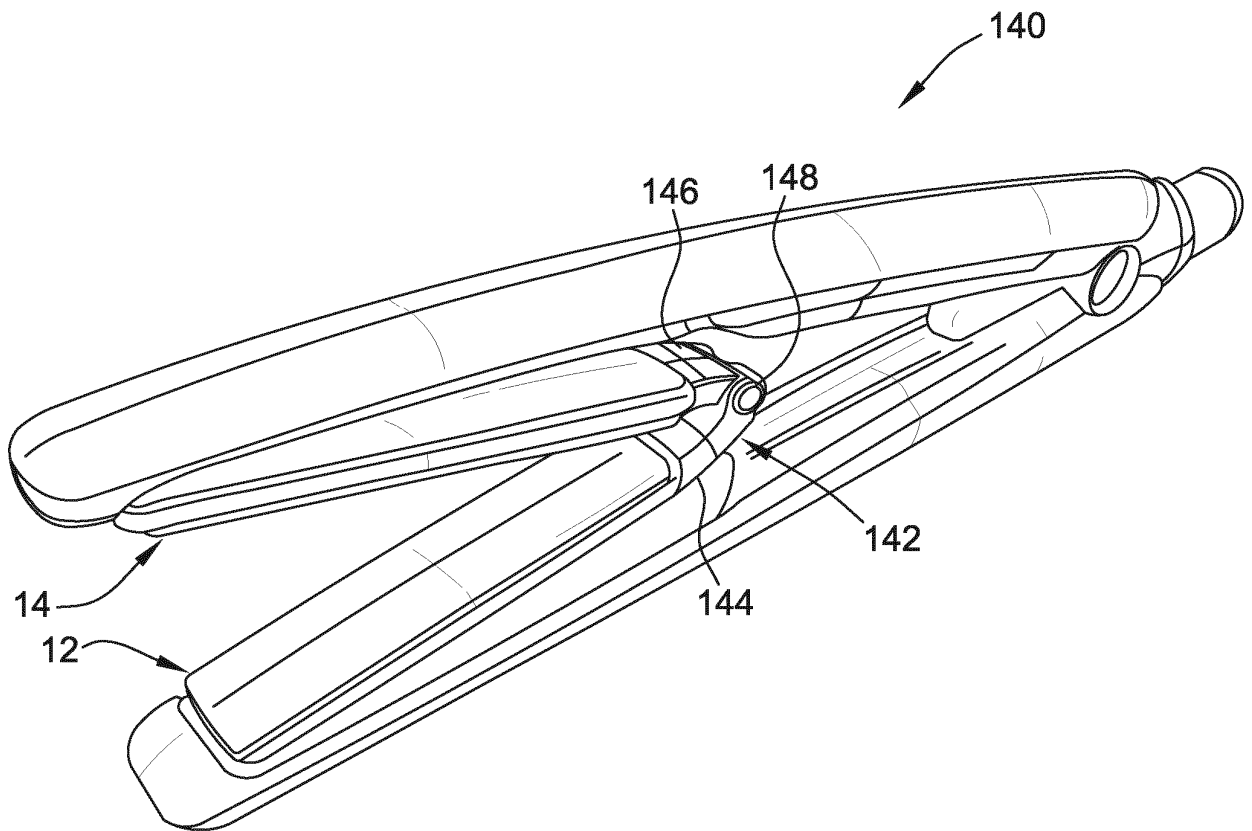


FIG. 12

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 62/129,335 filed on March 6, 2015, which is incorporated herein by reference in its entirety.

FIELD OF THE DISCLOSURE

[0002] The present disclosure relates generally to a hair styling apparatus, and more particularly to a hair styling apparatus having heating assemblies spaced apart from the housing by insulating air gaps.

BACKGROUND OF THE DISCLOSURE

[0003] Many different types of hair styling apparatus are available for use in styling hair, such as straightening, curling, waving or otherwise achieving a desired look. Common among such hair styling apparatus is the ability to apply heat to the hair, and in particular to provide one or more heated surfaces against which the hair to be styled is contacted during styling. For example, flat irons (which are also sometimes referred to as heated tongs or hair straighteners) often have a pair of arms that are moveable relative to each other between a closed position, in which at least portions of the arms are in close proximity to each other to hold hair therebetween, and an open position, in which the arms are spaced from each other such that the arms are generally inoperative to hold hair. A heating member with a heating surface is provided on at least one of the arms, and more typically on both of the arms. In use, the hair being styled is sandwiched between the heating surfaces of the heating members when the arms are in their closed position.

[0004] During use, at least some known flat irons do not close entirely, leaving a gap between the heating members at an end of the flat iron. In such instances, a user may grasp the free ends of the flat iron housing to squeeze the free ends of the arms together. However, due to the heating members being provided on the arms of the housing, the housing may become hot through the transfer of heat from the heating members to the arms. Thus, a user grasping the ends of the arms may experience discomfort due to the excessive heat transferred to the arms. There is a need, therefore, for a hair styling apparatus that can be grasped or otherwise manipulated near the heating members without such discomfort.

BRIEF DESCRIPTION

[0005] In one aspect, a hair styling apparatus is provided. The hair styling apparatus includes first and second arms each having respective first and second ends. The first and second arms are pivotably coupled to each other at least at the first end of the first arm for selective,

pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position. The hair styling apparatus also includes a heating assembly having a first and second end. The second end of the heating assembly is pivotably coupled to the second end of the first arm. The heating assembly includes a heat plate having a hair-heating surface. The heat plate is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define an air gap therebetween.

[0006] In another aspect, another hair styling apparatus is provided. The hair styling apparatus includes a handle having first and second arms having respective first and second ends. The first and second arms are pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an open position and a closed position. The hair styling apparatus also includes a first heating assembly having a first end and a second end. The second end of the first heating assembly is pivotably coupled to the second end of the first arm forming a cantilever. The first heating assembly is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define a first air gap therebetween. The hair styling apparatus also includes a second heating assembly having a first end and a second end. The second end of the second heating assembly is pivotably coupled to the second end of the second arm forming a cantilever. The second heating assembly is spaced from the second arm in both the opened position and the closed position of the hair styling apparatus to define an air gap therebetween. Moreover, the hair styling apparatus includes a resilient bridge member coupled to the first ends of the first and second heating assemblies.

[0007] In another aspect, yet another hair styling apparatus is provided. The hair styling apparatus includes first and second arms each having respective first and second ends. The first and second arms are pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position. The hair styling apparatus also includes a cantilevered first heating assembly having a first end and a second end. The second end of the first heating assembly pivotably is coupled to the second end of the first arm. The first heating assembly is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define a first air gap therebetween. Moreover, the hair styling apparatus includes a cantilevered second heating assembly having a first end and a second end. The second end of the second heating assembly is pivotably coupled to the second end of the second arm. The second heating assembly is spaced from the second arm in both the opened position and the closed position of the hair styling apparatus to define a second air gap therebetween.

ebetween. Furthermore, the hair styling apparatus includes a spring hinge. The spring hinge includes a first hinge member coupled to the first end of the first heating assembly, a second hinge member coupled to the first end of the second heating assembly and rotatably coupled to the first hinge member, and a torsion spring having a first end secured relative to the first hinge member and a second end secured relative to the second hinge member.

[0008] In yet another aspect, another hair styling apparatus is provided. The hair styling apparatus includes first and second arms each having respective first and second ends. The first and second arms are pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position. The apparatus also includes a heating assembly housing having first and second end portions and a center portion extending therebetween. At least the first end portion is coupled to the second end of the first arm. The center portion is spaced from the first arm to define an air gap therebetween. Moreover, the apparatus includes a heat plate coupled to the center portion of the heating assembly housing. The heat plate includes a hair-heating surface. The heat plate is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus.

DRAWINGS

[0009] These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

FIG. 1 is an isometric schematic of a hair styling apparatus having cantilevered heating assemblies, the hair styling apparatus being in a closed position;

FIG. 2 is a side view of the hair styling apparatus of FIG. 1 in the closed position;

FIG. 3 is an isometric schematic of the hair styling apparatus of FIG. 1 with the hair styling apparatus shown in an open position;

FIG. 4 is a side view of the hair styling apparatus of FIG. 3 in the open position;

FIG. 5 is an isometric schematic of a first arm of the hair styling apparatus of FIG. 1;

FIG. 6 is an exploded isometric schematic of the first arm of FIG. 5;

FIG. 7 is an exploded isometric schematic of the first arm of FIG. 5 illustrating the heating assembly exploded therefrom;

FIG. 8 is a side view of a second embodiment of a hair styling apparatus with the apparatus shown in a closed position;

FIG. 9 is a side view of a third embodiment of a hair styling apparatus illustrating bumpers coupled to a housing of the apparatus;

FIG. 10 is a side view of a fourth embodiment of a hair styling apparatus illustrating bumpers coupled to first and second heating assemblies of the apparatus;

FIG. 11 is a top view of a fifth embodiment of a hair styling apparatus with the apparatus having an angled handle;

FIG. 12 is an isometric schematic of a sixth embodiment of a hair styling apparatus with the apparatus having cantilevered heating assemblies and a spring hinge coupled therebetween;

FIG. 13 is a side view of a seventh embodiment of a hair styling apparatus with the apparatus having flexible hinges coupled to first and second heating assemblies;

FIG. 14 is a partial isometric view of an end of a lower arm assembly of the hair styling apparatus of FIG. 13;

FIG. 15 is a side view of an eight embodiment of a hair styling apparatus having heating assemblies spaced apart from a handle of the apparatus by insulating air gaps; and

FIG. 16 is a side view of a ninth embodiment of a hair styling apparatus having heating assemblies spaced apart from a handle of the apparatus by insulating air gaps.

[0010] Unless otherwise indicated, the drawings provided herein are meant to illustrate features of embodiments of the disclosure. These features are believed to be applicable in a wide variety of systems comprising one or more embodiments of the disclosure. As such, the drawings are not meant to include all conventional features known by those of ordinary skill in the art to be required for the practice of the embodiments disclosed herein.

DETAILED DESCRIPTION

[0011] In the following specification and the claims, reference will be made to a number of terms, which shall

be defined to have the following meanings. The singular forms "a", "an", and "the" include plural references unless the context clearly dictates otherwise. The terms "comprising", "including", and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements. "Optional" or "optionally" means that the subsequently described event or circumstance may or may not occur, and that the description includes instances where the event occurs and instances where it does not.

[0012] Approximating language, as used herein throughout the specification and claims, may be applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as "about", "approximately", and "substantially", are not to be limited to the precise value specified. In at least some instances, the approximating language may correspond to the precision of an instrument for measuring the value. Here and throughout the specification and claims, range limitations may be combined and/or interchanged; such ranges are identified and include all the sub-ranges contained therein unless context or language indicates otherwise.

[0013] Referring now to the drawings and in particular to FIGS. 1-4, FIG. 1 is an isometric schematic of a hair styling apparatus 10 having cantilevered heating assemblies 12, 14, with the hair styling apparatus 10 shown in a closed position. FIG. 2 is a side view of the hair styling apparatus 10 shown in the closed position. FIG. 3 is an isometric schematic of the hair styling apparatus 10 shown in an open position. FIG. 4 is a side view of the hair styling apparatus 10 shown in the open position. In the exemplary embodiment, the hair styling apparatus 10 is generally in the form of a flat iron-also referred to as a hair straightener-that is used to straighten a user's hair. The hair styling apparatus 10 includes two generally elongate cantilevered heating assemblies 12, 14 for use in straightening the user's hair when using the apparatus. The heating assemblies 12, 14 include opposite longitudinal ends, each having one of the longitudinal ends pivotably coupled to a handle 20 of the hair styling apparatus 10, thereby forming the cantilever. The heating assemblies 12, 14 are configured to maintain an air gap 16, 18 between the heating assemblies 12, 14, respectively, and the handle 20. The air gaps 16, 18 facilitate reducing the temperature of the handle 20 when the heating assemblies 12, 14 are producing heat.

[0014] In the exemplary embodiment, the handle 20 of the hair styling apparatus 10 is generally elongate with opposite longitudinal ends, and includes first and second arms (lower and upper arms as illustrated in FIGS. 1-4), generally indicated at 22 and 24, respectively. The first and second arms 22, 24 are pivotably coupled to each other by a suitable pivot connection, generally indicated at 26, at one of the longitudinal ends of the handle 20. The first and second arms 22, 24 are moveable relative to each other about a pivot axis of the pivot connection

26 such that the hair styling apparatus 10 is positionable between a closed position (FIGS. 1 and 2) and an opened position (FIGS. 3 and 4) of the hair styling apparatus 10.

[0015] In one suitable embodiment, a biasing member, for example, without limitation, a compression spring 28 (shown in FIGS. 5-7), is positioned between the first and second arms 22, 24 adjacent the pivot connection 26. In particular, the compression spring 28 is seated within opposing spring seats 30 (one of which is illustrated in FIGS. 3 and 4) formed on each of the arms 22, 24 to urge the arms toward the open position of the hair styling apparatus 10. It is contemplated that other embodiments of the hair styling apparatus 10 may not include the compression spring 28, but may include an alternative biasing member, for example, without limitation, a torsion spring integrated with the pivot connection 26.

[0016] In the exemplary embodiment, the hair styling apparatus 10 includes a resilient bridge member 32 coupled between the heating assemblies 12, 14 at each of the free longitudinal ends. The resilient bridge member 32 includes first and second support mounts 34, 36 coupled to the respective free longitudinal ends of the heating assemblies 12, 14. A resilient coupling 38 is coupled to the support mounts 34, 36 to form the resilient bridge member 32, which extends between the heating assemblies 12, 14 and facilitates reducing the likelihood that the user's hair will fall into the air gaps 16, 18. In an alternative embodiment, the resilient bridge member 32 includes a single resilient material that extends between the heating assemblies 12, 14. The resilient bridge member 32 can include, for example, without limitation, a thermoplastic elastomer and a thermoset elastomer. In one suitable embodiment, the resilient bridge member 32 includes a silicone-based material. Alternatively, the resilient bridge member 32 can include any resilient material that enables the resilient bridge member 32 to function as described herein. It is contemplated that other embodiments of the hair styling apparatus 10 may not include the resilient bridge member 32, such that the free longitudinal ends of the heating assemblies 12, 14 remain free.

[0017] In the exemplary embodiment, the second arm 24 (the upper arm as shown in FIGS. 1-4) includes an outer shell or housing member 40 having an interior space configured to enclose various components of the hair styling apparatus 10 therein. For example, without limitation, longitudinally adjacent to the spring seat 30 is an upper cover panel 42 that together with the housing member 40 encloses a control system (not shown) for controlling operation of the hair styling apparatus 10. The control system is configured to control, for example, power on/off and/or heat output control of the hair styling apparatus 10. The control system is electrically coupled to a power source (not shown) via an electrical cord 44 that is coupled to the hair styling apparatus 10 rearward of the pivot connection 26. The housing member 40 includes an integrated button 44, which is useable by the user to operate the hair styling apparatus 10, and an in-

tegrated display 46, which displays pertinent information to the user.

[0018] While in the exemplary embodiment the switch 44, the integrated display 46, and the control system are located on the second arm 24, it is contemplated that one or more of the switch 44, the integrated display 46, and the control system may instead be located on the first arm 22. It is also contemplated that more than one switch 44 may be provided, for example, without limitation, one for powering the hair styling apparatus 10 on/off and another for controlling the amount of heat output. Alternatively, the hair styling apparatus 10 includes any number of switches that enable the hair styling apparatus 10 to function as described herein.

[0019] FIG. 5 is an isometric schematic of the first arm 22 of the hair styling apparatus 10. FIG. 6 is an exploded isometric schematic of the first arm 22. FIG. 7 is an exploded isometric schematic of the first arm 22 illustrating the heating assembly 12 exploded therefrom. With reference to FIGS. 5-7, the first arm 22 includes a housing member 50 having an interior space configured to enclose various components of the hair styling apparatus 10 therein. For example, as disclosed above, the housing member 50 can include one or more of the switch 44, the integrated display 46, and the control system of hair styling apparatus 10. The first arm 22 includes a cover 52 coupled to the housing 50 generally at the longitudinal end opposite the spring seat 30. The cover 52 includes an upper surface 54 (as illustrated in FIGS. 5-7) generally opposing the heating assembly 12. A front cover 56 is coupled to the housing 50 to facilitate covering a revolute joint, generally indicated at 58, formed between the first heating assembly 12 and the first arm 22.

[0020] As shown in FIGS. 6 and 7, in the exemplary embodiment, the revolute joint 58 includes a pin 60 that is coupled to an insulating housing 62 of the heating assembly 12. The pin 60 is rotatably coupled to a pin receiving block 64, which is coupled to the first arm 22, and in particular the housing 50. The pin receiving block 64 includes an arcuate mounting surface 66 configured to receive the pin 60 and define a pivot axis for the first heating assembly 12. The front cover 56 includes a corresponding arcuate mounting surface (not shown) such that the pin 60 is captured between the pin receiving block 64 and the front cover 56, thereby defining the revolute joint 58.

[0021] In the exemplary embodiment, a biasing member, for example, without limitation, a compression spring 68 (shown in FIGS. 6 and 7), is positioned between the first arm 22 and the first heating assembly 12 adjacent the revolute joint 58. In particular, the compression spring 68 is seated within opposing spring seats 69 formed on each of the first arms 22 and the insulating housing 62 to urge the first heating assembly 12 away from the first arm 22. It is contemplated that other embodiments of the hair styling apparatus 10 may not include the compression spring 68, but may include an alternative biasing member, for example, without limitation, a resilient ma-

terial, or a torsion spring integrated with the revolute joint 58.

[0022] Referring to FIG. 7, the insulating housing 62 of the first heating assembly 12 forms a framework in which a heat plate assembly 70 is mounted. The heat plate assembly 70 includes a heat plate 72, a heating device 74, and a temperature sensor 76. The heat plate assembly 72 is generally formed as a substantially rectangular plate having a cavity or channel for receiving the heating device 74. The heating device 74 is thermally coupled to the heat plate 72, and upon assembly of the first heating assembly 12, is located within the framework of the insulating housing 62. The heating device 74 is electrically coupled to the control system via suitable wiring (not shown). The temperature sensor 76 is thermally coupled to the heating device 74 and is electrically connected to the control system. In the exemplary embodiment, the temperature sensor 76 includes a thermistor. Alternatively, the temperature sensor 76 is any type of temperature sensor that enables the hair styling apparatus 10 to function as described herein. In the exemplary embodiment, the temperature sensor 76 sends a temperature-indicating signal, indicative of the temperature of the heating device 74, to the control system. The control system is configured to regulate the temperature of the heat plate 72 by regulating the heat output of the heating device 74 in response to the temperature-indicating signal.

[0023] In the exemplary embodiment, the heating device 74 includes one or more heaters, for example, without limitation, electrical resistance heaters, in thermal contact with the heat plate 72 to heat the heat plate during use of the hair styling apparatus 10. In one suitable embodiment, the heating device 74 is operable to heat the heat plate 72 to a temperature of at least about 100 degrees Celsius (°C), and may heat the heat plate 72 to a temperature of about 250 °C. In another suitable embodiment, the heating device 74 is operable to heat the heat plate 72 to a temperature in the range of about 180 °C to about 230 °C. It is understood that other suitable heating units or heating methods may be used to heat the heat plate 72 without departing from the scope of this invention. In the exemplary embodiment, the heat plate 72 has a hair-heating surface 78 generally opposing the second arm 24 of the hair styling apparatus 10. The heat plate 72 may be constructed of any suitable material, such as, without limitation, metal, ceramic materials, or combinations thereof, that enable the heat plate 72 to function as described herein. The heat plate 72 can be formed in other configurations, including other shapes and sizes, without departing from the scope of this disclosure.

[0024] Referring back to FIGS. 1-4, the upper arm or second arm 24 is constructed substantially similar to the first arm 22. As disclosed herein, the second arm 24 includes the housing member 40 having an interior space configured to enclose various components of the hair styling apparatus 10 therein. In the exemplary embodi-

ment, the second heating assembly 14 is pivotably coupled to the second arm 24 of the hair styling apparatus 10 and is constructed substantially the same as the first heating assembly 12 pivotably coupled to the first arm 22. A heat plate 80 of the second heating assembly 14 has a hair-heating surface 82 generally opposing the hair-heating surface 78 of the first heating assembly 12. The first and second heating assemblies 12, 14 each include substantially similar heating devices and temperature sensors. For example, in the exemplary embodiment, the first and second heating assemblies 12, 14 each include the heating device 74 and the temperature sensor 76.

[0025] In operation, the heating devices 74 of the respective heating assemblies 12, 14 of the first and second arms 22, 24 pivot about a longitudinal end of the respective arms so that in the closed position of the hair styling apparatus 10, the hair-heating surfaces 78, 82 sandwich hair therebetween. The cantilever configuration of the heating assemblies 12, 14 operates to maintain the insulating air gaps 16, 18, respectively, between the heating assemblies 12, 14 and the first and second arms 22, 24, respectively. This facilitates reducing the heat transferred from the heating devices 72 to the first and second arms 22, 24. In the open position of the hair styling apparatus 10, the hair-heating surfaces 78, 82 of the heating devices 74 are spaced apart from each other a sufficient distance to allow the introduction of hair between the hair-heating surfaces while maintaining the air gaps 16, 18.

[0026] FIG. 8 is a side view of a second embodiment of a hair styling apparatus 100 with the apparatus shown in the closed position. The basic configuration of the hair styling apparatus 100 is substantially similar to the hair styling apparatus 10, and as such, like characters represent like parts throughout the drawings. The hair styling apparatus 100 includes the cantilevered heating assemblies 12, 14 for use in straightening the user's hair when using the apparatus. The heating assemblies 12, 14 include opposite longitudinal ends, each having one of the longitudinal ends pivotably coupled to the handle 20 of the hair styling apparatus 100, thereby forming the cantilever. The heating assemblies 12, 14 are configured to maintain the air gaps 16, 18 between the heating assemblies 12, 14, respectively, and the handle 20.

[0027] In the exemplary embodiment, the handle 20 of the hair styling apparatus 100 includes first and second arms 22, 24 (lower and upper arms as illustrated in FIG. 8). The first and second arms 22, 24 are pivotably coupled to the heating assemblies 12, 14, respectively, via resilient end pieces 102, 104, respectively. In the exemplary embodiment, the resilient end pieces 102, 104 are constructed and assembled substantially the same, thus only the lower arm assembly of the hair styling apparatus 100 will be discussed. The resilient end piece 102 is formed as a U-shaped component and is coupled to a longitudinal end of the first arm 22 and the longitudinal end of the first heating assembly 12. The U-shaped end piece 102 is configured to locate the first heating assembly 12 away

from the arm 22, thereby maintaining the air gap 16 therebetween. As the hair styling apparatus 100 is moved from an opened position to a closed position, the end piece 102 flexes, enabling the first heating assembly 12 to pivot about the longitudinal end of the first arm 22. While in the various embodiments of the hair styling apparatus the connection between the first and second arms 22, 24 and the heating assemblies 12, 14 is pivotable, or flexible, it is understood that the connection can be a fixed connection that retains the heating assemblies 12, 14 in a spaced relationship with the first and second arms 22, 24, as is further described herein.

[0028] In the exemplary embodiment, the resilient end piece 102 of the hair styling apparatus 100 is formed from a single resilient material, extending between the first arm 22 and the heating assembly 12. The resilient end piece 102 can include, for example, without limitation, a thermoplastic elastomer and a thermoset elastomer. Alternatively, the resilient end piece 102 can include any resilient material that enables resilient end piece 102 to function as described herein. In one suitable embodiment, the resilient end piece 102 includes a silicone-based material. In another suitable embodiment, the resilient end piece 102 is formed as a U-shaped tube, thereby facilitating passing electrical wires (not shown) there-through such that the control system can be electrically coupled to the first heating assembly 12. In another suitable embodiment, the resilient end piece 102 is formed as a solid component, having the electrical wires mold therein.

[0029] In the exemplary embodiment, the hair styling apparatus 100 includes a resilient bridge member 106 coupled between the heating assemblies 12, 14 at each of the free longitudinal ends, generally opposite the resilient end pieces 102, 104. The resilient bridge member 106 is substantially C-shaped and is formed from a single resilient material. The resilient bridge member 106 can include, for example, without limitation, a thermoplastic elastomer, a thermoset elastomer, and a fabric-based material. In one suitable embodiment, the resilient bridge member 106 includes a silicone-based material. Alternatively, the resilient bridge member 106 can include any resilient material that enables the resilient bridge member to function as described herein. In one suitable embodiment, the resilient bridge member 106 is formed substantially the same as the resilient bridge member 32 of the embodiment of FIGS. 1-7, and includes the first and second support mounts (not shown in FIG. 8 but similar to support mounts 34, 36 of FIGS. 1-7) coupled to the free longitudinal end of the heating assemblies 12, 14, respectively. A resilient coupling (not shown in FIG. 8 but similar to resilient coupling 38 of FIGS. 1-7) is coupled to the support mounts to form the resilient bridge member 106. The resilient bridge member 106 facilitates reducing the likelihood that the user's hair will fall into the air gaps 16, 18. It is contemplated that other embodiments of the hair styling apparatus 100 may not include the resilient bridge member 106.

[0030] FIG. 9 is a side view of a third embodiment of a hair styling apparatus 110 illustrating bumpers 112 coupled to the housing 20. In particular a bumper 112 is coupled to each of the first and second arms 22, 24 proximate the free ends of the first and second heating assemblies 12, 14, respectively. The bumpers 112 can be integrally formed with the first and second arms 22, 24, or can be mechanically coupled thereto. In the exemplary embodiment, the bumpers 112 are formed from a resilient material, for example, without limitation, a thermoplastic elastomer or a thermoset elastomer. In one suitable embodiment, the bumpers 112 include a silicone-based material coupled to the first and second arms 22, 24, respectively. In the exemplary embodiment, the bumpers 112 are configured to maintain the air gaps 16, 18 between the heating assemblies 12, 14, respectively, and the handle 20. The air gaps 16, 18 facilitate reducing the temperature of the handle 20 when the heating assemblies 12, 14 are producing heat.

[0031] In the exemplary embodiment, the hair styling apparatus 110 includes an alternative biasing member 114 positioned between the first arm 22 and the first heating assembly 12, and the second heating assembly 14 and the second arm 24, respectively. The biasing member 114 is positioned between the heating assemblies 12, 14 and the arms 22, 24, respectively, to urge the heating assemblies 12, 14 away from the arms 22, 24, respectively. In the exemplary embodiment, the biasing members 114 are formed from a resilient material, for example, without limitation, a thermoplastic elastomer or a thermoset elastomer. In one suitable embodiment, the biasing members 114 include a silicone-based material.

[0032] FIG. 10 is a side view of a fourth embodiment of a hair styling apparatus 120 illustrating bumpers 122 coupled to the first and second heating assemblies 12, 14. In the exemplary embodiment, a bumper 122 is coupled to each of the heating assemblies 12, 14 proximate the free ends of the first and second heating assemblies 12, 14, respectively. The bumpers 122 can be integrally formed with the insulating housing 62 of the first and second heating assemblies 12, 14, or can be mechanically coupled thereto. In the exemplary embodiment, the bumpers 122 are formed from a resilient material, for example, without limitation, a thermoplastic elastomer or a thermoset elastomer. In one suitable embodiment, the bumpers 122 include a silicone-based material coupled to the first and second heating assemblies 12, 14, respectively. In the exemplary embodiment, the bumpers 122 are configured to maintain air gaps 16, 18 between the heating assemblies 12, 14, respectively, and the handle 20. The air gaps 16, 18 facilitate reducing the temperature of the handle 20 when the heating assemblies 12, 14 are producing heat.

[0033] FIG. 11 is a top view of a fifth embodiment of a hair styling apparatus 130 with the apparatus having an angled handle 132. In the exemplary embodiment, the hair styling apparatus 130 is substantially similar to the hair styling apparatus 10, except that the angled handle

132 includes an angle α proximate the free longitudinal ends of the first and second heating assemblies 12, 14 such that a first portion 134 of the angled handle 132 defines an angle in the range of about 15 degrees to about 90 degrees relative to a second portion 136 of the angled handle 132.

[0034] FIG. 12 is an isometric schematic of a sixth embodiment of a hair styling apparatus 140 having the cantilevered heating assemblies 12, 14, and a spring hinge 142 coupled therebetween. In the exemplary embodiment, the spring hinge 142 includes a first hinge member 144 coupled to the free end of first heating assembly 12. A second hinge member 146 is rotatably coupled to the first hinge member 144, and is coupled to the free end of the second heating assembly 14. A torsion spring 148 includes a first end (not shown) secured relative to the first hinge member 144, and a second end (not shown) secured relative to the second hinge member 146. The torsion spring 148 is configured to bias the first hinge member 144 toward the second hinge member 146, thereby facilitating maintaining the air gaps 16, 18 when the hair styling apparatus 140 is moved between a closed position and an opened position.

[0035] FIG. 13 is a side view of a seventh embodiment of a hair styling apparatus 150 illustrating flexible hinges 152 and 154 coupled to the first and second heating assemblies 12, 14, respectively. FIG. 14 is a partial isometric view of an end of a lower arm assembly 156 of the hair styling apparatus 150. In the exemplary embodiment, the first heating assembly 12 is pivotably coupled to the lower arm assembly 156 of the hair styling apparatus 150 via the revolute joint 58 located proximate a longitudinal end of the lower arm assembly 156. The flexible hinge 152 is pivotably coupled to the free end of the first heating assembly 12 and extends into the lower arm assembly 156 through an opening 158 therein. The flexible hinge 152 is configured to slide into the lower arm assembly 156 as the hair styling apparatus 150 is moved from an opened position to a closed position. The flexible hinge 152 facilitates reducing the likelihood that the user's hair will fall into the air gap 16 during use of the hair styling apparatus 150. The upper arm assembly 158 and the lower arm assembly 156 are substantially identical, and therefore, for ease of explanation, only the lower arm assembly 156 is described in detail herein, with the understanding that the features of the lower arm assembly 156 apply equally to the upper arm assembly 158.

[0036] FIG. 15 is a side view of an eighth embodiment of a hair styling apparatus 160 having heating assemblies 162, 164 spaced apart from a handle 166 of the apparatus by insulating air gaps 168, 170. In the exemplary embodiment, the hair styling apparatus 160 includes two generally elongate heating assemblies 162, 164 for use in straightening the user's hair when using the apparatus. The heating assemblies 162, 164 are coupled to handle 166 of the hair styling apparatus 160 such that insulating air gaps 168, 170 are defined between the respective heating assemblies 162, 164 and the handle 166. The

air gaps 168, 170 facilitate reducing the temperature of the handle 166 when the heating assemblies 162, 164 are producing heat.

[0037] In the exemplary embodiment, the handle 166 of the hair styling apparatus 160 is generally elongate with opposite longitudinal ends, and includes first and second arms (lower and upper arms as illustrated in FIG. 15), generally indicated at 172 and 174, respectively. The first and second arms 172, 174 are pivotably coupled to each other by a suitable pivot connection, generally indicated at 176, at one of the longitudinal ends of the handle 166. The first and second arms 172, 174 are moveable relative to each other about a pivot axis of the pivot connection 176 such that the hair styling apparatus 160 is positionable between a closed position (not shown) and an opened position (FIG. 15) of the hair styling apparatus 160.

[0038] In the exemplary embodiment, a biasing member, for example, without limitation, a compression spring (not shown but similar to compression spring 28 of FIGS. 5-7), is positioned between the first and second arms 172, 174 adjacent the pivot connection 176. In particular, the compression spring is seated within opposing spring seats 178 formed on each of the arms 172, 174 to urge the arms toward the opened position of the hair styling apparatus 160. It is contemplated that other embodiments of the hair styling apparatus 160 may not include the compression spring, but may include an alternative biasing member, for example, without limitation, a torsion spring integrated with the pivot connection 176.

[0039] In the exemplary embodiment, a heating assembly housing 180 is coupled to the first arm 172 and forms a bridge with the first arm 172 to define the air gap 168. In particular, first and second end portions 182, 184 of the housing 180 are coupled to first arm 172 such that a center portion 186 of the housing 180 is spaced from the first arm 172 to define the insulating air gap 168. The center portion 186 of the housing 180 includes a framework in which a heat plate 188 is mounted. In one suitable embodiment, the heat plate 188 is rigidly mounted to the housing 180. In other embodiments, the heat plate 188 is flexibly mounted to the housing 180 such that heat plate is moveable in a direction generally perpendicular to a hair-heating surface 190 of the heat plate 188. In one suitable embodiment, the flexibly mounted heat plate 188 has a travel distance of about 1 millimeter.

[0040] In the exemplary embodiment, the heat plate 188 is substantially identical to the heat plate assembly 70 of FIGS. 6, 7. Alternatively, the heat plate 188 can be any type of heating device that enables hair styling apparatus 160 to function as described herein. The first arm assembly 172 and the second arm assembly 174 are substantially identical, and therefore, for ease of explanation, only the first arm assembly 172 is described in detail herein, with the understanding that the features of the first arm assembly 172 apply equally to the second arm assembly 174.

[0041] In operation, the heating assemblies 162, 164

of the first and second arms 172, 174 are positioned so that in the closed position of the hair styling apparatus 160 they sandwich hair therebetween. The bridge configuration of the heating assemblies 162, 164 and the first and second arms 172, 174, respectively, functions to define the insulating air gaps 168, 170, respectively. The air gaps facilitate reducing the heat transferred from the heating assemblies 162, 164 to the first and second arms 172, 174.

[0042] FIG. 16 is a side view of a ninth embodiment of a hair styling apparatus 200 having heating assemblies 162, 164 spaced apart from the handle 166 of the apparatus by the insulating air gaps 168, 170. In this embodiment, a heating assembly housing 202 is coupled to the first arm 172 and forms a fixed cantilever structure with the first arm 172 to define the air gap 168. In particular, an end portion 204 of the housing 202 is coupled to first arm 172 such that a center portion 206 of the housing 202 is spaced from the first arm 172 to define the insulating air gap 168. The first arm assembly 172 and the second arm assembly 174 are substantially identical, and therefore, for ease of explanation, only the first arm assembly 172 is described in detail herein, with the understanding that the features of the first arm assembly 172 apply equally to the second arm assembly 174. Furthermore, other elements of the hair styling apparatus 200 are substantially similar to the elements of the hair styling apparatus 160 of FIGS. 15.

[0043] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

[0044] As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Appendix (claims from parent application)

[0045]

Embodiment 1. A hair styling apparatus comprising:

first and second arms each having respective first and second ends, the first and second arms being pivotably coupled to each other at least at the first end of the first arm for selective, pivotal

movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position; and a heating assembly having a first and second end, the second end of the heating assembly being pivotably coupled to the second end of the first arm, the heating assembly comprising a heat plate having a hair-heating surface, wherein the heat plate is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define an air gap therebetween.

Embodiment 2. The hair styling apparatus set forth in Embodiment 1, wherein the heating assembly is pivotably coupled to the first arm by a revolute joint.

Embodiment 3. The hair styling apparatus set forth in Embodiment 1, wherein the heating assembly is pivotably coupled to the first arm using a resilient coupling.

Embodiment 4. The hair styling apparatus set forth in any of Embodiments 1-3 comprising a biasing member configured to bias the heating assembly away from the first arm.

Embodiment 5. The hair styling apparatus set forth in any of Embodiments 1-4 further comprising a bumper positioned between the heating assembly and the first arm, the bumper configured to maintain the air gap in the closed position of the hair styling apparatus.

Embodiment 6. The hair styling apparatus set forth in any of Embodiments 1-5, wherein the heating assembly further comprises an insulating housing configured to enclose at least a portion of the heat plate.

Embodiment 7. A hair styling apparatus comprising:

a handle having first and second arms having respective first and second ends, the first and second arms being pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position;
a first heating assembly having a first end and a second end, the second end of the first heating assembly being pivotably coupled to the second end of the first arm forming a cantilever, wherein the first heating assembly is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define a first air gap therebetween;
a second heating assembly having a first end

and a second end, the second end of the second heating assembly being pivotably coupled to the second end of the second arm forming a cantilever, wherein the second heating assembly is spaced from the second arm in both the opened position and the closed position of the hair styling apparatus to define a second air gap therebetween; and

a resilient bridge member coupled to the first ends of the first and second heating assemblies.

Embodiment 8. The hair styling apparatus set forth in Embodiment 7, wherein the resilient bridge member comprises at least one of an elastomer, a thermoset plastic, a thermoplastic, a fabric-based material, and a natural polymer.

Embodiment 9. The hair styling apparatus set forth in Embodiment 7, wherein the resilient bridge member is mechanically coupled to the first ends of the first and second heating assemblies using a mechanical fastener.

Embodiment 10. The hair styling apparatus set forth in any of Embodiments 7-9, wherein the resilient bridge member is formed integrally to the first ends of the first and second heating assemblies.

Embodiment 11. The hair styling apparatus set forth in any of Embodiments 7-9, wherein the resilient bridge member comprises a spring hinge having a first hinge member coupled to the first end of the first heating assembly, a second hinge member rotatably coupled to the first hinge member and coupled to the first end of the second heating assembly, and a torsion spring configured to bias the first hinge member toward the second hinge member.

Embodiment 12. A hair styling apparatus comprising:

first and second arms each having respective first and second ends, the first and second arms being pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position;
a cantilevered first heating assembly having a first end and a second end, the second end of the first heating assembly being pivotably coupled to the second end of the first arm, wherein the first heating assembly is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define a first air gap therebetween;
a cantilevered second heating assembly having a first end and a second end, the second end of

the second heating assembly being pivotably coupled to the second end of the second arm, wherein the second heating assembly is spaced from the second arm in both the opened position and the closed position of the hair styling apparatus to define an air gap therebetween; and a spring hinge comprising:

a first hinge member coupled to the first end of the first heating assembly;
a second hinge member coupled to the first end of the second heating assembly and rotatably coupled to the first hinge member; and
a torsion spring having a first end secured relative to the first hinge member and a second end secured relative to the second hinge member.

Embodiment 13. A hair styling apparatus comprising:

first and second arms each having respective first and second ends, the first and second arms being pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position; and a heating assembly housing having first and second end portions and a center portion extending therebetween, at least the first end portion being coupled to the second end of the first arm, the center portion being spaced from the first arm to define an air gap therebetween;
a heat plate coupled to the center portion of the heating assembly housing, the heat plate having a hair-heating surface, wherein the heat plate is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus.

Embodiment 14. The hair styling apparatus set forth in Embodiment 13, wherein the second end portion of the heating assembly is coupled to the first arm of the hair styling apparatus.

Embodiment 15. The hair styling apparatus set forth in either of Embodiments 13 and 14, wherein the heat plate is flexibly mounted to the heating housing assembly.

Claims

1. A hair styling apparatus comprising:

a handle having first and second arms having

respective first and second ends, the first and second arms being pivotably coupled to each other at least at the first end of the first arm for selective, pivotal movement relative to each other to selectively configure the hair styling apparatus between an opened position and a closed position;

a first heating assembly having a first end and a second end, the second end of the first heating assembly being pivotably coupled to the second end of the first arm forming a cantilever, wherein the first heating assembly is spaced from the first arm in both the opened position and the closed position of the hair styling apparatus to define a first air gap therebetween;

a second heating assembly having a first end and a second end, the second end of the second heating assembly being pivotably coupled to the second end of the second arm forming a cantilever, wherein the second heating assembly is spaced from the second arm in both the opened position and the closed position of the hair styling apparatus to define a second air gap therebetween; and

a resilient bridge member coupled to the first ends of the first and second heating assemblies.

2. The hair styling apparatus set forth in claim 1, wherein the resilient bridge member comprises at least one of an elastomer, a thermoset plastic, a thermoplastic, a fabric-based material, and a natural polymer.

3. The hair styling apparatus set forth in claim 1, wherein the resilient bridge member is mechanically coupled to the first ends of the first and second heating assemblies using a mechanical fastener.

4. The hair styling apparatus set forth in any of claims 1-3, wherein the resilient bridge member is formed integrally to the first ends of the first and second heating assemblies.

5. The hair styling apparatus set forth in any of claims 1-3, wherein the resilient bridge member comprises a spring hinge having a first hinge member coupled to the first end of the first heating assembly, a second hinge member rotatably coupled to the first hinge member and coupled to the first end of the second heating assembly, and a torsion spring configured to bias the first hinge member toward the second hinge member.

6. The hair styling apparatus set forth in any of claims 1-3, wherein the handle includes an angle proximate the first end of the first and second heating assemblies such that a first portion the handle defines an angle in the range between about 15 degree and about 90 degrees to a second portion of the handle.

7. A hair styling apparatus comprising:

first and second arms each having respective
first and second ends, the first and second arms
being pivotably coupled to each other at least at
the first end of the first arm for selective, pivotal
movement relative to each other to selectively
configure the hair styling apparatus between an
opened position and a closed position;
a cantilevered first heating assembly having a
first end and a second end, the second end of
the first heating assembly being pivotably cou-
pled to the second end of the first arm, wherein
the first heating assembly is spaced from the
first arm in both the opened position and the
closed position of the hair styling apparatus to
define a first air gap therebetween;
a cantilevered second heating assembly having
a first end and a second end, the second end of
the second heating assembly being pivotably
coupled to the second end of the second arm,
wherein the second heating assembly is spaced
from the second arm in both the opened position
and the closed position of the hair styling appa-
ratus to define an air gap therebetween; and
a spring hinge comprising:
a first hinge member coupled to the first end
of the first heating assembly;
a second hinge member coupled to the first
end of the second heating assembly and
rotatably coupled to the first hinge member;
and
a torsion spring having a first end secured
relative to the first hinge member and a sec-
ond end secured relative to the second
hinge member.

8. The hair styling apparatus set forth in claim 7 further comprising a resilient bridge member coupled to the first ends of the first and second heating assemblies.
9. The hair styling apparatus set forth in claim 8, wherein the resilient bridge member comprises at least one of an elastomer, a thermoset plastic, a thermoplastic, a fabric-based material, and a natural polymer.
10. The hair styling apparatus set forth in either of claims 8 and 9, wherein the resilient bridge member is mechanically coupled to the first and second heating assemblies using a mechanical fastener.

11. A hair styling apparatus comprising:

first and second arms each having respective
first and second ends, the first and second arms
being pivotably coupled to each other at least at
the first end of the first arm for selective, pivotal

movement relative to each other to selectively
configure the hair styling apparatus between an
opened position and a closed position; and
a heating assembly housing having first and sec-
ond end portions and a center portion extending
therebetween, at least the first end portion being
coupled to the second end of the first arm, the
center portion being spaced from the first arm
to define an air gap therebetween; and
a heat plate coupled to the center portion of the
heating assembly housing, the heat plate having
a hair-heating surface, wherein the heat plate is
spaced from the first arm in both the opened
position and the closed position of the hair styl-
ing apparatus.

12. The hair styling apparatus set forth in claim 11, wherein the second end portion of the heating assembly is coupled to the first arm of the hair styling apparatus.
13. The hair styling apparatus set forth in either of claims 11 and 12, wherein the heat plate is flexibly mounted to the heating housing assembly.
14. The hair styling apparatus set forth in either of claims 11 and 12, wherein the heat plate is rigidly coupled to the heating housing assembly.

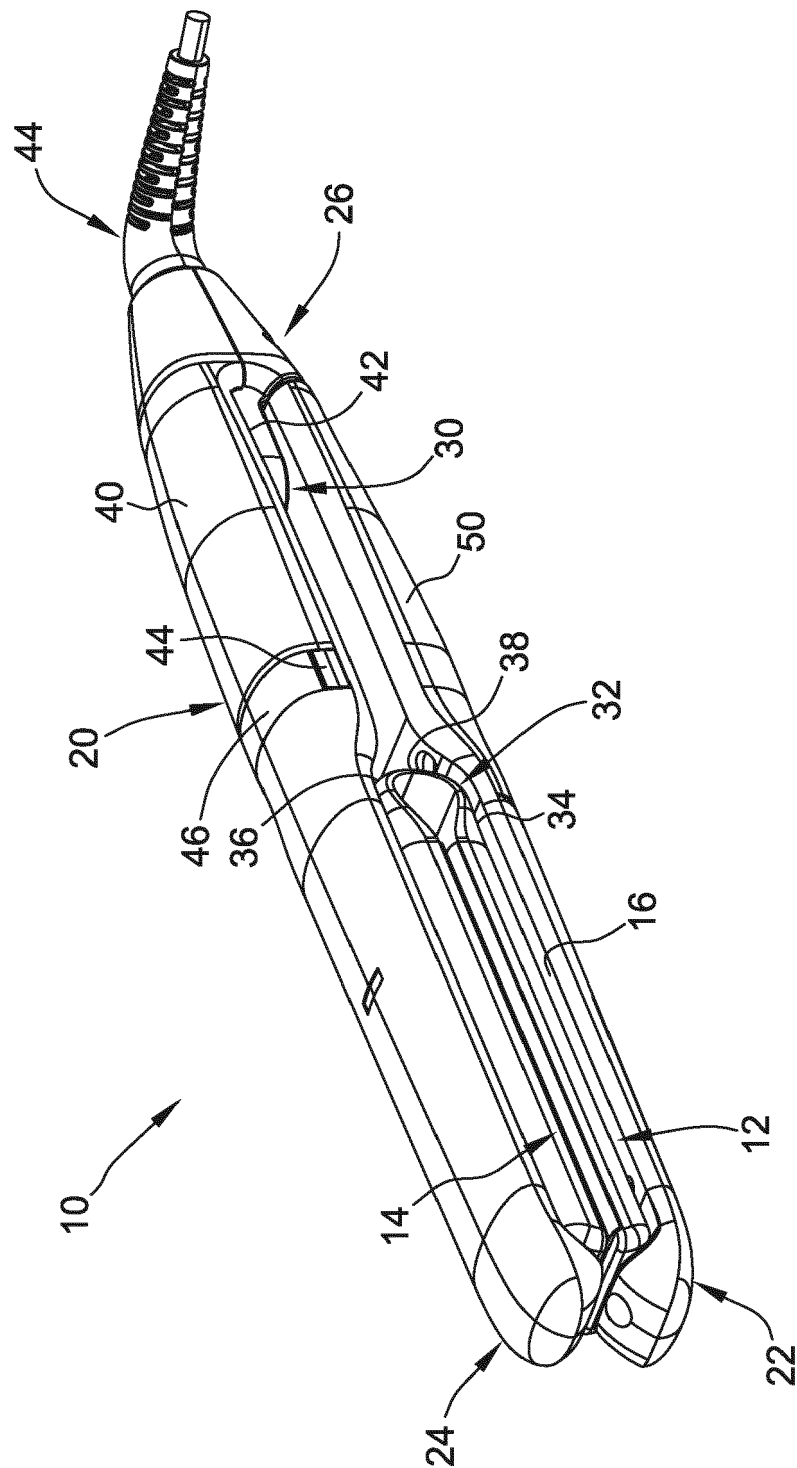


FIG. 1

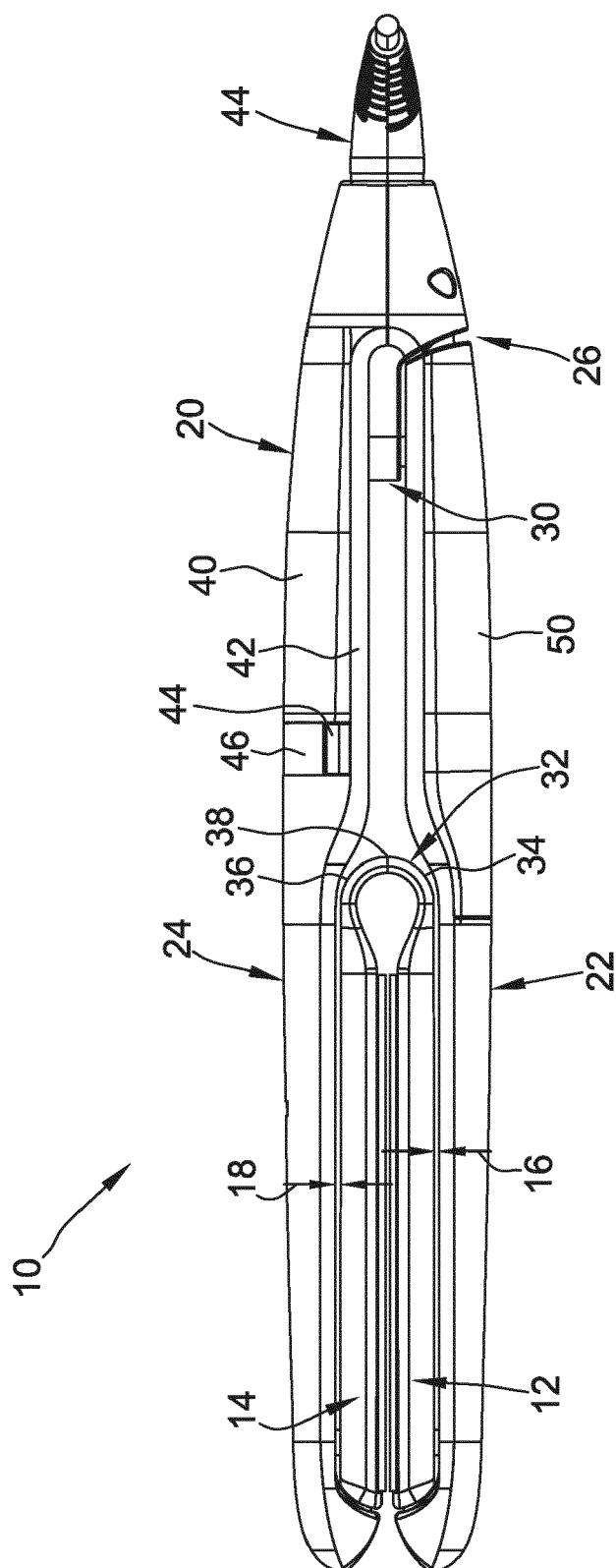


Fig. 2

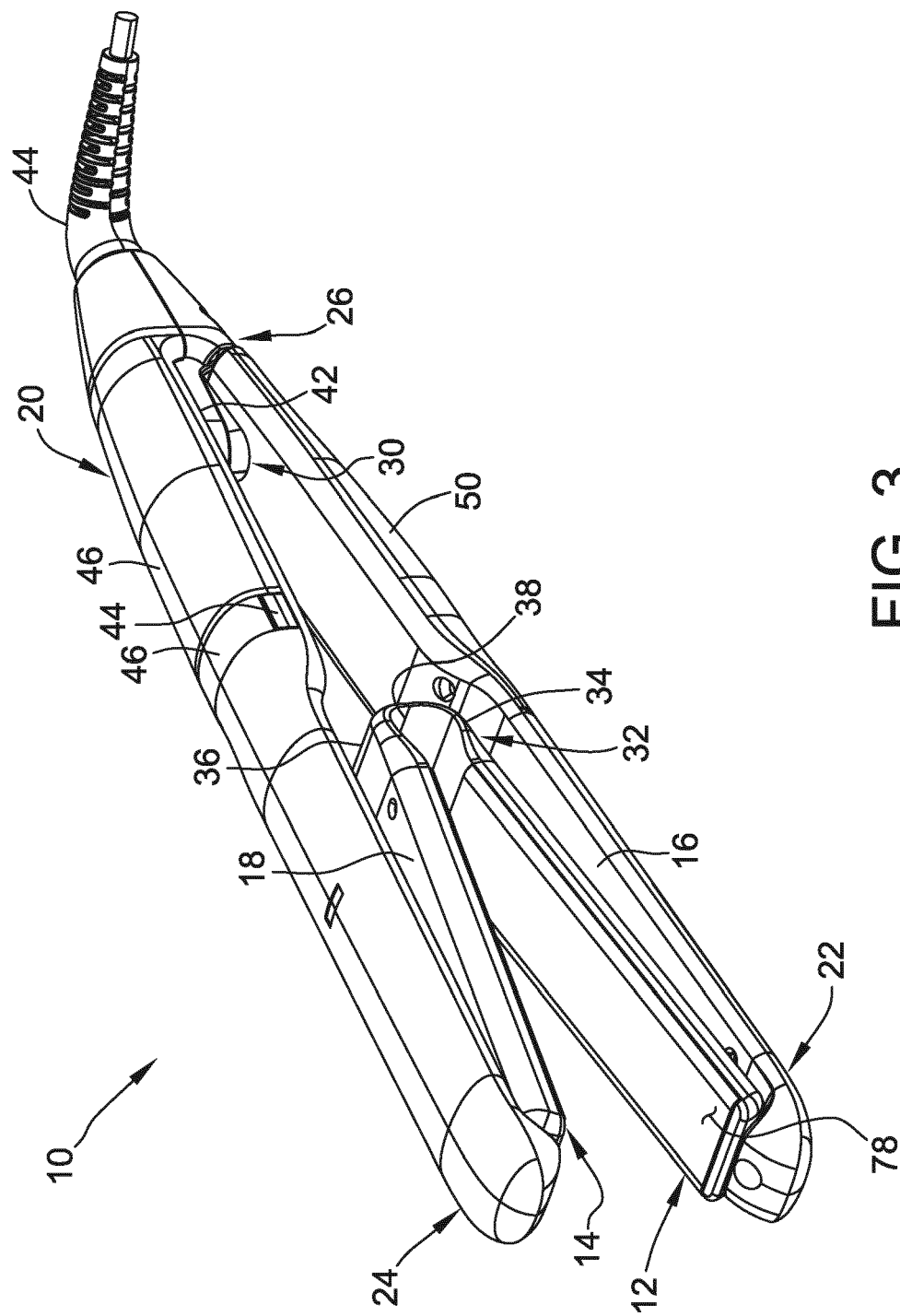


FIG. 3

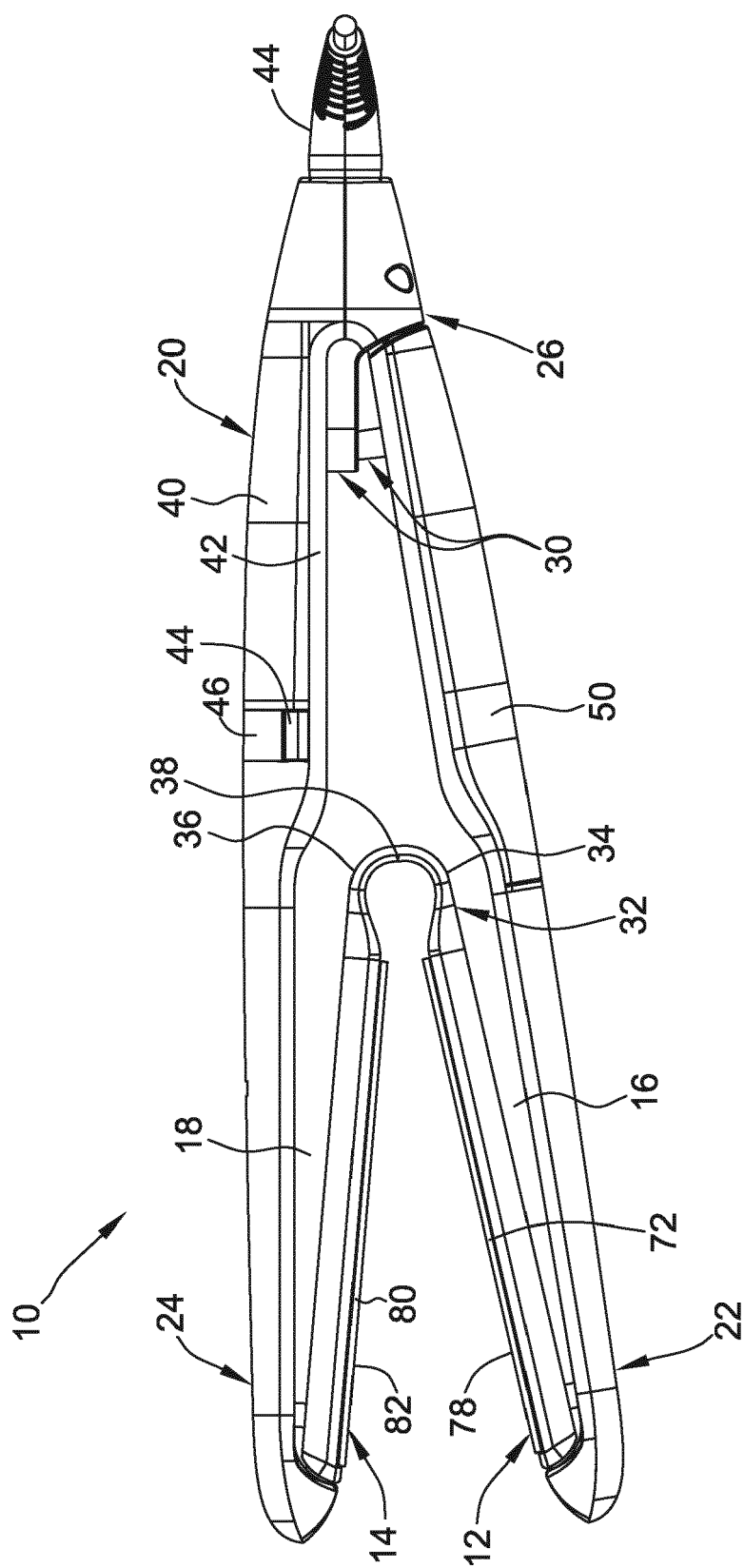


FIG. 4

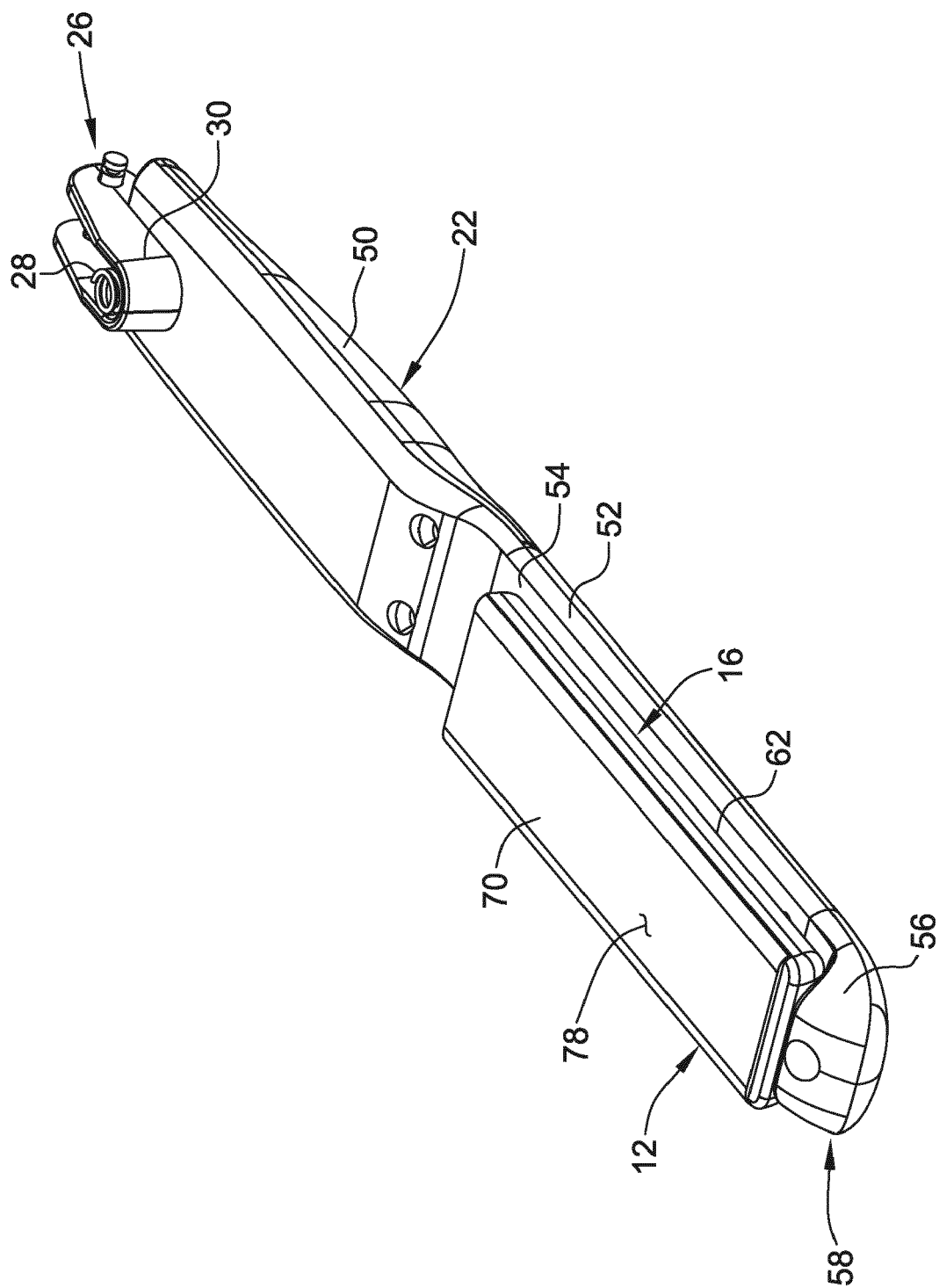
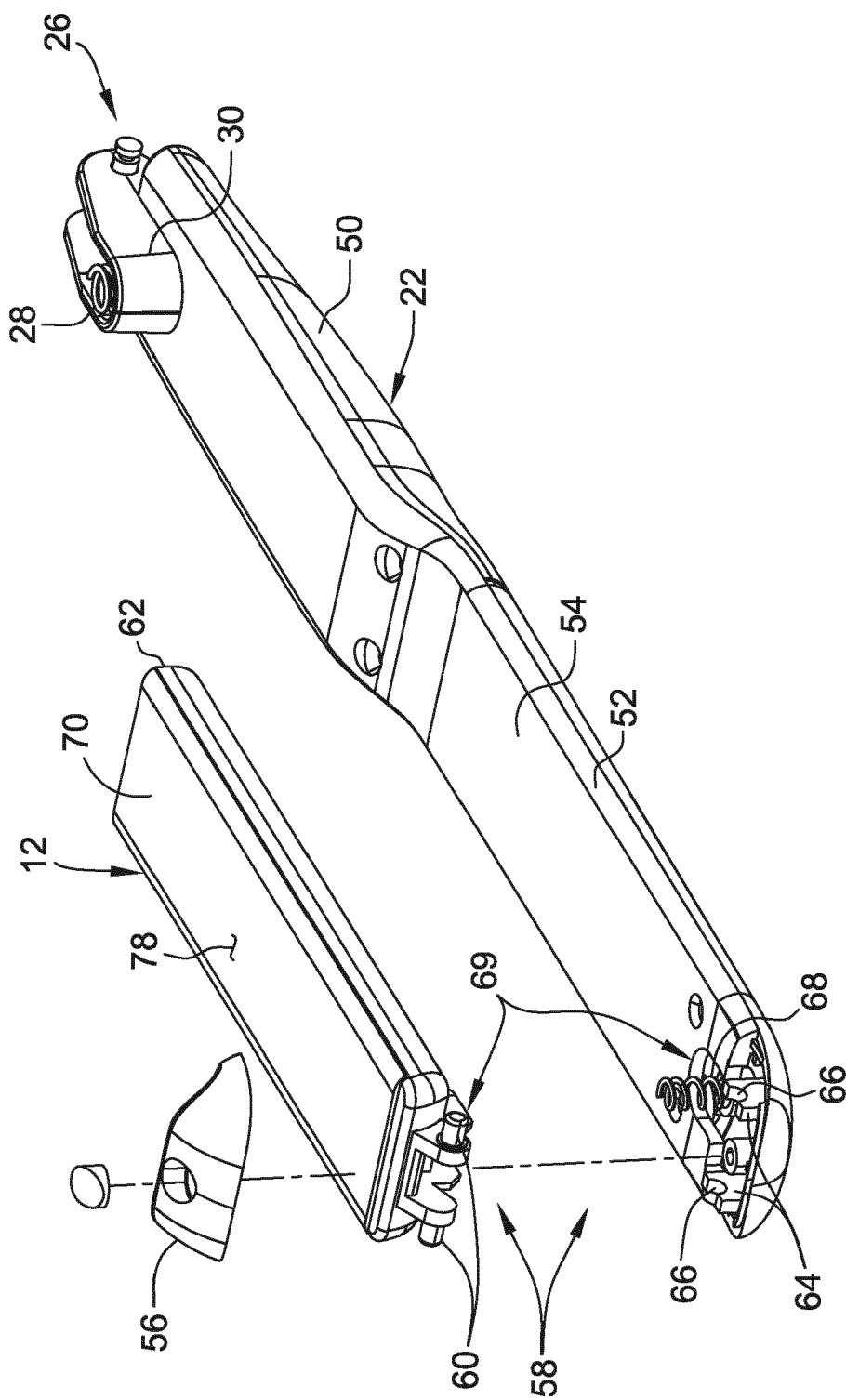


FIG. 5



6
7
8

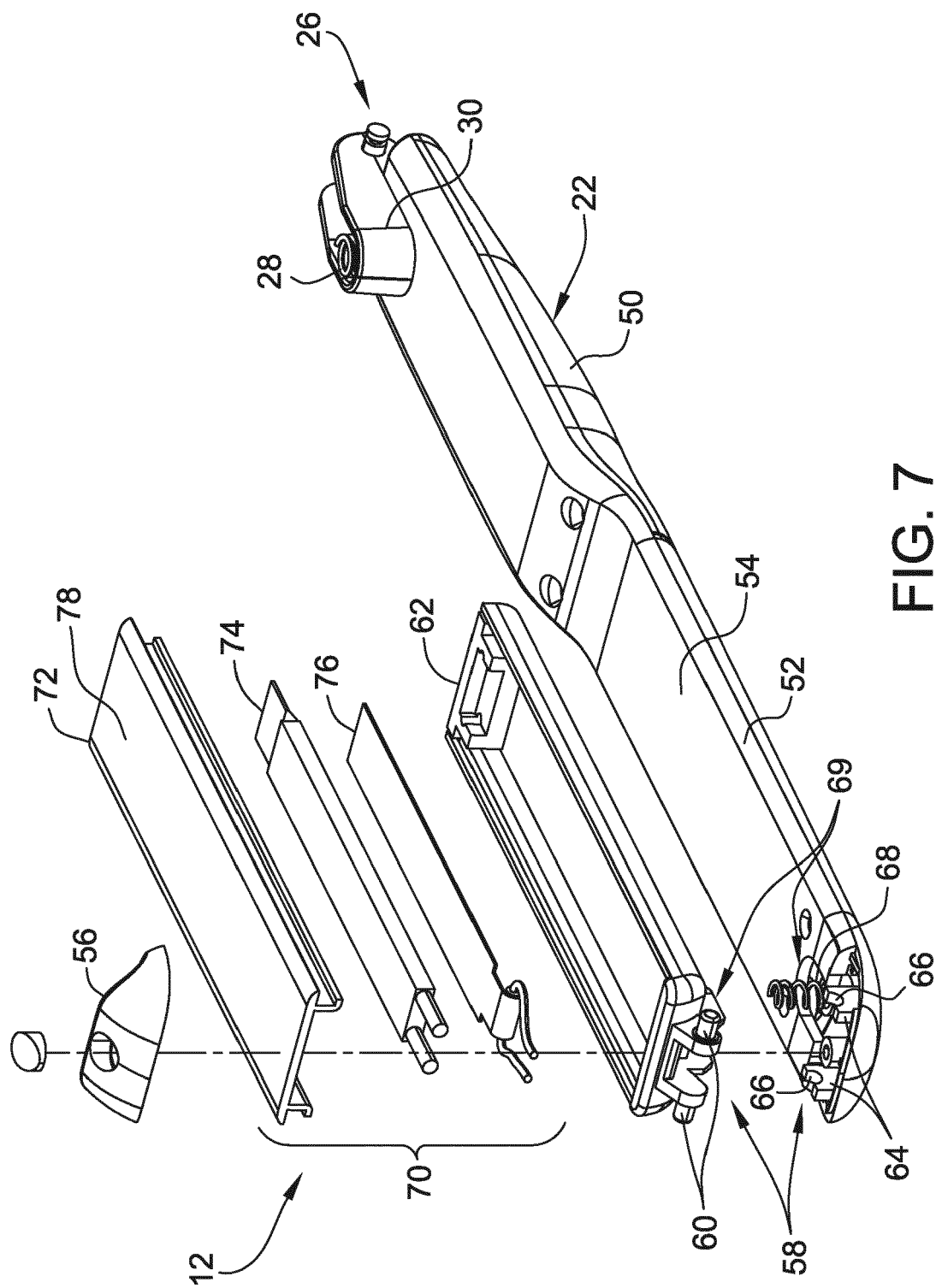


FIG. 7

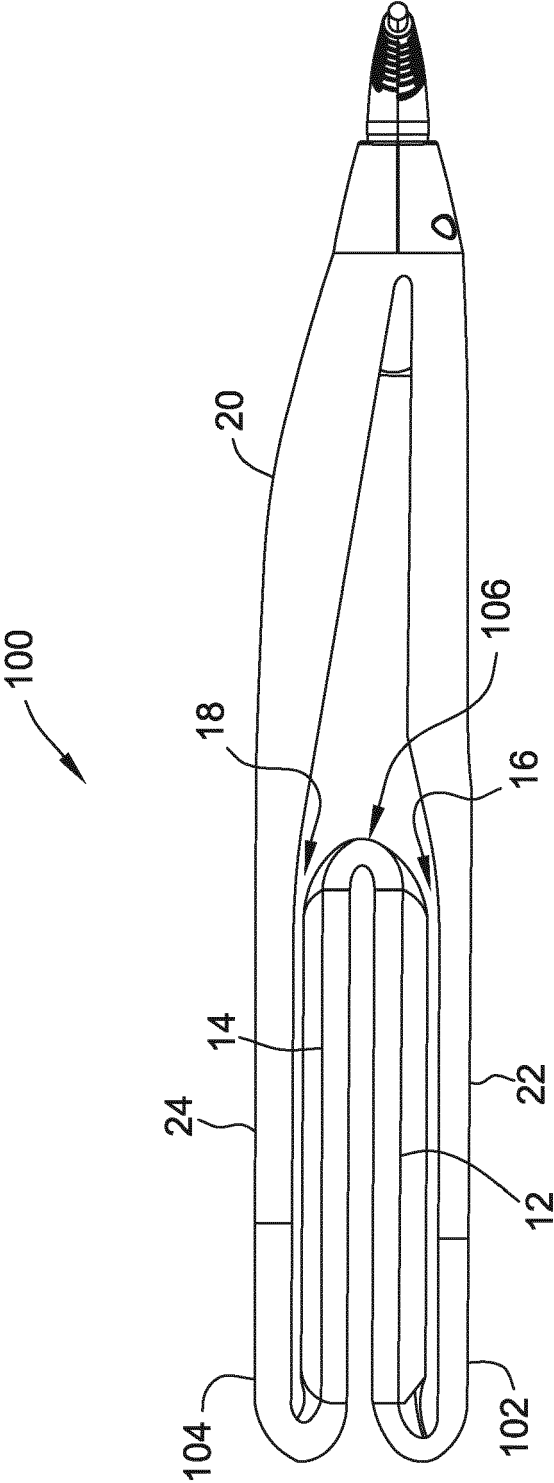


FIG. 8

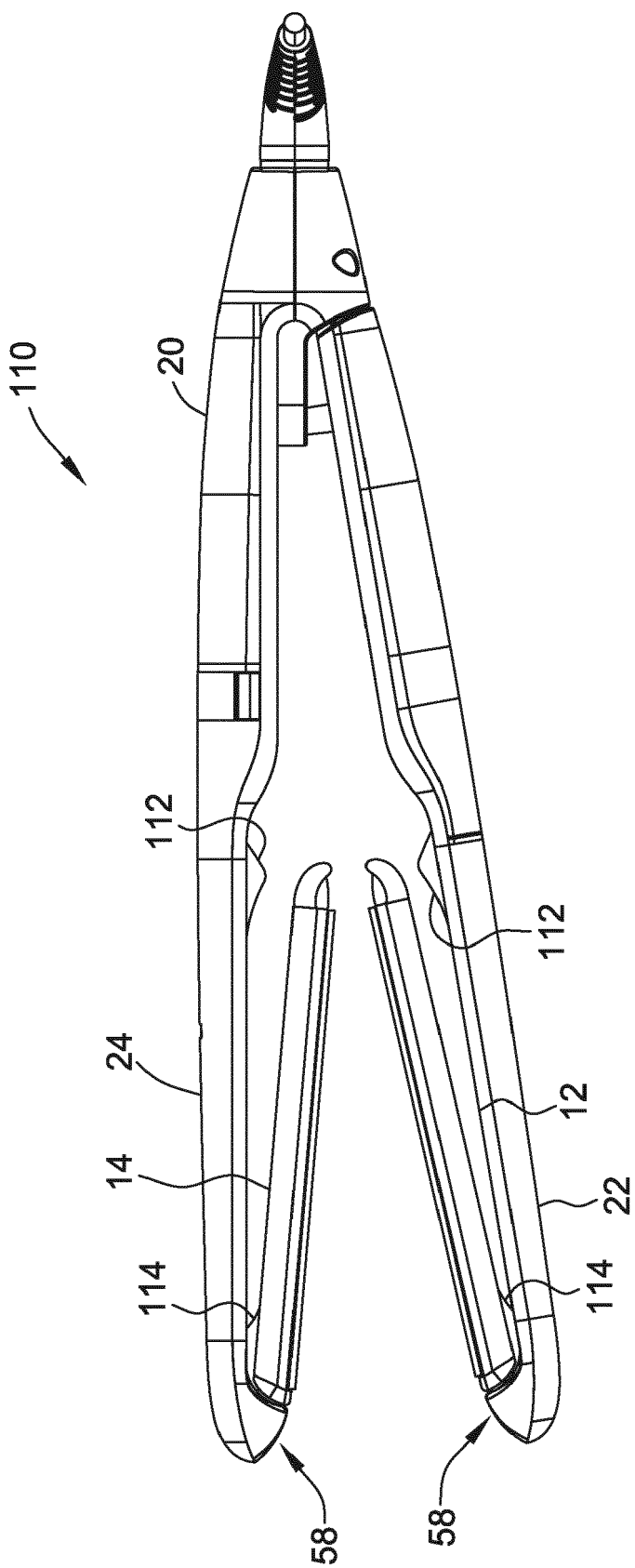


FIG. 9

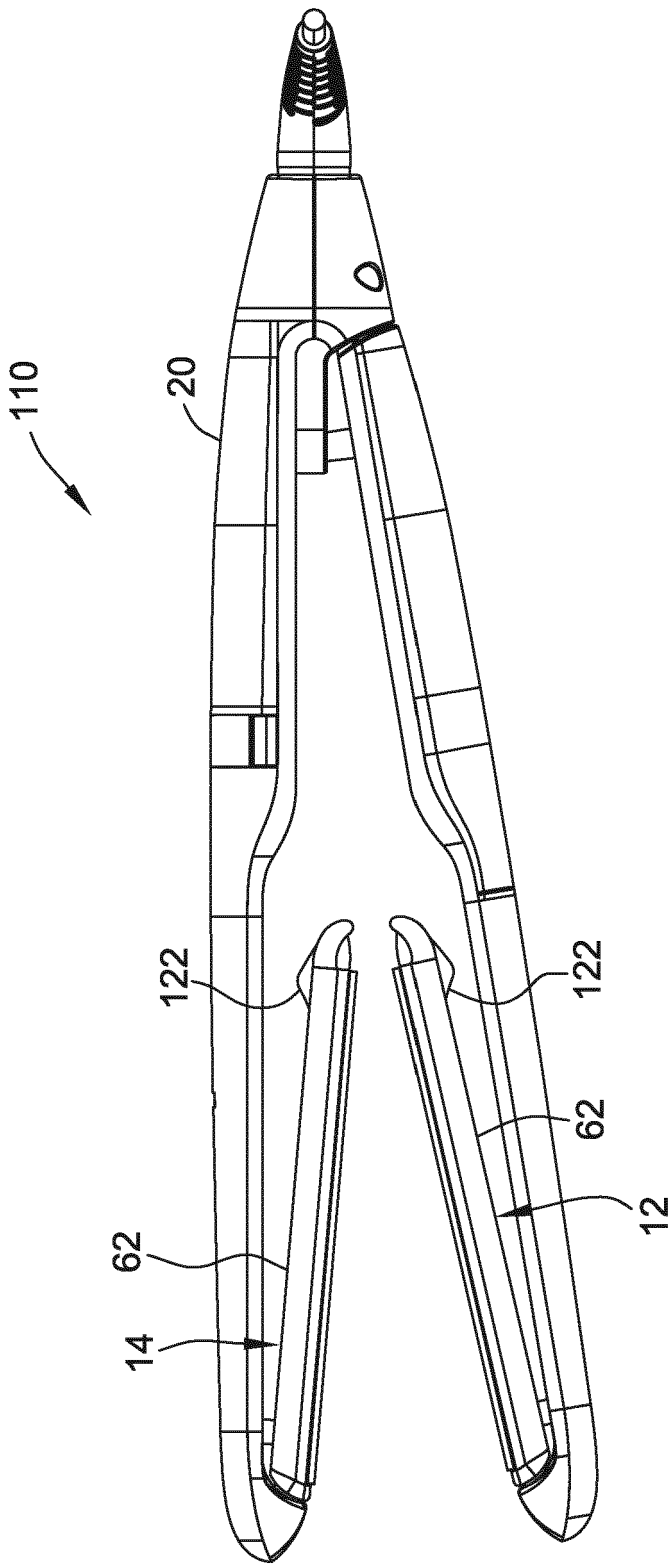


FIG. 10

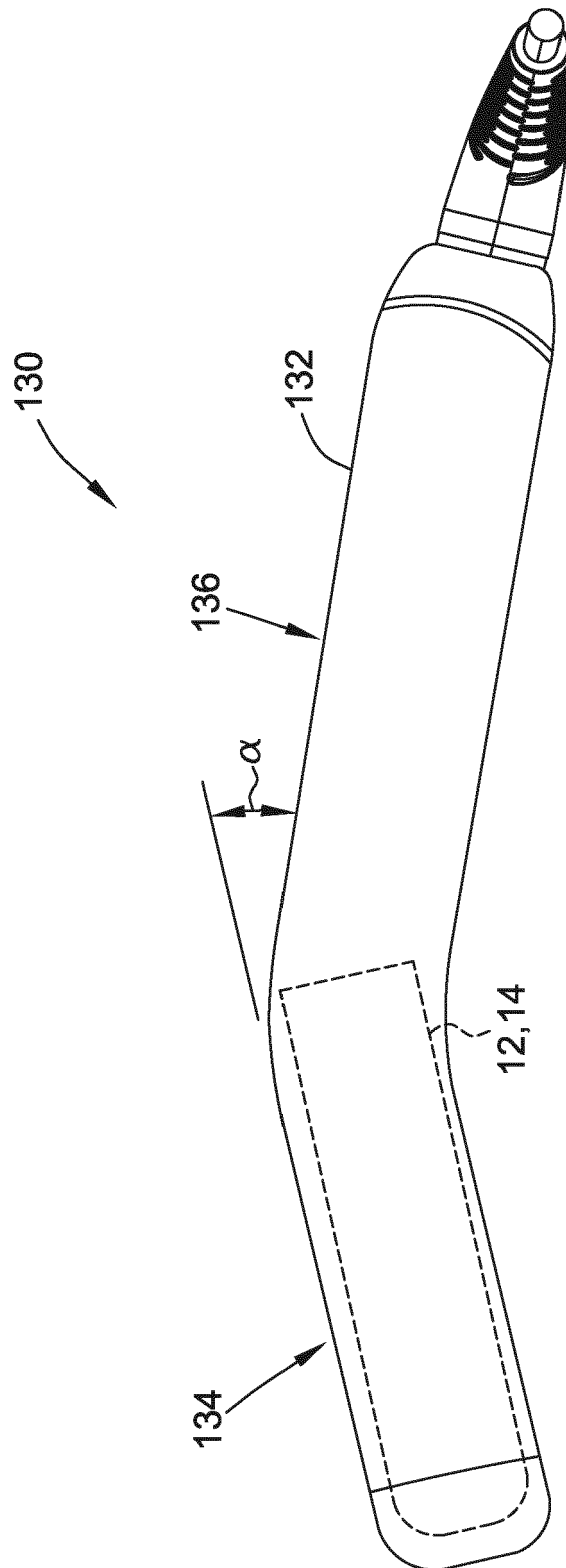


FIG. 11

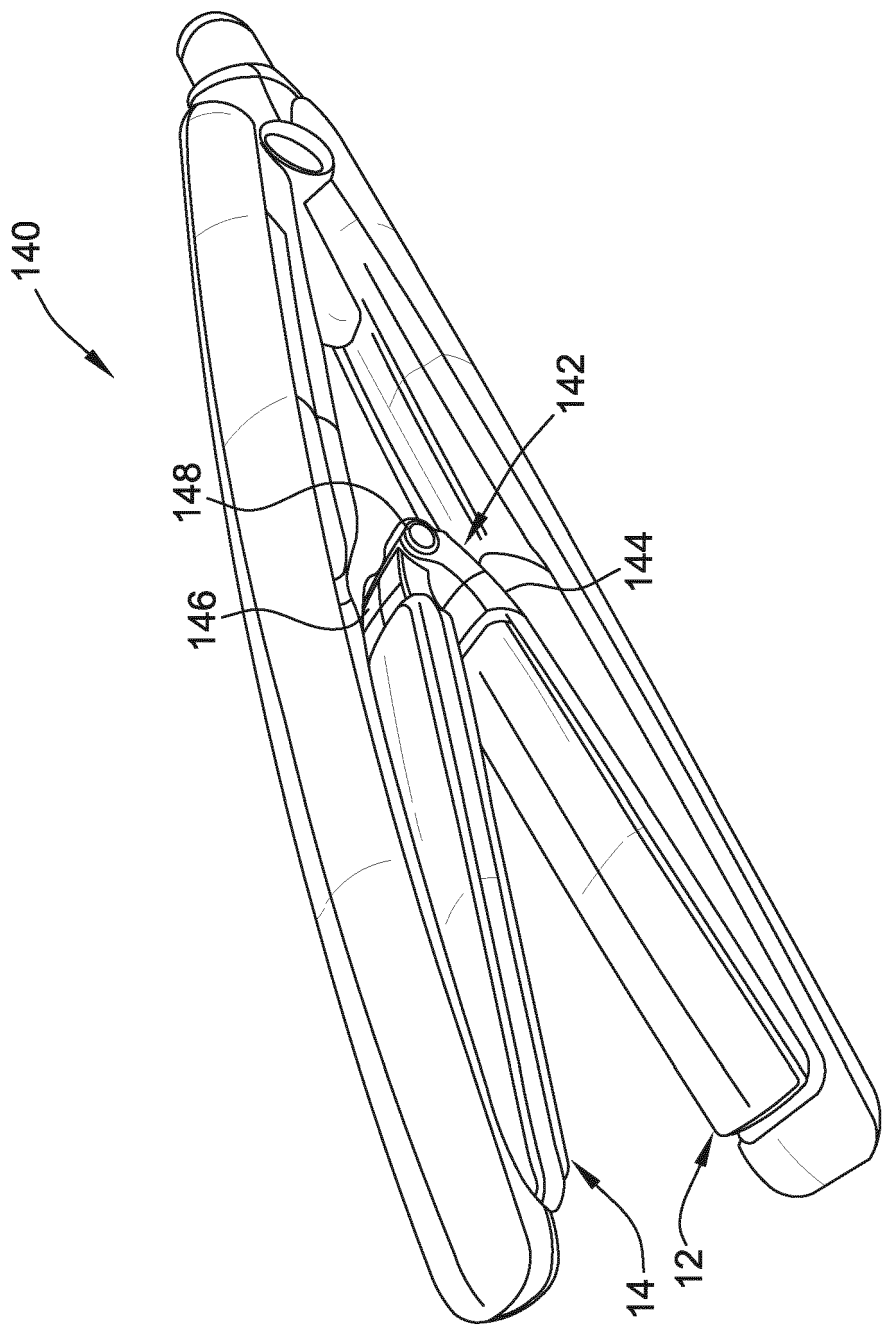


FIG. 12

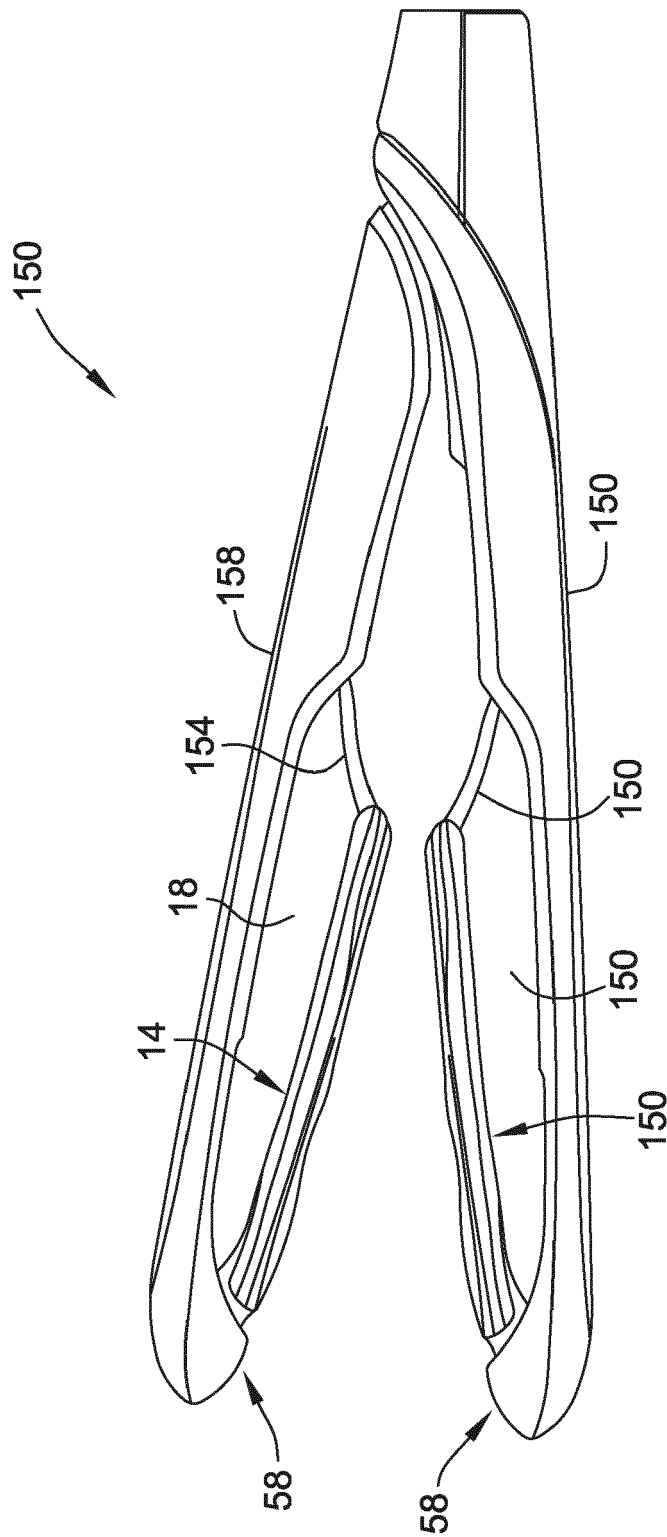


FIG. 13

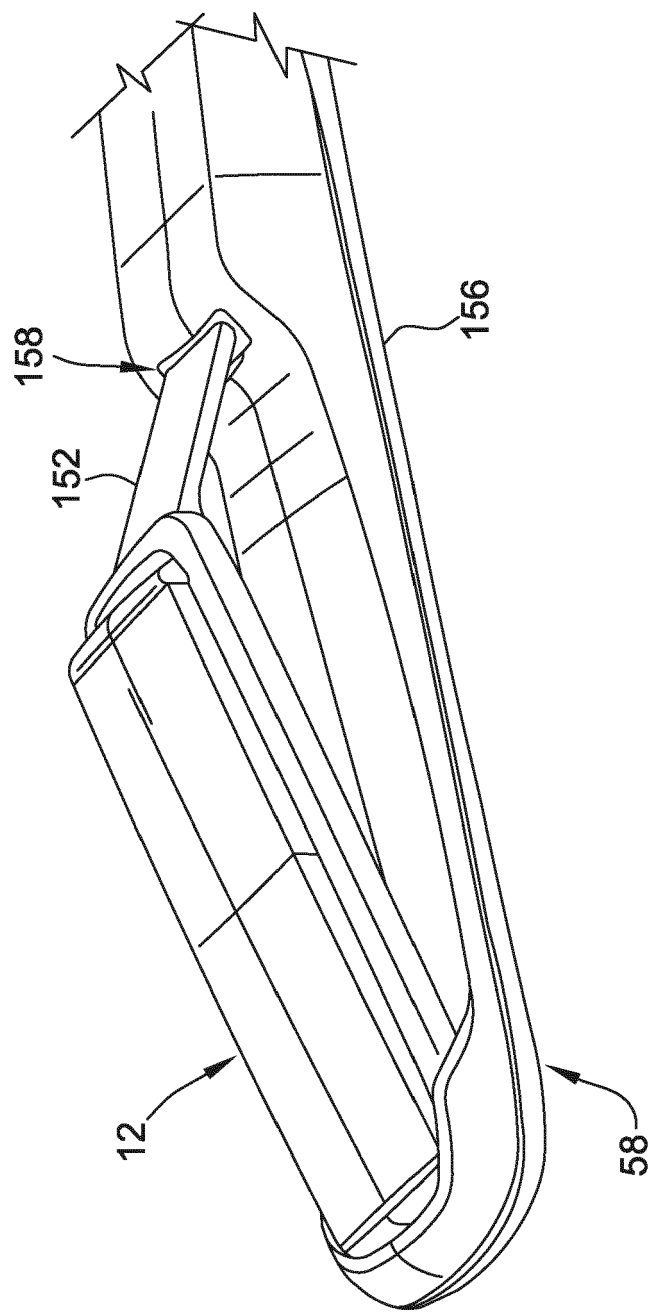


FIG. 14

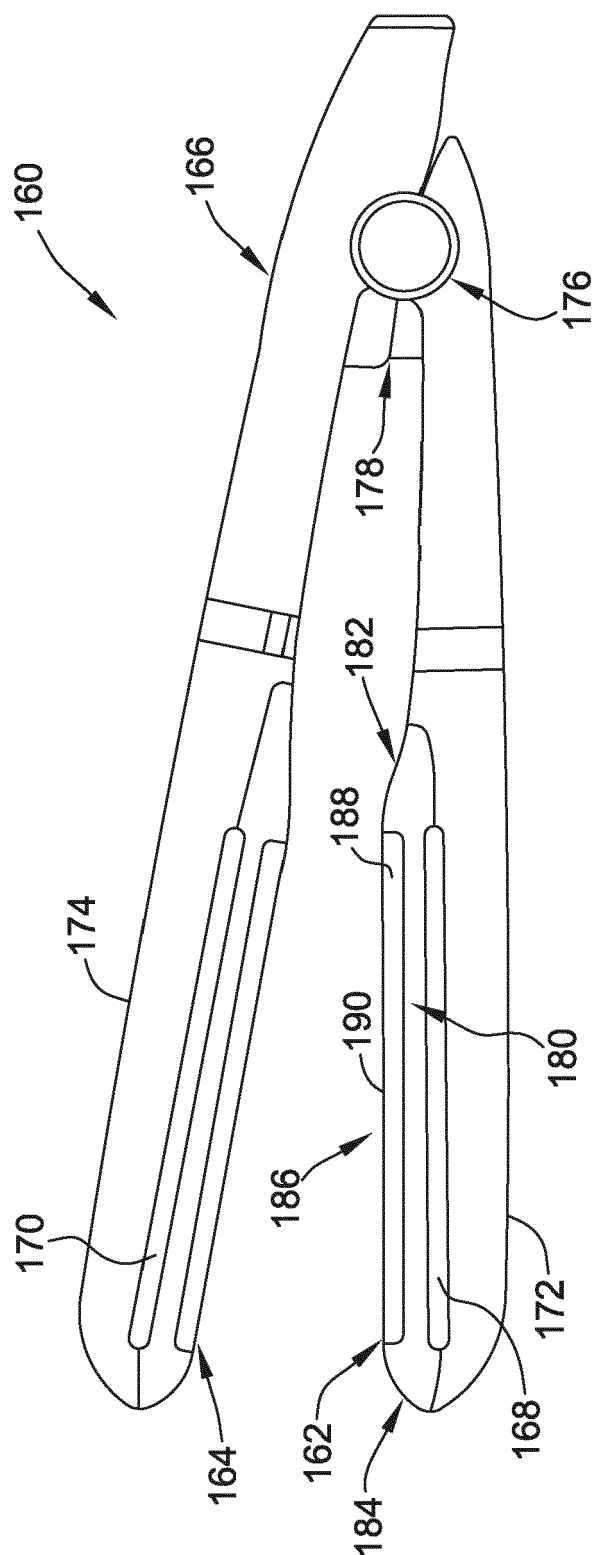


FIG. 15

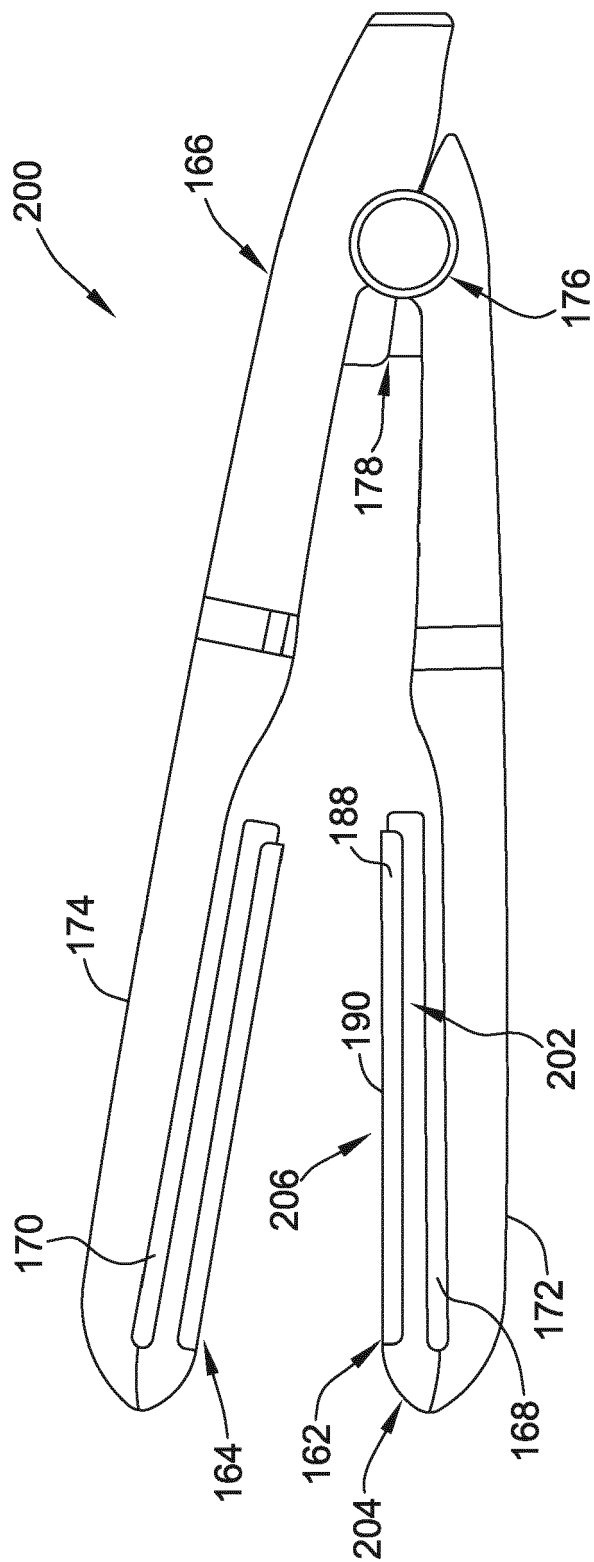


FIG. 16

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 62129335 [0001]