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(54) Hair curling device

(57) A hair curling device has a hand grip (10), and a heating barrel (20) extending from the hand grip to have a lengthwise axis. A hair clamp (30) is held by the hand grip to be moveable between a hair lamping position and a release position. The hair clamp is curved in match with the curling surface in order to curl the hair clamped between the hair lamp and the barrel. The device includes at least one negative ion generator (60) with an ion port (82) for emitting negative ions. The negative ion generator gives a cone emission axis along which the negative ions are emitted out through the ion port in an emission cone. The ion port is located at a portion offset axially from the barrel as well as offset circumferentially from the hair clamp with the cone emission axis being oriented in such a direction that the emission cone extends mainly along the axial of the barrel to cover a region outwardly of the curling surface of the barrel, i.e., the hair clamp. Thus, the negative ion generator can emit the negative ions in a concentrated manner to the hair just out of the hair clamp for adding the negative ion treatment effect to the curled hair.

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Description

TECHNICAL FIELD

[0001] The present invention is directed to a hair curling device, and more particularly to a hair curling device with a hair clamp for curling hair as well as a negative ion generator for imparting negative ions to the curled hairs.

BACKGROUND ART

[0002] Application of negative ions to hairs is known to be effective to give a well finished hair styling. The negative ions are widely recognized in the filed of air purification or environmental improvement to denote negatively charged airborne molecules mostly combined with moisture. One typical example is a hair dryer in which the negative ions are applied to the hairs being heat-treated for supplementing the hair with moisture carried on the negative ions, in addition to neutralizing the positively-charged hairs. For effectively applying the negative ions, the hair dryer is preferably designed to emit the negate ions relatively free from a hot shot of air blow in order to deliver the negative ions to the hairs without being deteriorated or collapsed by the heat. Therefore, the heat problem has to be considered when giving the effect of the negative ions to a hair curling device that applies a considerable amount of heat directly to the hair intended to be curled. This is particularly true for the curling device with a hair clamp, as disclosed in U.S. Patent No. 5, 243, 694 in which the hair clamp is placed over a heated barrel to clamp the hair therebetween for curling the hair by application of considerable amount of heat.

[0003] WO 03/061425 A1 proposes a hair iron device provided with a negative ion generator which emits the negative ions towards the volume of hair adjacent but not covered by a hair clamp. In the device, one or more negative ion generators are located on the heating barrel at portions offset laterally from the hair clamp with respect to an axis of the barrel for emitting the negative ions generally in radial directions of the barrel towards the hair out of the hair clamp. However, since the negative ion generator is normally limited to give a small range or emission cone within which the negative ions propagate relative to an effective axial length of the barrel, i.e., the width of the strand of hair wound around the barrel, it is difficult to cover the full length of the barrel with a single negative ion generator on one side of the barrel. In other words, the single ion generator is not sufficient to give the negative ion bombardment to the hair over the entire length of the barrel. Further, since the ion generators are mounted on the barrel itself, the addition of the ion generators within the length of the barrel will certainly lead to an increased bulk and complexity of the barrel.

DISCLOSURE OF THE INVENTION

[0004] In view of the above insufficiency, the present invention has been accomplished to provide an improved hair curling device which is capable of effectively applying the negative ions to hairs with a simplified arrangement of negative ion generator. The hair curling device in accordance with the present invention includes a hand grip, and a heating barrel extending from the hand grip to have a lengthwise axis. The heating barrel is configured to wind user's hair therearound and to have a rounded curling surface on a part of its circumference. A hair clamp is held by the hand grip to be moveable between a clamping position of clamping the hair on the curling surface and a release position of releasing the hair from the curling surface. The hair clamp is curved in match with the curling surface in order to curl the hair clamped between the hair lamp and the barrel. The device further includes at feast one negative ion generator with an ion port for emitting negative ions. The negative ion generator is configured to give a cone emission axis along which the negative ions are emitted through the ion port in an emission cone. The ion port is located at a portion offset axially from the barrel as well as offset circumferentially from the hair clamp with the cone emission axis being oriented in such a direction that the emission cone extends mainly along the axial of the barrel to cover a region outwardly of the curling surface of the barrel, i.e., the hair clamp. Thus, the negative ion generator can emit the negative ions in a concentrated manner over the length of the barrel to the hair just out of the hair clamp for adding the negative ion treatment effect to the curled hair.

[0005] Preferably, the negative ion generator is mounted on the hand grip adjacent to the barrel with the cone emission axis oriented radially outwardly of the barrel at an inclination angle of less than 45° with respect to the axis of the barrel within a horizontal plane which is perpendicular to a vertical plane including a width center of the hair clamp and the axis of the barrel. Accordingly, the optimal negative ion treatment is expected, in addition to that the barrel can be free from mounting the negative ion generator and therefore can be made into a simple and compact structure for curling the hair.

[0006] Further, the two negative ion generators may be mounted around the hand grip in a generally diametrically opposite relation to each other so as to apply the negative ions to the hair on both sides of the hair clamp.

[0007] In this connection, the ion port is preferred to be spaced radially outwardly of the circumference of the barrel for directing the negative ions effectively to the volume of hair around the barrel out of the hair clamp.

[0008] The heating barrel may be provided with an end cap at its axial end opposite to the hand grip. In this case, the negative ion generator may be mounted either solely on the end cap or both on the end cap and the hand grip for emitting the negative ions on the hairs over

the length of the barrel.

[0009] Further, the heading barrel may be composed of a first barrel half and a second barrel half each shaped to have a semi-circular cross section with a top rounded outer surface and a flat straightening surface. In this case, the top rounded surface of the first barrel half defines the curling surface. Likewise, the hand grip is composed of a first grip half and a second grip half which support the first barrel half and the second half barrel, respectively. The first and second grip halves are pivotally connected to each other so as to move the first barrel half between a closed position of keeping the respective flat straightening surfaces in a closely adjacent relation for straightening the hairs entrapped therebetween and an open position of releasing the hair. The first grip half is configured to carry the hair clamp as well as the negative ion generator. The negative ion generator is arranged such that the emission cone is intersected by a mating plane defined between the straightening surfaces in the closed position of the barrel so as to cover a region immediately outwardly of the straightening surfaces. Thus, the hairs just out of the flat straightening surfaces can successfully receive a considerable amount of the negative ions so as to be treated therewith over the length of the barrel for optimal hair straightening finish. The two negative ion generators are preferred to be mounted on opposite sides of the first grip half. Further, additional negative ion generator or generators are mounted on the second grip half to give a like emission cone which coves the region in an overlapping relation with the emission cone provided by the negative ion generator on the first second grip half.

[0010] These and still further advantageous feature of the present invention will become more apparent from the following detailed description of the preferred embodiment when taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

FIG. 1 is a top view of a hair curling device in accordance with a preferred embodiment of the present invention;
FIG. 2 is a front view of the hair curling device;
FIG. 3 is a sectional view of the above device;
FIG. 4 is a sectional view taken along line 4-4 of FIG. 1;
FIG. 5 is a perspective view of a negative ion generator shown with its cover removed;
FIG. 6 is a front view of the negative ion generator;
FIG. 7 is an end view of the negative ion generator;
FIG. 8 is a sectional view taken along line 8-8 of FIG. 7;
FIG. 9 is a top view of a modification of the above device.
FIG. 10 is a top view of a hair curling device in accordance with another preferred embodiment of the present invention;
FIG. 11 is a front view of the hair curling device;
FIG. 12 is a sectional view of the device in its open position; and
FIG. 13 is a front view of a modification of the above device.

BEST MODE FOR CARRYING OUT THE INVENTION

[0012] Now referring to FIGS. 1 to 4, there is shown a hair curling device in accordance with a preferred embodiment of the present invention. The hair curling device includes a hand grip **10**, a heating barrel **20** extending coaxially from one axial end of the hand grip **10** to have a lengthwise axis, and a hair clamp **30** supported to the hand grip **10** for clamping user's hair on a portion of the heating barrel **20**. The heating barrel **20** is made of a metal cylinder and incorporates an electric heater **40** for heating the entire circumference of the barrel. The hair clamp **30** is composed of a metal-made tongue **34** extending substantially the full length of the barrel **20** and a handle **36** holding the one end of the tongue **34.** The handle **36** includes a pivot **38** which is supported to the hand grip **10** adjacent to the axial end of the barrel so that the hair clamp **30** is movable between a clamping position where the tongue **34** is placed over the peripheral portion of the barrel **20** for clamping the hair therebetween and a release position where the tongue **34** is away from the barrel for releasing the hair. A bias spring **39** is provided inside of the handle **36** to urge the hair clamp towards to the clamping position. The tongue **34** is curved in conformity with the portion of the circumference of the barrel **20** to clamp the hair around the portion of the barrel for curling the hair. In this sense, the curved portion of the barrel **20** is defined as a curling surface **24**.

[0013] An end cap **50** is provided at the distal axial end of the barrel **20** to constitute a water tank holding a volume of water which is supplied for contact with the heater **40** to thereby generate steam that is discharged through a plurality of vents formed in the barrel **20** to the clamped hair. The tongue **34** of the clamp **30** is formed with escape holes **35** in staggered relation to the vents for escaping the steam.

[0014] The hand grip **10** is also configured to mount two negative ion generators **60** at its one end adjacent to the barrel **20** for spraying negative ions to the hairs being clamped for curling, particularly to the volume of hair out of the hair clamp **30**, i.e., the curling surface **24** of the barrel **20** in order to give smoothed finish to the curled hair. A switch **14** is provided on the hand grip **10** to heat the barrel **20** with activating or deactivating the negative ion generators.

[0015] As shown in FIGS. 5 to 8, the negative ion generator **60** includes a dielectric base **62** carrying a needle electrode **70** and a ground electrode **74**, and a dielectric cover **80** which is assembled to the base to form a shell concealing therein the electrodes **70** and **74**. The needle

electrode **70** has a pointed tip at its front end and is provided at its rear end with a voltage terminal **71** for connection with a wire **72** leading to a voltage output of a high voltage generating circuit **90** accommodated within the grip **10.** The needle electrode **70** extends along the length of the base **62** with its pointed tip receded from the front edge of the base **62**. The ground electrode **74** is disposed at the front end of the base **62** in a forwardly spaced relation to the pointed tip of the needle electrode **70** and is provided with a ground terminal **75** for connection with a ground wire **76** leading to a ground of the high voltage generating circuit **90**. As shown in FIG. 6, the high voltage generating circuit **90** applies a high voltage, for example, - 5 kV to the needle electrode **70** relative to the ground electrode **74**, thereby developing the corona discharge between the electrodes to negatively charge the particles present in the surrounding air for generating negatively charged ions around the pointed tip of the needle electrode **70**. The negative ions are attracted towards the ground electrode **74** to move in a forward direction past the ground electrode **74** and is caused to emit through an ion port **82** formed in the front end of the cover **80**. Thus, the negative ions are forced out through the ion port **82** and directed along a cone emission axis (E) to emit within an emission cone having a cone angle (γ) of about 30° to 100°, as shown in FIGS. 1 and 2. Although not shown in the figures, the negative ion generator **60** may be configured to incorporate a fan which gives an additional force for emitting the negative ions out through the ion port.

[0016] The negative ion generators **60** thus configured are mounted on the hand grip **10** at portions offset axially from the barrel **20**, as shown in FIGS. **1** and 2, and offset circumferentially from the hair clamp **30**, as shown in FIG. 4, in order to emit the negative ions mainly along the axial length of the barrel **20** towards regions on opposite sides of the hair clamp **30** or the curling surface **24**. Also, the ion port **82** is offset radially outwardly by a distance (D) of 5 to 20 mm from the circumference of the barrel **20** and is oriented radially outwardly of the barrel **20** to have the cone emission axis (E) inclined at an angle (θ) of 10° to 45° with respect to the axis of the barrel **20** within a horizontal plane, as shown in FIGS. 1 and 4. The horizontal plane is defined as a plane in which the two negative ion generators **60** are disposed or a plane perpendicular to a vertical plane passing through a width center of the tongue **34** of the hair clamp **30** and through the axis of the barrel **20**. As shown in FIG. 2, the cone emission axis is approximately aligned with the axis of the barrel **20** within the vertical plane. Thus, the emission cone covers the region immediately outwardly of barrel **20**, particularly outwardly of the curling surface **24** and the hair clamp **30**, assuring to spray the negative ions over the hair out of the tongue **34** of the clamp **30** along the full length of the barrel **20**. This arrangement can minimize the amount of the negative ions being unintentionally attracted to the heated barrel surface, thereby concentrating the negative ions to the hair.

[0017] In order to enhance the adhesion of the negative ions to the hair, the hand grip **10** is provided with a positive electrode **16** for direct contact with a user's hand holding the grip **10.** The positive electrode **16** is electrically connected to a voltage source within the grip **10** to charge the user's body to positive so that the negative ions can be attracted to the positively charged hair.

[0018] As shown in FIG. 9, the device may be modified to have one or more negative ion generators **60** on the end cap **50** either in addition to or in place of those mounted on the hand grip **10**. The negative ion generators **60** on the end cap **50** are arranged to have their respective ion ports directed mainly axially towards the hand grip **10.** When negative ion generator **60** are mounted on both of the hand grip **10** and the end cap **50**, the individual emission cones overlaps at the regions immediately outwardly of the tongue **34** of the clamp **30** over a major length of the barrel **20**, thereby applying the negative ions concentratedly to the volume of the hair just out of the clamp **30**. In this modification, the negative ion generators **60** on the end cap **50** are set to have their cone emission axes also inclined at an angle (θ) of 10° to 45° with respect to the axis of the barrel **20** within the horizontal plane in much the same way as the ion generators on the hand grip **10**.

[0019] FIGS.10 to 12 illustrates another embodiment of the present invention which is basically identical to the above embodiment except that the device is added with a function of straightening the hair. Like parts are designated by like reference numerals with a suffix letter of "A" and no duplicate explanation is deemed necessary. The hand grip 10A is composed of two grip haves 11 and **12** which are pivotally connected to each other, while the barrel **20A** is composed of two barrel halves **21** and **22** which extend respectively from the grip halves **11** and **12**. Each of the barrel halves **21** and **22** is shaped to have a semi-circular cross section with a rounded surface and a flat surface, and accommodates therein the electric heater **40A**. The hair clamp **30A** is pivotally supported to the grip half **11** to have its tongue **34A** placed over the rounded surface of the barrel half **21**, precisely the curling surface **24A** on a part of the rounded surface for curing the hairs clamped therebetween. In association with the pivot movement of the grip halves **11** and **12,** the barrel halves **21** and **22** assumes a closed position of bringing the individual flat surfaces in close relation with the each other to clamp the hair therebetween for straightening the hair, and an open position of releasing the hair. In this sense, the flat surfaces are referred to as the straightening surface and designated collectively by reference numerals **"25"**.

[0020] The barrel halves **21** and **22** are fitted at their distal end respectively with end caps **51** and **52** of dielectric material. The end cap **51** is in the form of the water tank containing the volume of water which is supplied for contact with the heater **40A** to generate the steam. The tank **51** includes a wick **53** carrying the water and

is slidable connected to the barrel half **21** with a spring interposed between. Upon the tank **51** being depressed, the wick **53** comes into contact with the heater **40A** to generate the steam which goes through vents in the periphery of the barrel half **21** to moisten the hair clamped between the barrel half **21** and the tongue **34A** of the clamp **30A.** The tongue **34A** is formed with a plurality of escape holes which are staggered with the vents for escaping the steam. The positive electrode **16A** is formed on the grip half **11** for charging the user's hair to positive.

[0021] In this embodiment, the negative ion generators **60A** are mounted on the grip half **11** adjacent to the barrel half **21** at locations offset axially from the barrel half **21** and offset radially from the hair clamp **30A**. The ion port **82A** is oriented to have its cone emission axis (E) inclined at an angle (θ) of 10° to 45° with respect to the axis of the barrel **20** within the horizontal plane, as shown in FIG. 10, and also inclined at a small angle (ω) of 2° to 30° with respect to the axis of the barrel within the vertical plane, as shown in FIG. 11. It is noted that the vertical plane is normal to a mating plane defined between the closed straightening surfaces **25**. Since the mating plane extends in the horizontal plane in alignment with the axis of the barrel **20A**, the cone emission axis (E) is naturally inclined at the small angle (ω) of 2° to 30° with respect to the mating plane or a mating line between the straightening surfaces **25**. With this result, the emission cone is intersected by the mating plane at an optimum angle and therefore can certainly cover a region immediately outwardly of the straightening surfaces for imparting the negative ion treatment successfully to the hair out of the straightening surfaces, in addition to cover the region outwardly of the tongue **34A.**

[0022] As shown in FIG. 13, the device may be modified to have additional negative ion generators **60A** also on the grip half **12** adjacent to the associated barrel half **22**. The additional negative ion generators **60A** are oriented to have the individual cone emission axes inclined oppositely to the negative ion generators on the grip half **11** so that the emission cones provided by the generators on both of the grip halves **11** and **12** can overlap immediately adjacent to the straightening surfaces **25**, thereby concentrating the negative ions to the regions immediately outwardly of the straightening surfaces for optimal negative ion treatment. Further, the negative ion generators may be mounted either alone on the end cap or in addition to those on the hand grip.

[0023] The above embodiments and modifications are illustrated only for the purpose of easy understanding of the subject matter of the present invention. Therefore, any combination of the features disclosed herein is also encompassed within the present invention.

[0024] The features disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

Claims

1. A hair curling device comprising:

a hand grip (10; 10A);
a heating barrel (20; 20A) extending from said hand grip to have a lengthwise axis; said heating barrel being configured to wind user's hair therearound and to have a rounded curling surface (24; 24A) on a part of its circumference;
a hair clamp (30; 30A) held by said hand grip to be movable between a clamping position of clamping the hair on said curling surface and a release position of releasing the hair from the curling surface, said hair clamp being curved in match with said curling surface in order to curl the hair clamped between the hair clamp and the barrel;

characterized in that
said device includes at least one negative ion generator (60; 60A) with an ion port (82) for emitting negative ions therefrom, said negative ion generator configured to have a cone emission axis along which said negative ions are emitted out through said ion port in an emission cone;
said ion port is located at a portion offset axially from said barrel as well as offset circumferentially from said hair clamp with said cone emission axis being oriented in such a direction that said emission cone extends mainly along said axis of the barrel to cover a region outwardly of said curling surface.

2. The hair curling device as set forth in claim 1, wherein
said negative ion generator are mounted on said hand grip adjacent to said barrel with said cone emission axis oriented radially outwardly of said barrel at an inclination angle (θ) of less than 45° with respect to the axis of said barrel within a horizontal plane which is perpendicular to a vertical plane passing through a width center and said axis of the barrel.

3. The hair curling device as set forth in claim 2, wherein
two said negative ion generator is mounted around said hand grip in a generally diametrically opposite relation from each other.

4. The hair curling device as set forth in claim 2, wherein
said ion port is spaced radially outwardly from the circumference of said barrel.

5. The hair curling device as set forth in claim 1, wherein
said heating barrel is provided with an end cap (50;

50A) at its axial end opposite to said hand grip, said negative ion generator being mounted on said end cap.

6. The hair curling device as set forth in claim 1, wherein
said heating barrel (20A) comprises a first barrel half (21) and a second barrel half (22) each shaped to have a semi-circular cross section with a top rounded outer surface and a flat straightening surface (25), the top rounded surface of said first barrel half giving said curling surface,
said hand grip comprises a first grip half (11) and a second grip half (12) which support said first barrel half and said second half barrel, respectively, said first and second grip halves being pivotally connected to each other so as to move the first barrel half between a closed position of keeping the respective flat straightening surfaces in a closely adjacent relation for straightening the hairs entrapped therebetween and an open position of releasing the hair,
said first grip half carrying said hair clamp (30A) as well as said negative ion generator (60A),
said negative ion generator being arranged such that said emission cone is intersected by a mating plane defined between the straightening surfaces in the closed position of said barrel so as to cover a region immediately outwardly of said straightening surfaces.

7. The hair curling device as set forth in claim 6, wherein
said negative ion generator (60A) is mounted on said hand grip adjacent to said barrel with said cone emission axis oriented radially outwardly of said barrel at an inclination angle (θ) of less than 45° with respect to the axis of said barrel within a horizontal plane which is perpendicular to a vertical plane passing through a width center and said axis of the barrel,
said cone emission axis also inclined at an inclination angle (ω) of less than 30° with respect to the axis of said barrel within said vertical plane.

8. The hair curling device as set forth in claim 6, wherein
two said negative ion generators (60A) are mounted on opposite sides of said first grip half (11).

9. The hair curling device as set forth in claim 6, wherein
said second grip half (12) carries like negative ion generator (60A) which gives an emission cone covering said region in an overlapping relation with said emission cone given by said negative ion generator on said first grip half.

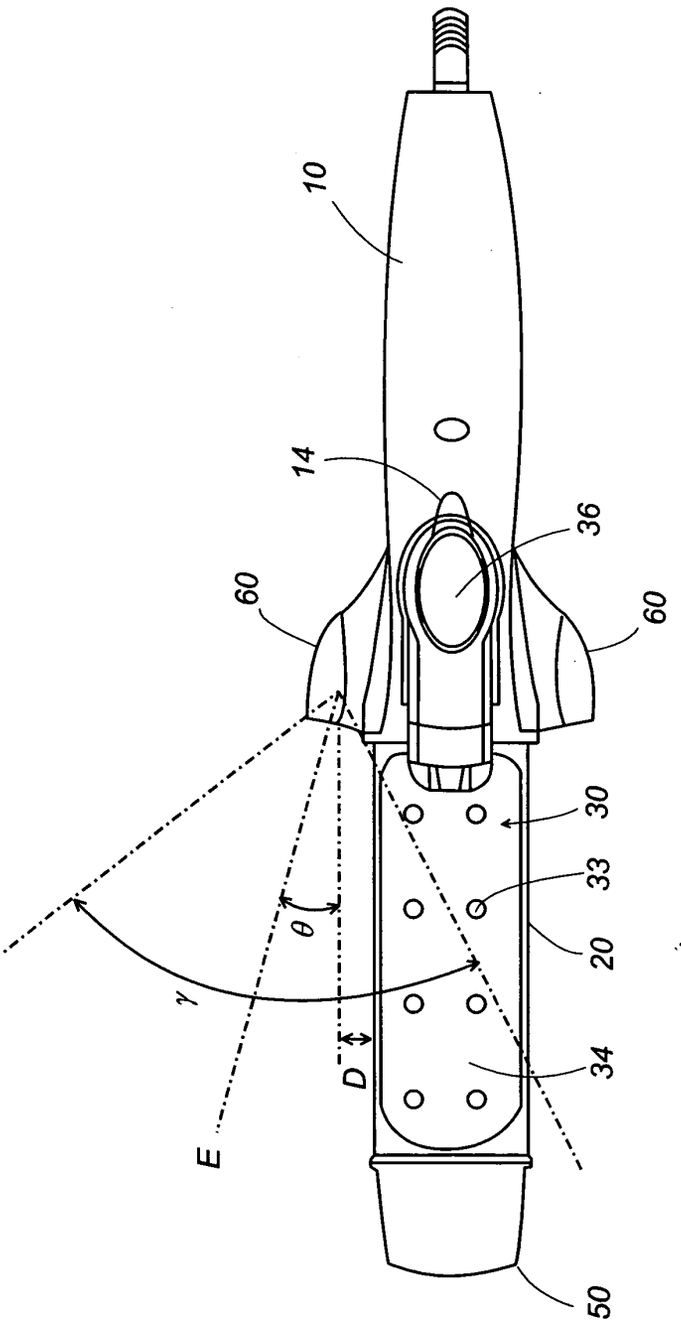


FIG. 1

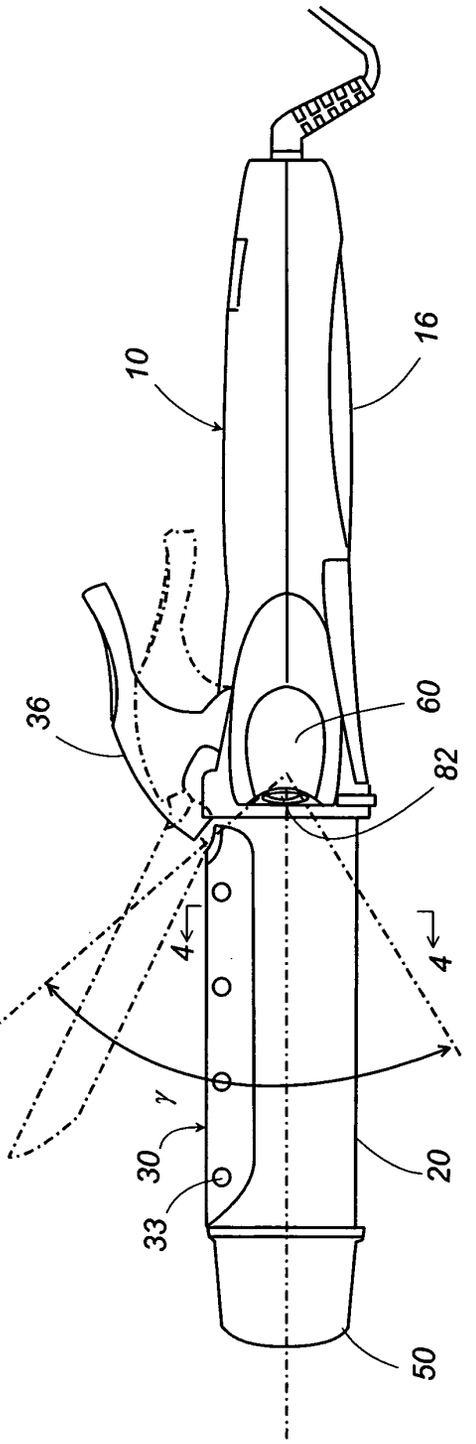


FIG. 2

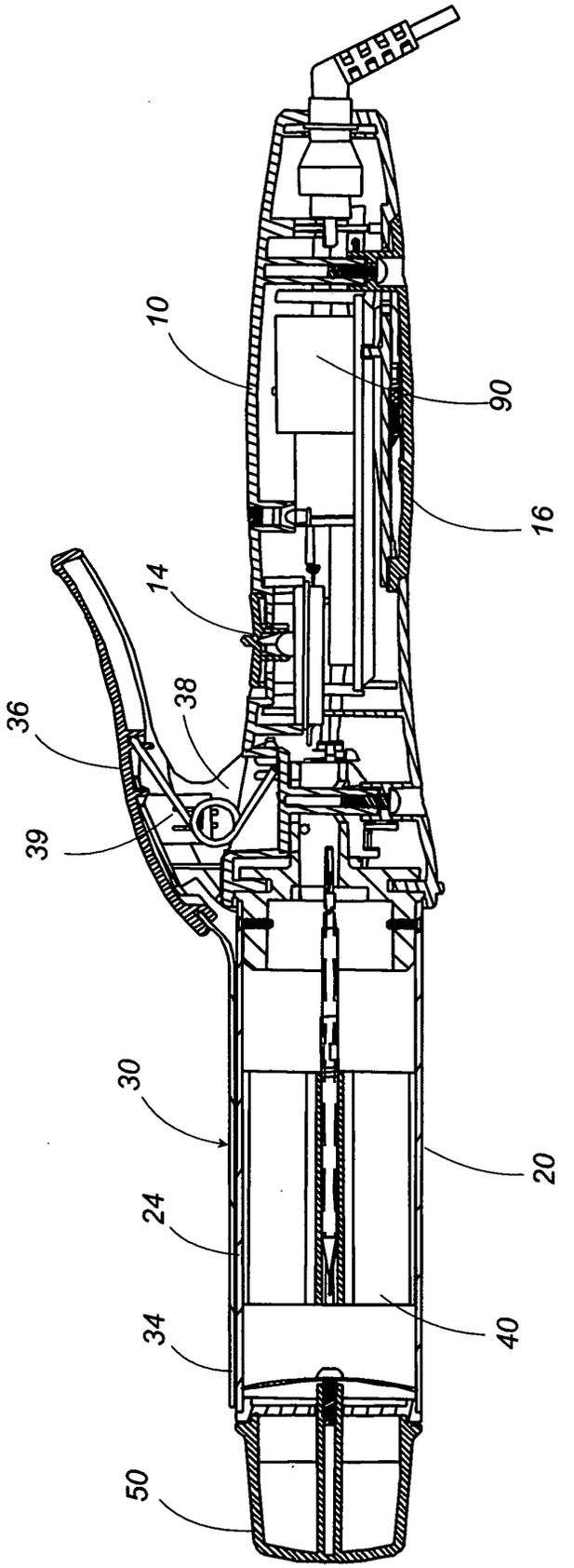


FIG. 3

FIG. 4

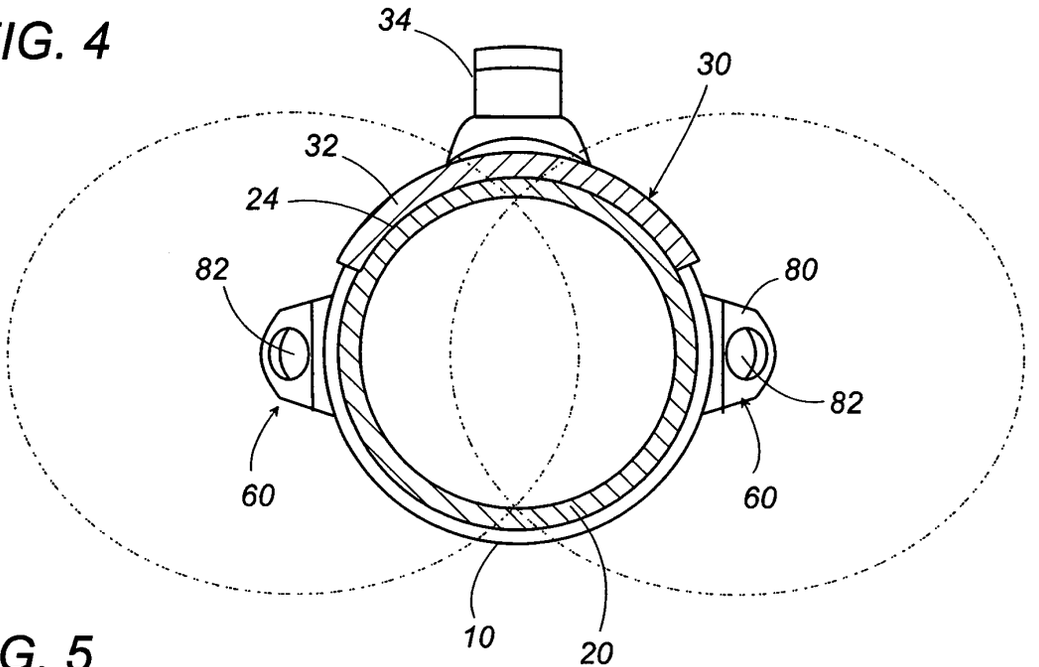


FIG. 5

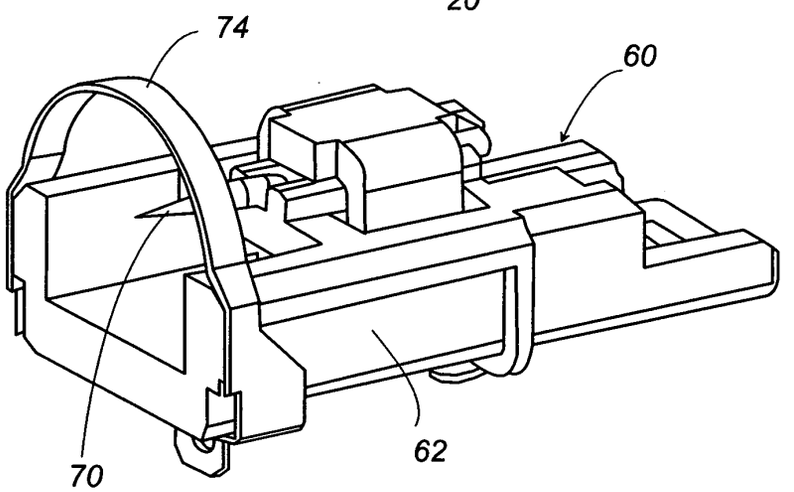


FIG. 6

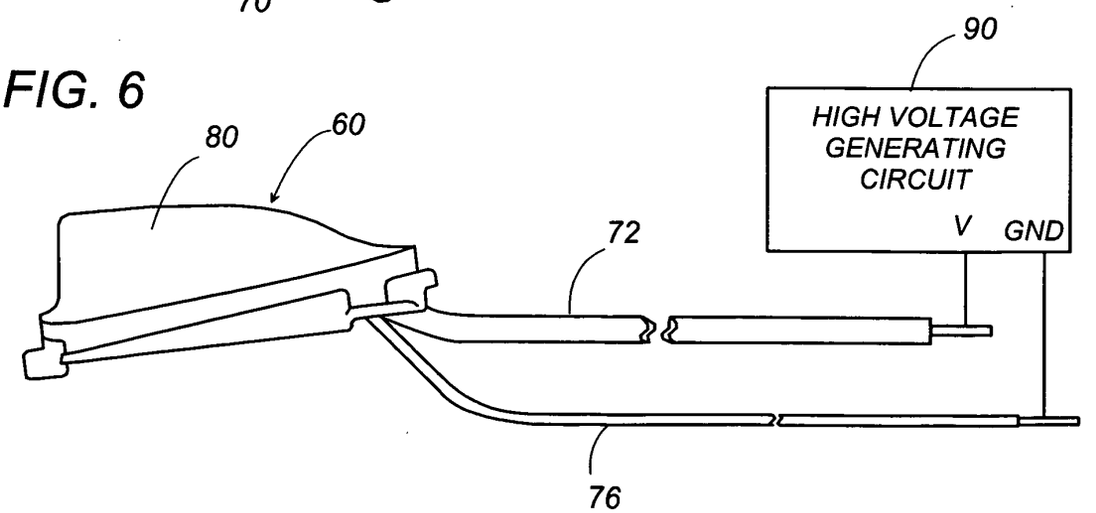


FIG. 7

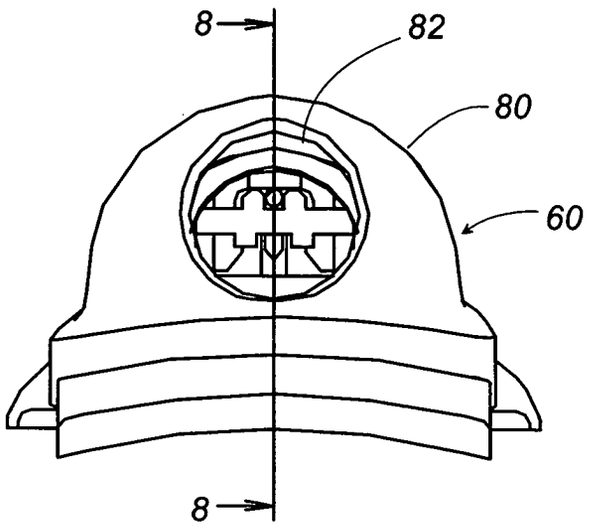
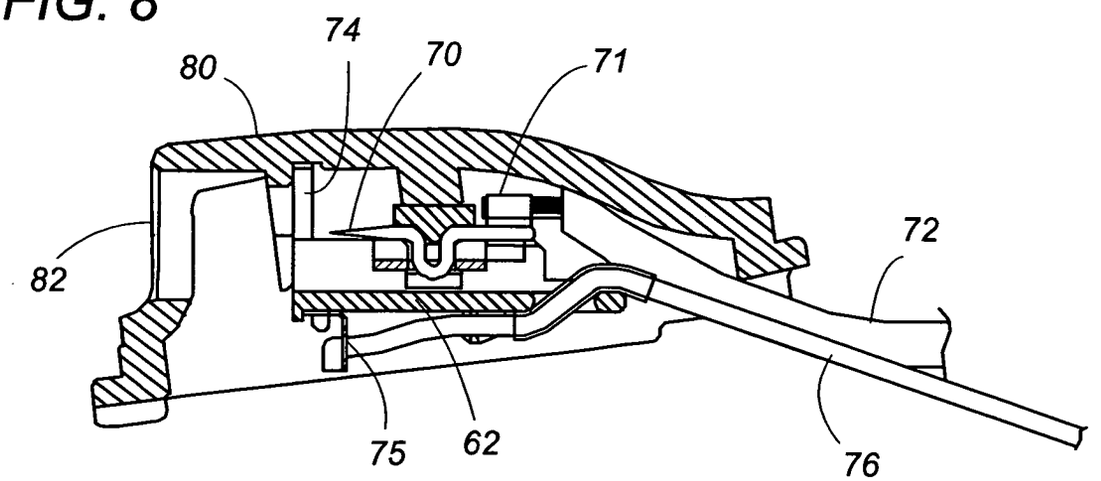


FIG. 8



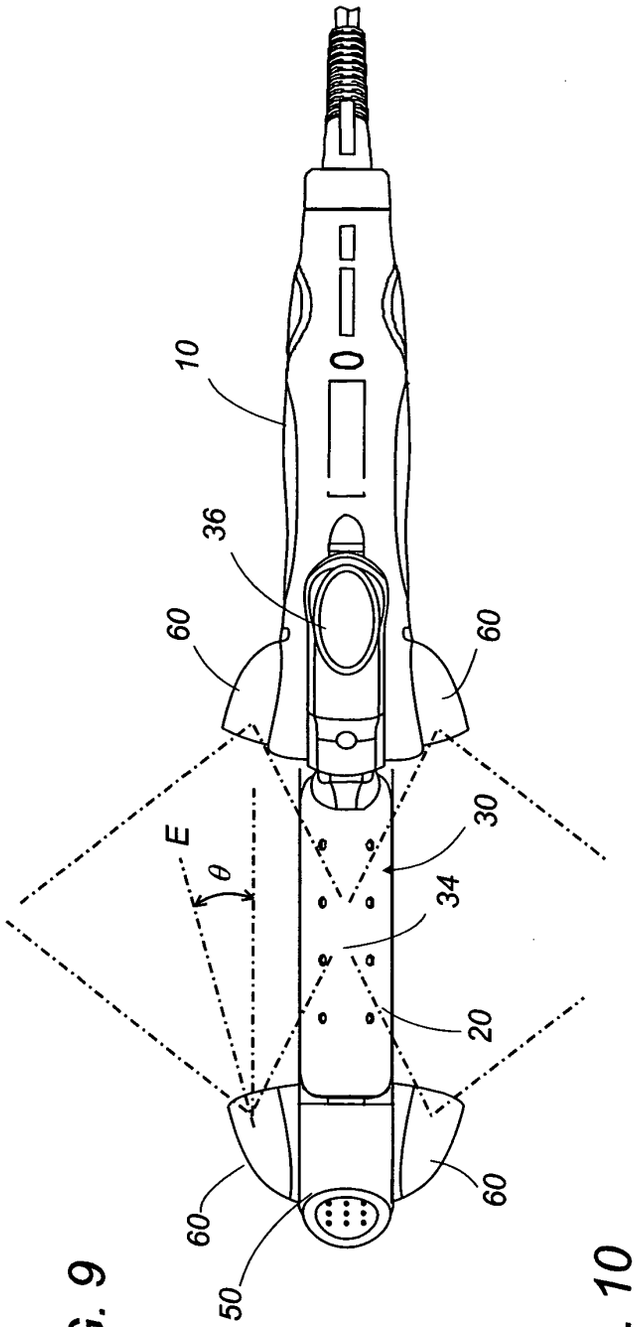


FIG. 9

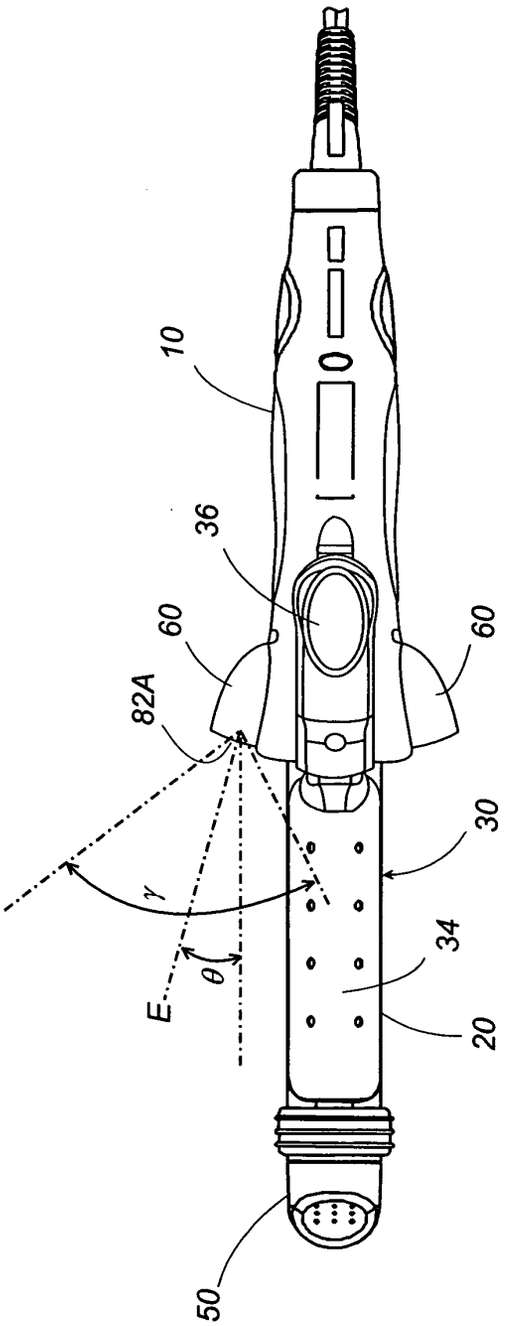
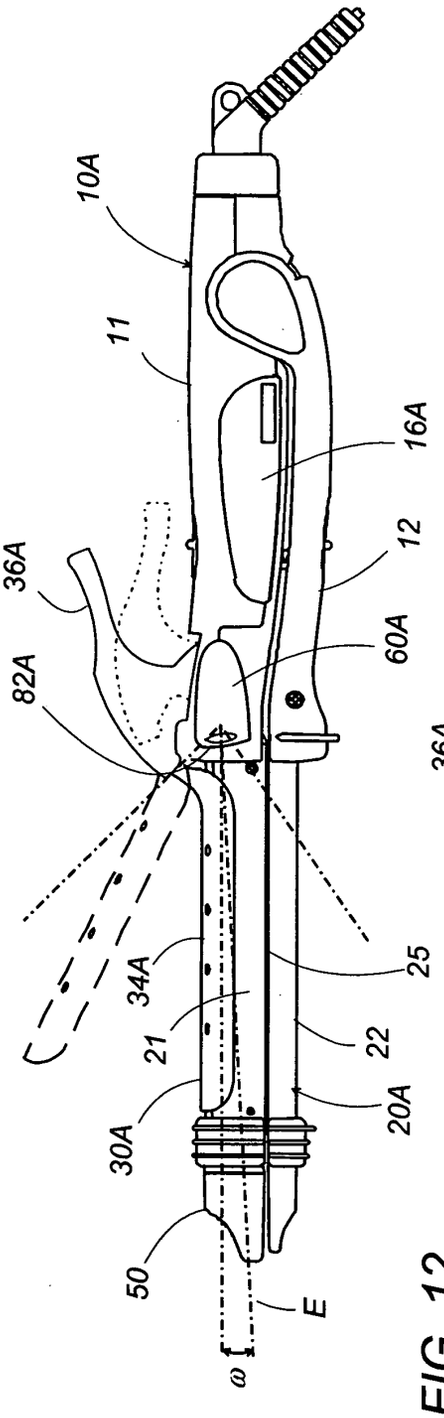


FIG. 10

FIG. 11


10A
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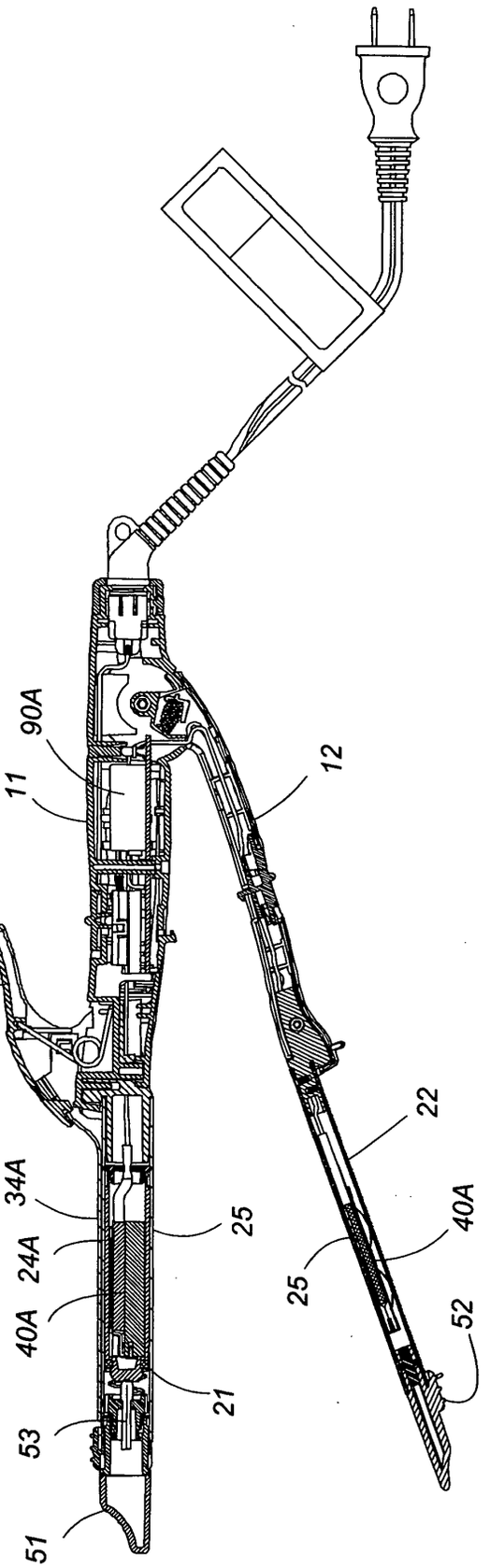
16A
12
36A
60A
82A
25
34A
21
22
30A
20A
50
E
ω

FIG. 12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25
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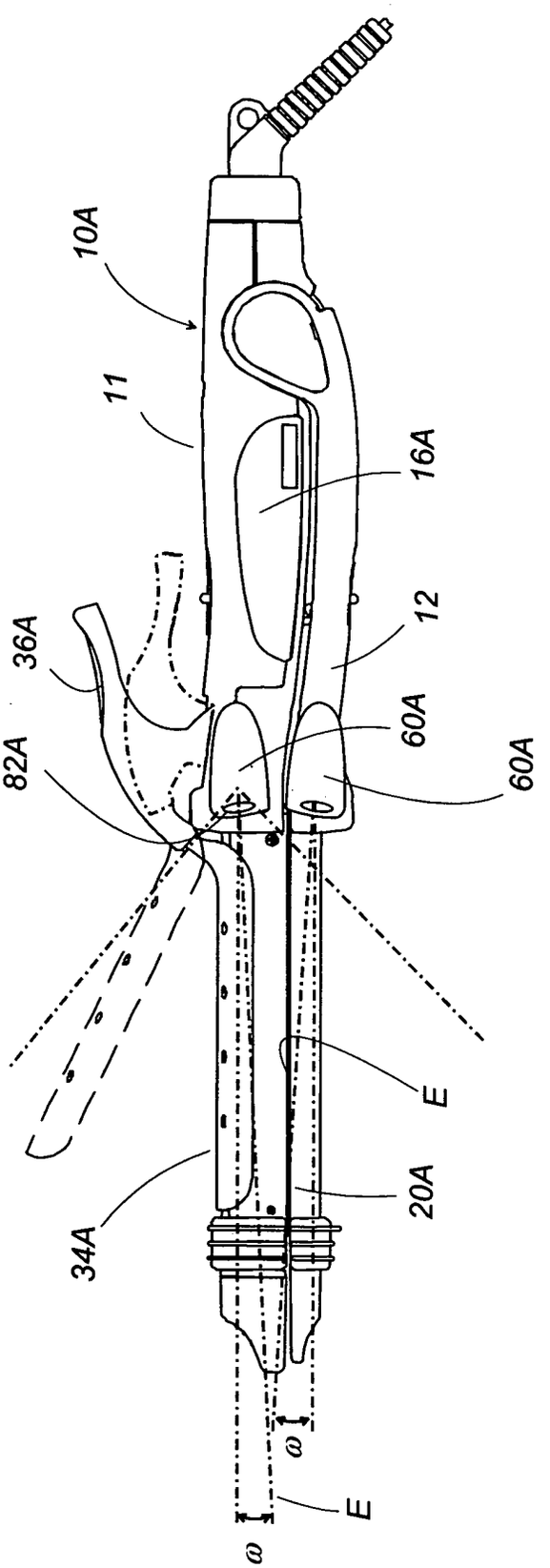
40A
52
21
53
51

FIG. 13



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 0157

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	WO 03/101242 A (CONAIR CORPORATION; SANTHOUSE, DANIEL) 11 December 2003 (2003-12-11) * page 5, line 10 - page 9, line 16; figure 19 * -----	1 2-4,6,8,9	A45D1/04
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 February 2005	Koob, M

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X : particularly relevant if taken alone
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