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(54) **HAIR CURLING IRON WITH WINDER**

LOCKENSTAB MIT WICKLER

FER À FRISER AVEC ENROULEUR

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(73) Proprietor: **Kenford Industrial Company Ltd**
New Territories, Hong Kong (CN)

(72) Inventors:
- **KEONG, Wai Ho Michael**
  New Territories, Hong Kong (CN)
- **LAM, Wai Ming**
  New Territories, Hong Kong (CN)

(74) Representative: **Oxley, Robin John George et al**
Marks & Clerk LLP
15 Fetter Lane
London EC4A 1BW (GB)

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Description

Technical field

[0001] The present invention relates to hair styling irons, particularly electrical appliances for hair curling, having a winder for winding up hair.

Background of the Invention

[0002] One class of hand-held electric hair irons has a winder that is driven to rotate, or to rotate relative to, a barrel onto which a lock of hair is thereby wound for curling, such as described in US20130025620 and WO2013186547. These prior art motorised curling irons have two jaws connected by a hinge so as to be moveable from an open position allowing the insertion of hair to a closed position to put the hair in contact with the heater and perform the curling treatment. The principal advantages of these appliances are the speed and ease with which they allow hair to be styled, however there is an on-going need for improvements in the performance of this class of hair iron, particularly with respect to ergonomics.

[0003] In the curling iron of Fig. 54 of WO2013186547 the first jaw carries the barrel, and a hair-receiving opening in a head surrounding the barrel has a slot portion parallel to the barrel is opened and closed by movement of the second jaw relative to the first jaw. Advantageously, this slot portion is too narrow to allow a user's fingers to into the heated chamber next to the barrel. However, ease of use is compromised by the second jaw blocking access to the slot portion, requiring hair to be fed along a complex path, firstly in a longitudinal direction, and then transversely into the slot portion. There is a risk that some strands of hair will not be retained in the slot portion and wound about the barrel, resulting in incomplete styling of lock of hair.

[0004] The lack of symmetry or "handedness" of the appliance also means that it is not equally readily used both left- and right-handed. It would also be advantageous to have a simple and compact structure that can be manufactured for a lower cost. It is an object of the present invention to overcome or substantially ameliorate the above disadvantages or, more generally, to provide an improved curling iron.

Disclosure of the Invention

[0005] There is provided a curling iron according to claim 1.

[0006] Preferably the barrel substantially abuts the body in the closed position i.e. the barrel is very close to, or in abutment with, the body in the closed position. A portion proximate to the distal end of the barrel preferably substantially abuts the body in the closed position.

[0007] The gating coupling may allow sliding movement of the barrel with respect to the body. The sliding movement may be substantially perpendicular to a central axis of the barrel. The gating coupling may comprise an elongate guide fixed to one of the body and the barrel and a block slidingly engaged with the guide and fixed to the other of the body and the barrel.

[0008] The gating coupling may comprise a pivot allowing relative pivoting movement of the barrel with respect to the body. The pivot may have a pivot axis substantially orthogonal to a central axis of the barrel. The pivot axis may intersect the central axis.

[0009] The barrel may fixed to a handle of the curling iron, so that the gating coupling provides relative movement between the handle and the body.

[0010] Preferably an operating lever is fixed to the body, for sliding or pivoting the body relative to the handle. A switch may be actuated by movement of the operating lever for supplying power to a winder for winding the lock of hair about the barrel.

[0011] Preferably the curling iron further comprises a temperatures sensor for providing a temperature signal indicative of a temperature of the element and a controller that receives the temperature signal and controls power supply to the element to maintain the element within i) a predefined standby temperature range and ii) a predefined operating temperature range higher than the standby temperature range, and further comprising a winder for winding the lock of hair about the barrel, and feedback means connected to the controller for indicating that the winder is in operation, when power is supplied to the curling iron the controller actuates the element to maintain the element in the standby temperature range and when the feedback means indicates that the winder is in operation, the controller actuates the element to maintain the element in the operating temperature range.

[0012] Optionally, the controller comprises a timer circuit and records an elapsed time from the activation of the feedback means that indicates that the winder is in operation, and after the elapsed time exceeds a predefined limit, the controller reverts to actuate the element to maintain the element in the standby temperature range.

[0013] Optionally, a rotary encoder is connected to the controller to indicate the angular displacement of the winder, and after a predefined angular displacement is exceeded, the controller reverts to actuate the element to maintain the element in the standby temperature range.

[0014] Preferably the handle is elongate and an axis of the barrel lies in a longitudinal plane that bisects the slot portion and bisects the handle longitudinally. Preferably the longitudinal axis of the handle is approximately transverse to the axis of the barrel.

[0015] Preferably the barrel is an assembly of two like half-cylindrical parts, each of which may enclose a respective heating element.

[0016] The invention provides a curling iron which is effective and efficient, and can be conveniently used both left- and right-handed, while reducing the risk that some

strands of hair will not be retained in the slot portion and also offering a simple design which minimises manufacturing costs.

Brief Description of the Drawings

[0017] Preferred forms of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a pictorial view from above of a curling iron according to a first embodiment of the invention;

Figure 2a is a part-sectional view of the head of the iron of Fig. 1, in which an outer wall of the head is shown cut away;

Figure 2b is a transverse section through the barrel of Fig. 2a;

Figure 3 is a top view of the head of the iron of Fig. 1;

Figures 4 and 5 are sections AA and CC, respectively, of Fig. 3;

Figures 6a and 6b are schematic longitudinal sections through the iron of Fig. 1, showing the upper gate open and closed respectively;

Figure 7 is a part-sectional view of the head of a second embodiment of a curling iron of the invention, in which an outer wall of the head is shown cut away;

Figure 8 is a part-sectional view of the head of a third embodiment of a curling iron of the invention, in which an outer wall of the head is shown cut away;

Figures 9 and 10 are side views from opposing sides of a fourth embodiment of a curling iron of the invention;

Figure 11 is an end view of a fifth embodiment of a curling iron of the invention in an open position;

Figure 12 is a schematic section along plane AA of Fig. 11;

Figures 13 and 14 correspond to Figs 11 and 12 respectively but show a closed position;

Figures 15 and 16 are schematic cross sections of a sixth embodiment of a curling iron of the invention in open and closed positions respectively;

Figures 17 and 18 are schematic cross sections of a seventh embodiment of a curling iron of the invention in open and closed positions respectively;

Figures 19 and 20 are schematic cross sections of an eighth embodiment of a curling iron of the invention in open and closed positions respectively;

Figure 21 is a schematic cross section of the curling iron of Figs 19 and 20 mounted to a handle, and

Figure 22 is a schematic of a control circuit of a curling iron of the invention.

Description of the Preferred Embodiments

[0018] Referring to Fig. 1, an electric appliance for hair styling, or a curling iron 1, has a body 10, 11 that generally comprises a handle 10 on which a head 11 is disposed. The body 10, 11 may be an assembly of parts, or the head 10 and handle 11 may be integrally formed, as by moulding from polymer. The handle 10 may be elongate and hollow with a longitudinal handle axis 12 and it may be fixed at one end to the head 11, with a mains power cable 14 extending from the opposite end. User controls 15 may be mounted to the handle 10, and may include a lever operator 13. A control circuit (not shown) may be mounted within the handle 10.

[0019] A barrel 16, about which a lock of hair 20 is wound in use, may be heated by internal elements 81. The barrel 16 is surrounded by the head 11 and has an axis 17, which may be aligned approximately transverse to the handle axis 12. An opening 18 in the head 11 is provided for the passage of the lock of hair, and comprises a circumferential portion 18a (through which the barrel 16 is visible in Fig. 1) and that extends around the barrel 16, and a slot portion 18b extending therefrom. A hair-receiving space 19 is provided between the head 11 and the barrel 16 and, in use, with a lock of hair 20 passing through the hair-receiving space 19 a root end 20a extends from the circumferential portion 18a and a tip 20b of the lock of hair 20 may extend from the slot portion 18b generally axially.

[0020] As shown in Figs 2a, 2b and 3, a proximal end 16a of the barrel 16 is fixed within the head 11 and the circumferential portion 18a extends about an opposing distal end 16b, so that the distal end 16b is recessed inside the head 11. The cylindrical barrel 16 may be an assembly of two like half-cylindrical parts 80 fixed back-to-back as shown in Fig. 2b, each half enclosing a respective one of the heating elements 81. The head 11 is a substantially rigid part of the body assembly which may comprise double walls. The head 11 encloses the barrel 16 and other parts of the appliance, including a reversible gear motor 21 fixed near the proximal end 16a. The gear motor 21 is part of a winder assembly for winding the lock of hair 20 about the barrel 16, and is connected to a winder hook 22 mounted to rotate about the axis 17 through the hair-receiving space 19 for hooking and rotating the hair, while simultaneously moving parallel to axis 17 to help form a helical curl.

[0021] The slot portion 18b intersects with the circum-

ferential portion 18a to provide the only substantial opening in the head 11, and connecting the hair-receiving space 19 to the space surrounding the head. The slot portion 18b may be elongated to extend generally axially from the circumferential portion 18a toward the proximal end 16a. The hair-receiving space 19 is closed at the proximal end 16a and the circumferential portion 18a and slot portion 18b provide a passage through which the lock of hair may pass. The hair-receiving space 19 may be bounded by substantially coaxial walls, as by the cylindrical walls 24, 25 of the barrel 16 and the head 11 respectively, as illustrated.

[0022] An outer gate 27 opens and closes the circumferential portion 18a of the opening 18, as by pivoting, and serves to restrict movement of the lock of hair 20 about the circumferential portion 18a. It is sufficient that movement of the lock of hair 20 about the circumferential portion 18a is restricted to prevent unwinding, and it is not necessary to clamp or grip the lock. Fig. 2a shows the outer gate 27 in its open position in which it is retracted from the circumferential portion 18a within a hollow in the head 11 that is located between a wall 29 and the distal end 16b. With the outer gate 27 open a curled lock of hair may freely be withdrawn from the hair-receiving space 19 through the circumferential portion 18a. The outer gate 27 may move substantially transverse to the axis 17 from the open position shown, in which a hair-engaging surface 28 is retracted from the circumferential portion 18a, to a closed position (best seen in Fig. 6b) in which the hair-engaging surface 28 bounds a space adjacent to the slot portion 18b, restricting movement of the lock of hair 20 to this space adjacent the slot portion 18b.

[0023] A mechanism (described further below with respect to Figs 6a and 6b) connects the lever operator 13 and outer gate 27, allowing the outer gate 27 to be closed by the user pressing the lever operator 13, and opened by a spring 76. After the outer gate 27 is closed, or substantially closed, the lever operator 13 may actuate a switch 70 in the control circuit to start the gear motor 21 and wind up the lock of hair 20.

[0024] Fig. 2a also illustrates an embodiment of fingers 30 that provide a low cost and very effective inner gate means that close the slot portion 18b to hold the lock of hair 20 in the hair-receiving space 19. The fingers 30 are mounted to the head 11 to project from a wall of the slot portion 18b and, in their normally closed position shown, substantially occlude the slot portion 18b. The fingers 30 are preferably made from a silicon elastomer, and are configured to be resiliently deflected inwardly to an open position (not shown) by the user pushing the lock of hair 20 past them. The fingers 30 may be of like dimensions, tapering to narrow from their bases 31 to their tips 32. The fingers 30 may be arranged in a linear array, optionally integrally formed with a mounting strip 33 at their bases 31, with the mounting strip 33 being secured on a channel in the head 11 so that the array may be aligned substantially axially. Compared to gate means hingedly connected to the handle, fingers 30 mounted to the head 11, particularly in the slot potion 18b, may be much smaller, while also better ensuring the lock of hair 20 actually enters through the slot portion 18b into the hair-receiving space 19 and strands are not clamped against an outer surface of the head 11.

[0025] As shown in Fig. 3, all of the fingers 30 may be mounted on the same side of a mouth 35 of the slot portion 18b that is tapered in a transverse plane to narrow toward the barrel 16, and toward a throat 36 of the slot portion 18b. The mouth 35 may have reflective symmetry about a plane 37 bisecting the slot portion 36 along an axis of the throat 36. The throat 36 may be of substantially constant cross-sectional dimensions throughout its axial length, and the width 38 of the throat 36 is substantially narrower than its length 39 in a radial direction. The width 38 of the throat 36 is preferably less than 20% of the diameter of the cylindrical wall 24, and the ratio of the diameter of the cylindrical wall 24 of the barrel 16 to the diameter of the cylindrical wall 25 of the head 11 is preferably between 2:3 and 6:7. In the normally closed position, the fingers 30 are elongated generally perpendicular to the plane 37, and are retained within the slot portion 18b.

[0026] With reference to Figs. 4 and 5, the hair-receiving space 19 between the cylindrical walls 24, 25 is generally annular and the winder hook 22 is disposed near its innermost end. The winder hook 22 has two opposing concave edges 40, 41, one of which abuts and hooks the lock of hair 20, depending on the direction of rotation of the winder hook 22. The pitch circle swept by the winder hook 22 as it turns has a substantially larger diameter than the annular hair-receiving space 19 and extends adjacent to the fingers 30. In this way the swept path overlaps a substantial radial extent of the slot portion 18b, ensuring that a lock of hair 20 that has been pushed past the fingers 30 will be caught by the winder hook 22. The displacement of the winder hook 22 parallel to axis 17 may be mechanically driven by its rotation, as by a screw thread (not shown).

[0027] These Figs. 4 and 5 also best show the double-walled hollow construction of the head 11, in which the cylindrical wall 25 comprises the mouth of a generally cup-shaped inner wall 46 that is open at the circumferential portion 18a and closed at its opposite end, and which is encompassed by an outer wall 47.

[0028] Figs. 6a and 6b illustrate the operation of the outer gate 27, showing the outer gate 27 in its open position (Fig. 6a) and its closed position (Fig. 6b) where it projects to close the circumferential portion 18a, with the hair-engaging surface 28 bounding the space adjacent to the slot portion 18b. The lever operator 13 may be mounted by a transverse pivot 71 to the handle 10 for rotation between open and closed positions, with the pivot 71 disposed near one end of the lever operator 13. The lever operator 13 may include a button portion 72 projecting through an opening in the handle for actuation by the user, and an arm portion 73 extending into the head 11 to engage the outer gate 27. The outer gate 27

may be mounted to rotate on a transverse axle 74, and may further include a tongue 75 integral with the gate 27, with a roller 78 fixed at one end. One end of a spring 76 is fixed in one end of a recess 77 in the arm 73 and the opposite end of the spring 76 abuts the tongue 75, urging the roller 78 against the opposite end of the recess 77 when the outer gate is in its open position. Pressing the button portion 72 rotates the lever operator 13, pushing the roller 78 to move along the arm portion 73 from one end of the recess 77 to the other, thereby rotating the outer gate 27 simultaneously. Immediately before the closed position shown in Fig. 6b, the arm portion 73 abuts the start switch 70, providing a signal to the control circuit to start the winder.

[0029] These drawings also clearly show that the slot portion 18b is disposed at a longitudinal end of the curling iron 1, as in an endmost face 52. This provides enhanced ergonomics, compared to having the slot portion 18b providing an opening on the sides of the head 11, as the appliance can be more readily used in a like manner in the left and right hand. The slot portion 18b may aligned such that the axis 17 of the barrel 16 lies in the longitudinal plane 37 that bisects the slot portion and bisects the handle longitudinally.

[0030] Figs. 7 and 8, show second and third embodiments of the invention, distinguished from the hair curler 1 by the fingers 130, 230. The array of fingers need not extend along the axial length of the slot portion 18b and, for instance, fingers 130 (individually of like form to the fingers 30) may be disposed in a shorter array proximate the winder member 22 at the inner end of the slot portion 18b. The fingers need not have rotational symmetry about their long axes and, for instance, may have a strip-like form like the fingers 230. The fingers 230 have the form of an oblong or strip in cross section. The strip may be generally axially aligned. The fingers 230 may be fixed near the inner end of the slot portion 18b on opposite sides of the slot portion 18b, staggered axially and overlapping one another longitudinally such that both would be need to be deflected by a lock of hair 20 pressed transverse to the lock into the slot portion.

[0031] A fourth embodiment of the hair iron 401 is shown in Figs. 9 and 10 and is of generally like construction to the first embodiment, although differing in the external form of the outer wall 447 of the head 411. The head 411 tapers inwardly toward the longitudinal end of the hair iron 401. The lever operator 413 is also elongated along the handle 410. Opposing sides of the mouth 435 have convex surfaces 50.

[0032] In use, when the barrel 16 is up to temperature the appliance is located toward the root end 20a of a lock of hair 20, so that the axis 17 is approximately aligned lengthwise with the lock of hair 20, which is then inserted into the slot portion 18b by a generally transverse relative movement. The lock is pressed against the fingers 30, 130, 230, bending them inwards and allowing the lock past, before the fingers are restored to their normal position, in which they retain the lock 20 in the slot portion 18b. With the root end 20a extending from the circumferential portion 18a the user presses the operator 13, and a first part of the displacement of the lever operator 13 moves the outer gate 27 to its closed position, restraining the root end 20a. A second part of the movement of the lever operator 13 may actuate the start switch 70, starting the gear motor 21 to turn the winder hook 22 in a direction selected by the user controls 15 for a predefined number of turns. As the lock 20 is wound about the barrel 16 the free tip 20b is drawn into the hair-receiving space 19. The control circuit measures an elapsed time starting from actuation of the start switch 70 and operates an alarm to indicate when the curling is completed, whereupon the user releases the lever operator 13 and the spring restores the lever operator 13 to an extended position and the outer gate 27 to its open position. With the outer gate 27 retracted, the lock of hair, now curled into a generally helical form, can be readily removed through the open circumferential portion 18a without being deformed.

[0033] Further embodiments of the invention are shown in Figs 11-21, and differ from the preceding embodiments in respect of the outer gate means provided to open and close the circumferential portion 18a of the opening 18. The outer gate means is provided, for instance, by a gating coupling 90, 91 connecting the barrel 16 and the body 10 for movement relative to one another, thus avoiding the need for a separate gate to perform this function.

[0034] Referring to Figs 11-16, the gating coupling 90, 91 allows sliding movement of the barrel 16 with respect to the body 10. The gating coupling may comprise a linear guide 90, formed in the body 10 and elongated generally orthogonal to the axis 17 of the barrel 16, the guide 90 receiving a sliding block 91 that houses the gear motor 21. The barrel 16 is mounted to this gear motor housing or sliding block 91 to reciprocate thererewith. In preferred embodiments, the barrel 16 is fixed to the handle (not shown in Figs 11-14, see Fig. 21) and, in this manner, the body 10 may be mounted to the handle so as to allow the body to slide back and forth transversely to the axis 17 between open and closed positions. The open position is shown in Figs 11 and 12 and shows that the barrel 16 may be disposed generally coaxially with the internal cylindrical wall 25 of the body 10 that surrounds it, so as to form the annular hair-receiving space 19. In this open position, a lock of hair can be entered through the opening 18 into the hair-receiving space 19 and, once formatted into a generally helical coil, it can slide axially out from the hair-receiving space. In the closed position (shown in Figs 13 and 14) the barrel 16 is disposed eccentrically, after being displaced along the guide 90, transverse to the axis 17. In this closed position, the distal end 16b may be disposed closely adjacent to, or in abutment with, the inner cylindrical surface 25 and providing contact along an axial line at a pinch point 92. The pinch point 92 is shown located at about 90° from the slot portion 18b, but may generally be located at any angular position

around the internal wall surrounding the barrel. In this manner, the circumferential portion 18a is closed to restrict movement of the lock of hair in the circumferential portion past the pinch point 92. One or more springs (not shown) may act between the barrel and body, to bias them to the open position.

[0035] Figs 15 and 16 illustrate an embodiment in which the circumferential portion 18a is opened and closed by transverse sliding movement of the barrel 116 inside the body 110. In this curling oron the body 110 may be fixed to a handle (not shown). The hair-receiving space 119 may be symmetrical about the axis 17 and taper to narrow in the axial direction toward the distal end 116b. The distal end 116 may be domed, as by a hemispherical surface 94 which may extend from the body 110. The hemispherical surface 94 may be disposed, in the closed position (see Fig. 16), closely adjacent to, or in abutment with, a complementary inner surface 95 having a like radius of curvature as the hemispherical surface 94. In this manner, line contact may be also provided along a curved line at pinch point 92.

[0036] Figs 17-20 illustrate embodiments in which a pivot 97 having an axis transverse to the axis 17 of the barrel serves to provide the gating coupling that connects the barrel and body to turn relative to one another. The pivot axis may be offset to one side of the axis 17 (see Figs 17 and 18) or may be disposed centrally to intersect the axis 17 (see Figs 19 and 20). A torsion spring (not shown) may act between the barrel and body, to urge them to the open position, as shown in Fig. 20..

[0037] Fig. 21 illustrates how the barrel 116 may fixed by a pivot 97 to one end of an elongate handle 111 of the curling iron, so that the body 310 pivots relative to the handle 111. A lever operator 113 fixed to the body 310 may extend adjacent to the handle 11 so that it can be readily operated, as by the user's thumb, for pivoting the body 310. A start switch 170, such as a microswitch, may be actuated by movement of the lever operator 113 for supplying power to a winder 101 for winding the lock of hair 20 about the barrel 116.

[0038] As shown in Fig. 22, a control circuit 105 of the curling iron controls the supply of power from a power supply 106 to a motor 107 and the heating elements 81. The gear motor 121 turns the winder 101 to wind the lock around the barrel 116. A temperature sensor 109 provides a temperature signal indicative of a temperature of the element 81 and a controller 108 receives the temperature signal and controls power supply to the element 81, according a value preset by the user via the temperature control 111. Depending upon the mode of operation, the controller 108 maintains the element 81 either within i) a predefined standby temperature range or ii) within a predefined operating temperature range higher than the standby temperature range, as by 5°C. Feedback means in the form of a rotary encoder 110 is connected to the controller for indicating that the winder motor 121 is in operation, and provides an indication of the angle through which the winder 101 has been turned.

[0039] Referring to Figs 19-22, in use, after supplying power to the control circuit, the user may select one of a plurality of predefined standby temperature ranges as required according to the operation to be performed. Thereafter, the controller 108 supplies power to the element 81 to maintain the element 81 within the standby temperature range selected. When the barrel 116 is up to temperature the appliance is located toward the root end 20a of a lock of hair 20, so that the axis 17 is approximately aligned lengthwise with the lock of hair 20, which is then inserted into the slot portion 18b by a generally transverse relative movement. With the root end 20a extending from the circumferential portion 18a the user presses the operator 113, and the displacement of the lever operator 113 moves the body 310 to its closed position, restraining the root end 20a, as by clamping between the surfaces 94, 95, although it is not important that that the hair be clamped in this way. Continued movement of the lever operator 113 may actuate the start switch 170, starting the gear motor 121 to turn the winder hook 22 in a direction selected by the user controls

[0040] When the rotary encoder 110 indicates that the winder motor 121 is turning, the controller 108 boosts power to the element 81 and maintains the element in the higher operating temperature range. The control circuit measures an elapsed time starting from actuation of the start switch 170 and after a predefined elapsed time or after a predefined angular displacement is exceeded (as determined from the rotary encoder 110), the controller 108 lowers the power level to the element 81 and reverts to actuate the element to maintain the element 81 in the selected standby temperature range. The controller 108 may operate an alarm to indicate when the curling is completed, whereupon the user releases the lever operator 113 and a spring restores the lever operator 113 to an extended position and the body 310 to its open position. With the barrel 116 disposed centrally in the hair-receiving space, the lock of hair, now curled into a generally helical form, can be readily removed through the open circumferential portion 18a without being deformed.

[0041] Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof.

Claims

1. A curling iron (1) comprising:

a body (10, 11) with an endmost face (52);
a barrel (16) having a central axis (17), a proximal end (16a) mounted within the body (10, 11) and an opposing distal end (16b), the body (10, 11) surrounding the barrel (16) and enclosing a hair-receiving space (19) between the barrel (16) and the body (10, 11);

an element (81) for heating hair in the hair-receiving space (19), and
an opening (18) in the body (10, 11), the opening (18) comprising a circumferential portion (18a) extending about the distal end (16b) and a slot portion (18b) disposed in the endmost face (52), the slot portion (18b) extending from the circumferential portion (18a) toward the proximal end (16a), whereby opposing ends (20a, 20b) of a lock of hair (20) passing through the hair-receiving space (19) extend from the circumferential portion (18a) and the slot portion (18b),
characterised in that the curling iron further comprises a gating coupling (90, 91) connecting the barrel (16) to the body (10, 11) to provide for relative movement between the barrel (16) and the body (10, 11) between a closed position, in which the circumferential portion (18a) is closed to restrict movement of the lock of hair (20) about the circumferential portion (18a), and an open position, in which the circumferential portion (18a) is opened to allow a curled lock of hair to be withdrawn from the hair-receiving space (19).

2. The curling iron of claim 1, wherein the barrel (16) abuts the body (10, 11) in the closed position.

3. The curling iron of claim 2, wherein a portion proximate to the distal end (16b) of the barrel (16) abuts the body (10, 11) in the closed position.

4. The curling iron of any one of claims 1 to 3, wherein the gating coupling (90, 91) allows sliding movement of the barrel (16) with respect to the body (10, 11), optionally wherein the sliding movement is substantially perpendicular to the central axis of the barrel.

5. The curling iron of claim 4, wherein the gating coupling (90, 91) comprises:

an elongate guide (90) fixed to one of the body (10, 11) and the barrel (16), and
a block (91) slidingly engaged with the guide (90) and fixed to the other of the body (10, 11) and the barrel (16).

6. The curling iron of claim 1 or claim 2, wherein the gating coupling (90, 91) comprises a pivot (97) allowing relative pivoting movement of the barrel (16) with respect to the body (310).

7. The curling iron of claim 6, wherein the pivot (97) has a pivot axis substantially orthogonal to the central axis (17) of the barrel (16).

8. The curling iron of claim 6 or claim 7, wherein the pivot axis intersects the central axis (17).

9. The curling iron of any one of claims 4 to 8, wherein the barrel (16) is fixed to a handle (111) of the curling iron so that the gating coupling (90, 91) provides relative movement between the handle (111) and the body (310).

10. The curling iron of claim 9, further comprising an operating lever (113) fixed to the body (10, 310), for sliding or pivoting the body (10, 310) relative to the handle (111), and optionally further comprising a switch (170) actuated by movement of the operating lever (113) for supplying power to a winder (101) for winding the lock of hair (20) about the barrel (16).

11. The curling iron of any one of the preceding claims, further comprising a temperature sensor (109) for providing a temperature signal indicative of a temperature of the element (81) and a controller (108) that receives the temperature signal and controls power supply to the element (81) to maintain the element (81) within i) a predefined standby temperature range and ii) a predefined operating temperature range higher than the standby temperature range, and further comprising a winder (101) for winding the lock of hair (20) about the barrel (16) and feedback means connected to the controller (108) for indicating that the winder (101) is in operation, wherein, when power is supplied to the curling iron, the controller (108) actuates the element (81) to maintain the element (81) in the standby temperature range and, when the feedback means indicates that the winder (101) is in operation, the controller (108) actuates the element (81) to maintain the element (81) in the operating temperature range, optionally wherein:

i) the controller (108) comprises a timer circuit and records an elapsed time from the activation of the feedback means that indicates that the winder (101) is in operation, and after the elapsed time exceeds a predefined limit, the controller (108) reverts to actuate the element (81) to maintain the element (81) in the standby temperature range, and/or
ii) the curling iron comprises a rotary encoder (110) connected to the controller (108) to indicate the angular displacement of the winder (101), and after a predefined angular displacement is exceeded, the controller (108) reverts to actuate the element (81) to maintain the element (81) in the standby temperature range.

12. The curling iron of claim 1 wherein the body (10, 11) further comprises a handle (10) fixed to a head (11), the head (11) surrounds the barrel (16) and encloses the hair-receiving space (19) between the barrel (16) and the head (11), and the proximal end (16a) of the barrel (16) is fixed within the head (11) and, option-

ally, wherein the handle (10) is elongate and an axis (17) of the barrel (16) lies in a longitudinal plane that bisects the slot portion (18b) and bisects the handle (10) longitudinally.

13. The curling iron of claim 1 wherein the barrel (16) is an assembly of two like half-cylindrical parts (80), optionally wherein each of the half-cylindrical parts (80) encloses a respective heating element (81).

14. The curling iron of claim 13 further comprising a winder, wherein the winder comprising a member (22) mounted to rotate relative to the barrel (16) through the hair-receiving space (19) substantially about the axis (17) of the barrel (16), while simultaneously moving parallel to the axis (17) of the barrel (16).

Patentansprüche

1. Lockenstab (1), der Folgendes umfasst:

einen Körper (10, 11) mit einer hintersten Fläche (52),
einen Zylinder (16), der eine Mittelachse (17), ein proximales Ende (16a), das innerhalb des Körpers (10, 11) angebracht ist, und ein entgegengesetztes distales Ende (16b) aufweist, wobei der Körper (10, 11) den Zylinder (16) umgibt und einen Haaraufnahmeraum (19) zwischen dem Zylinder (16) und dem Körper (10, 11) umschließt,
ein Element (81) zum Erhitzen von Haar in dem Haaraufnahmeraum (19), und
eine Öffnung (18) in dem Körper (10, 11), wobei die Öffnung (18) einen Umfangsabschnitt (18a), der sich um das distale Ende (16b) erstreckt, und einen Schlitzabschnitt (18b), der in der hintersten Fläche (52) angeordnet ist, umfasst, wobei sich der Schlitzabschnitt (18b) von dem Umfangsabschnitt (18a) zu dem proximalen Ende (16a) hin erstreckt, wodurch sich entgegengesetzte Enden (20a, 20b) einer Haarlocke (20), die durch den Haaraufnahmeraum (19) hindurchgehen, von dem Umfangsabschnitt (18a) und dem Schlitzabschnitt (18b) aus erstrecken, **dadurch gekennzeichnet, dass** der Lockenstab ferner eine Schleusungskupplung (90, 91) umfasst, die den Zylinder (16) mit dem Körper (10, 11) verbindet, um für eine relative Bewegung zwischen dem Zylinder (16) und dem Körper (10, 11) zu sorgen, zwischen einer geschlossenen Stellung, in welcher der Umfangsabschnitt (18a) geschlossen ist, um eine Bewegung der Haarlocke (20) um den Umfangsabschnitt (18a) zu beschränken, und einer offenen Stellung, in welcher der Umfangsabschnitt (18a) geöffnet ist, um zu ermöglichen, dass eine gekräuselte Haarlocke aus dem Haaraufnahmeraum (19) herausgezogen wird.

2. Lockenstab nach Anspruch 1, wobei der Zylinder (16) in der geschlossenen Stellung an den Körper (10, 11) anstößt.

3. Lockenstab nach Anspruch 2, wobei ein Abschnitt, nahe dem distalen Ende (16b) des Zylinders (16), in der geschlossenen Stellung an den Körper (10, 11) anstößt.

4. Lockenstab nach einem der Ansprüche 1 bis 3, wobei die Schleusungskupplung (90, 91) eine gleitende Bewegung des Zylinders (16) in Bezug auf den Körper (10, 11) ermöglicht, wahlweise wobei die gleitende Bewegung im Wesentlichen senkrecht zu der Mittelachse des Zylinders ist.

5. Lockenstab nach Anspruch 4, wobei die Schleusungskupplung (90, 91) Folgendes umfasst:
eine längliche Führung (90), die an dem einen von dem Körper (10, 11) und dem Zylinder (16) befestigt ist, und einen Block (91), der gleitend mit der Führung (90) in Eingriff gebracht und an dem anderen von dem Körper (10, 11) und dem Zylinder (16) befestigt ist,

6. Lockenstab nach Anspruch 1 oder Anspruch 2, wobei die Schleusungskupplung (90, 91) ein Drehgelenk (97) umfasst, das eine relative Schwenkbewegung des Zylinders (16) in Bezug auf den Körper (310) ermöglicht.

7. Lockenstab nach Anspruch 6, wobei das Drehgelenk (97) eine Schwenkachse, im Wesentlichen senkrecht zu der Mittelachse (17) des Zylinders (16), aufweist.

8. Lockenstab nach Anspruch 6 oder Anspruch 7, wobei die Schwenkachse die Mittelachse (17) schneidet.

9. Lockenstab nach einem der Ansprüche 4 bis 8, wobei der Zylinder (16) so an einem Handgriff (111) des Lockenstabs befestigt ist, dass die Schleusungskupplung (90, 91) eine relative Bewegung zwischen dem Handgriff (111) und dem Körper (310) gewährleistet.

10. Lockenstab nach Anspruch 9, der ferner einen Betätigungshebel (113), der an dem Körper (10, 310) befestigt ist, zum Verschieben oder Schwenken des Körpers (10, 310) im Verhältnis zu dem Handgriff (111) umfasst und der ferner wahlweise einen Schalter (170), der durch eine Bewegung des Betätigungshebels (113) betätigt wird, umfasst, um einem Wickler (101) Energie zuzuführen zum Wickeln der Haar-

locke (20) um den Zylinder (16).

11. Lockenstab nach einem der vorhergehenden Ansprüche, der ferner einen Temperatursensor (109) zum Bereitstellen eines Temperatursignals, das eine Temperatur des Elements (81) angibt, und ein Steuergerät (108), welches das Temperatursignal empfängt und eine Energiezufuhr zu dem Element (81) steuert, um das Element (81) innerhalb i) eines vordefinierten Bereitschaftstemperaturbereichs und ii) eines vordefinierten Betriebstemperaturbereichs, der höher ist als der Bereitschaftstemperaturbereich, zu halten, umfasst und der ferner einen Wickler (101) zum Wickeln der Haarlocke (20) um den Zylinder (16) und Rückmeldungsmittel, die mit dem Steuergerät (108) verbunden sind, zum Anzeigen, dass der Wickler (101) in Betrieb ist, umfasst, wobei, wenn dem Lockenstab Energie zugeführt wird, das Steuergerät (108) das Element (81) betätigt, um das Element (81) in dem Bereitschaftstemperaturbereich zu halten, und wenn das Rückmeldungsmittel anzeigt, dass der Wickler (101) in Betrieb ist, das Steuergerät (108) das Element (81) betätigt, um das Element (81) in dem Betriebstemperaturbereich zu halten, wahlweise wobei:

i) das Steuergerät (108) eine Zeitgeberschaltung umfasst und eine abgelaufene Zeit von der Aktivierung der Rückmeldungsmittel aufzeichnet, die anzeigt, dass der Wickler (101) in Betrieb ist, und nachdem die abgelaufene Zeit eine vordefinierte Grenze überschreitet, das Steuergerät (108) zurückfällt, um das Element (81) zu betätigen, um das Element (81) in dem Bereitschaftstemperaturbereich zu halten, und/oder
ii) der Lockenstab einen Drehgeber (110) umfasst, der mit dem Steuergerät (108) verbunden ist, um die Winkelverschiebung des Wicklers (101) anzuzeigen, und nachdem eine vordefinierte Winkelverschiebung überschritten ist, das Steuergerät (108) zurückfällt, um das Element (81) zu betätigen, um das Element (81) in dem Bereitschaftstemperaturbereich zu halten.

12. Lockenstab nach Anspruch 1, wobei der Körper (10, 11) ferner einen Handgriff (10) umfasst, der an einem Kopf (11) befestigt ist, wobei der Kopf (11) den Zylinder (16) umgibt und den Haaraufnahmeraum (19) zwischen dem Zylinder (16) und dem Kopf (11) umschließt, und das proximale Ende (16a) des Zylinders (16) innerhalb des Kopfes (11) befestigt ist und wahlweise wobei der Handgriff (10) länglich ist und eine Achse (17) des Zylinders (16) in einer Längsebene liegt, die in Längsrichtung den Schlitzabschnitt (18b) zweiteilt und den Handgriff (10) zweiteilt.

13. Lockenstab nach Anspruch 1, wobei der Zylinder (16) eine Baugruppe aus zwei gleichen halbzylindrischen Teilen (80) ist, wahlweise wobei jeder der halbzylindrischen Teile (80) ein jeweiliges Heizelement (81) umschließt.

14. Lockenstab nach Anspruch 13, der ferner einen Wickler umfasst, wobei der Wickler ein Element (22) umfasst, das angebracht ist, um sich im Verhältnis zu dem Zylinder (16) durch den Haaraufnahmeraum (19) im Wesentlichen um die Achse (17) des Zylinders (16) zu drehen, während es sich gleichzeitig parallel zu der Achse (17) des Zylinders (16) bewegt.

Revendications

1. Fer à friser (1), comprenant :

un corps (10, 11) avec une face d'extrémité extrême (52) ;
un cylindre (16) comportant un axe central (17), une extrémité proximale (16a) montée dans le corps (10, 11) et une extrémité distale opposée (16b), le corps (10, 11) entourant le cylindre (16) et renfermant un espace de réception des cheveux (19) entre le cylindre (16) et le corps (10, 11) ;
un élément (81) pour chauffer les cheveux dans l'espace de réception des cheveux (19), et
une ouverture (18) dans le corps (10, 11), l'ouverture (18) comprenant une partie circonférentielle (18a) s'étendant autour de l'extrémité distale (16b) et une partie de fente (18b) disposée dans la face d'extrémité extrême (52) la partie de fente (18b) s'étendant de la partie circonférentielle (18a) vers l'extrémité proximale (16a), les extrémités opposées (20a, 20b) d'une mèche de cheveux (20) passant à travers l'espace de réception des cheveux (19) s'étendant ainsi de la partie circonférentielle (18a) et de la partie de fente (18b) ;
caractérisé en ce que le fer à friser comprend en outre un couplage de déclenchement (90, 91) connectant le cylindre (16) au corps (10, 11) pour permettre un déplacement relatif entre le cylindre (16) et le corps (10, 11) entre une position fermée, dans laquelle la partie circonférentielle (18a) est fermée pour limiter le déplacement de la mèche de cheveux (20) autour de la partie circonférentielle (18a), et une position ouverte, dans laquelle la partie circonférentielle (18a) est ouverte pour permettre le retrait d'une mèche bouclée de cheveux de l'espace de réception des cheveux (19).

2. Fer à friser selon la revendication 1, dans lequel le cylindre (16) bute contre le corps (10, 11) dans la position fermée.

3. Fer à friser selon la revendication 2, dans lequel une partie proche de l'extrémité distale (16b) du cylindre (16) bute contre le corps (10, 11) dans la position fermée.

4. Fer à friser selon l'une quelconque des revendications 1 à 3, dans lequel le couplage de déclenchement (90, 91) permet un déplacement coulissant du cylindre (16) par rapport au corps (10, 11), dans lequel le déplacement coulissant est optionnellement sensiblement perpendiculaire à l'axe central du cylindre.

5. Fer à friser selon la revendication 4, dans lequel le couplage de déclenchement (90, 91) comprend : un guide allongé (90) fixé sur l'un parmi le corps (10, 11) et le cylindre (16), et un bloc (91) engagé de manière coulissante dans le guide (90) et fixé sur l'autre parmi le corps (10, 11) et le cylindre (16).

6. Fer à friser selon les revendications 1 ou 2, dans lequel le couplage de déclenchement (90, 91) comprend un pivot (97) permettant un déplacement pivotant relatif du cylindre (16) par rapport au corps (310).

7. Fer à friser selon la revendication 6, dans lequel le pivot (97) comporte un axe de pivotement sensiblement orthogonal à l'axe central (17) du cylindre (16).

8. Fer à friser selon les revendications 6 ou 7, dans lequel l'axe de pivotement coupe l'axe central (17).

9. Fer à friser selon l'une quelconque des revendications 4 à 8, dans lequel le cylindre (16) est fixé sur une poignée (111) du fer à friser, de sorte que le couplage de déclenchement (90, 91) permet un déplacement relatif entre la poignée (111) et le corps (310).

10. Fer à friser selon la revendication 9, comprenant en outre un levier opérationnel (113) fixé sur le corps (10, 310), pour faire coulisser ou pivoter le corps (10, 310) par rapport à la poignée (111), et comprenant optionnellement en outre un interrupteur (170) actionné par le déplacement du levier opérationnel (113) pour alimenter en énergie un enrouleur (101) destiné à enrouler la mèche de cheveux (20) autour du cylindre (16).

11. Fer à friser selon l'une quelconque des revendications précédentes, comprenant en outre un capteur de température (109) pour fournir un signal de température indicatif d'une température de l'élément (81), et un moyen de commande (108) recevant le signal de température et contrôlant l'alimentation en énergie de l'élément (81) pour maintenir l'élément (81) dans i) un intervalle de températures de veille prédéfini, et ii) un intervalle de températures opérationnelles prédéfini supérieur à l'intervalle de températures de veille, et comprenant en outre un enrouleur (101) pour enrouler la mèche de cheveux (20) autour du cylindre (16), et un moyen de rétroaction connecté au moyen de commande (108) pour indiquer que l'enrouleur (101) est en service, dans lequel, lors de l'alimentation en énergie du fer à friser, le moyen de commande (108) actionne l'élément (81) pour maintenir l'élément (81) dans l'intervalle de températures de veille, et lorsque le moyen de rétroaction indique que l'enrouleur (101) est en service, le moyen de commande (108) actionne l'élément (81) pour maintenir l'élément (81) dans l'intervalle de températures opérationnelles, dans lequel, optionnellement :

i) le moyen de commande (108) comprend un circuit de temporisation et enregistre un temps écoulé depuis l'activation du moyen de rétroaction indiquant que l'enrouleur (101) est en service, et après que le temps écoulé dépasse une limite prédéfinie, le moyen de commande (108) change pour actionner l'élément (81) en vue de maintenir l'élément (81) dans l'intervalle des températures de veille, et/ou
ii) le fer à friser comprend un codeur rotatif (110) connecté au moyen de commande (108) pour indiquer le déplacement angulaire de l'enrouleur (101), et après qu'un déplacement angulaire prédéfini est dépassé, le moyen de commande (108) change pour actionner l'élément (81) en vue de maintenir l'élément (81) dans l'intervalle de températures de veille.

12. Fer à friser selon la revendication 1, dans lequel le corps (10, 11) comprend en outre une poignée (10) fixée sur une tête (11), la tête (11) entourant le cylindre (16) et renfermant l'espace de réception des cheveux (19) entre le cylindre (16) et la tête (11), et l'extrémité proximale (16a) du cylindre (16) est fixée dans la tête (11), et dans lequel la poignée (10) est optionnellement allongée, un axe (17) du cylindre (16) se situant dans un plan longitudinal coupant longitudinalement la partie de fente (18b) et coupant longitudinalement la poignée (10).

13. Fer à friser selon la revendication 1, dans lequel le cylindre (16) est un assemblage de deux parties semi-cylindriques semblables (80), dans lequel chacune des parties semi-cylindriques (80) renferme un élément chauffant respectif (81).

14. Fer à friser selon la revendication 13, comprenant en outre un enrouleur, l'enrouleur comprenant un élément (22) monté de sorte à tourner par rapport au cylindre (16) à travers l'espace de réception des cheveux (19), sensiblement autour de l'axe (17) du

cylindre (16), tout en se déplaçant simultanément de manière parallèle à l'axe (17) du cylindre (16).

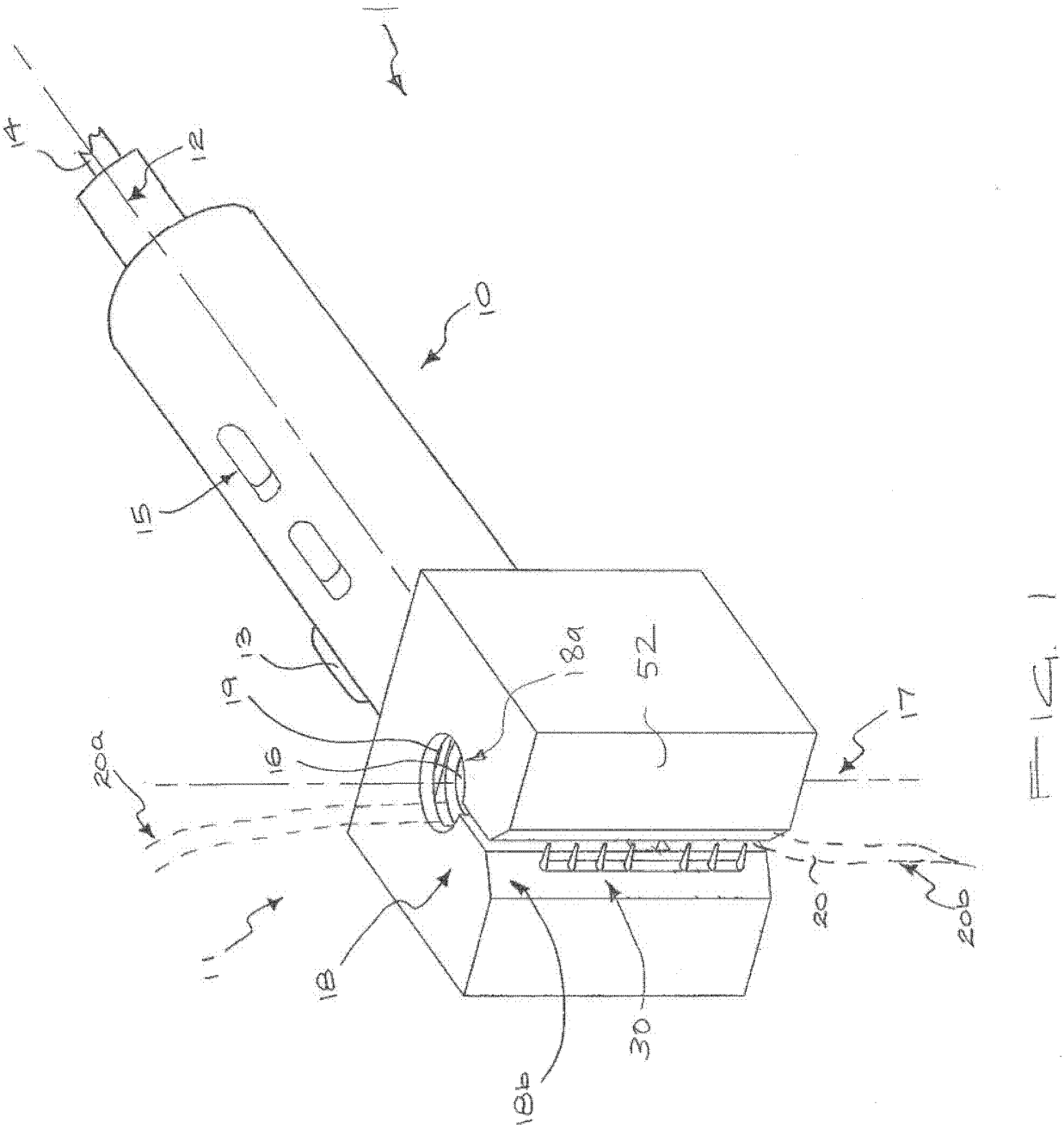


FIG. 1

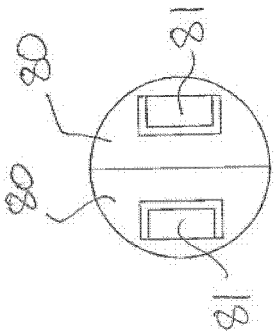

80
81
80
81

FIG 2b

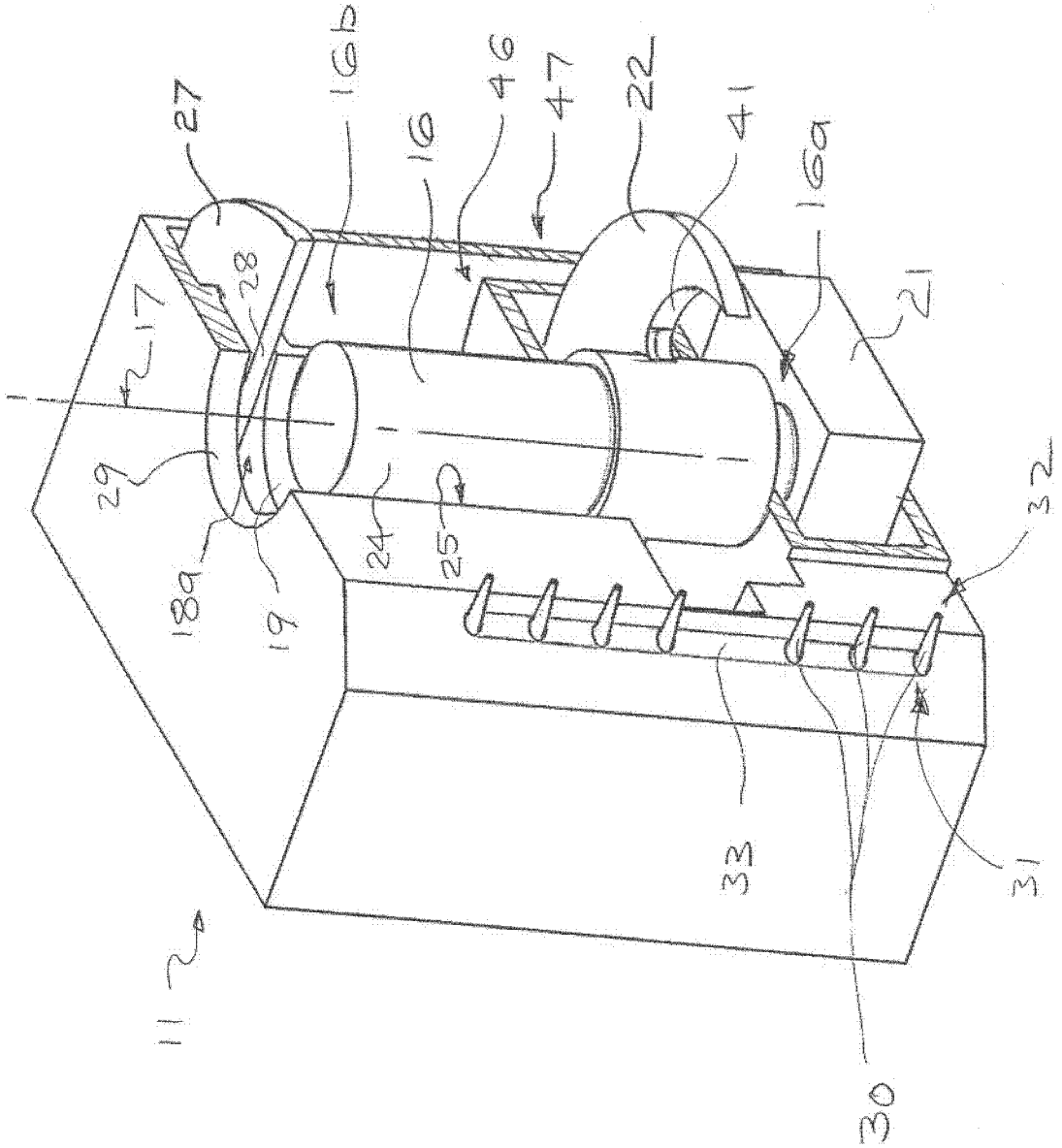

27
16b
16
46
47
22
41
16a
21
17
28
29
18a
19
24
25
32
33
31
30
11

FIG 2a

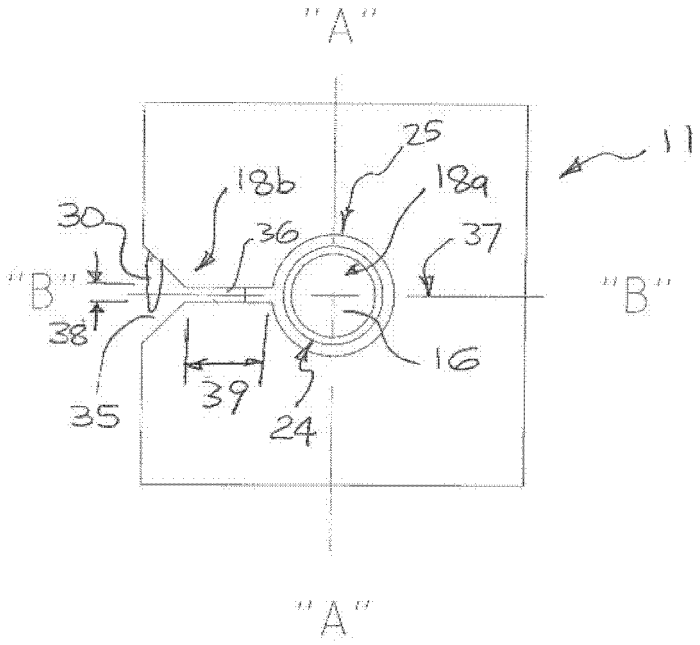


FIG. 3

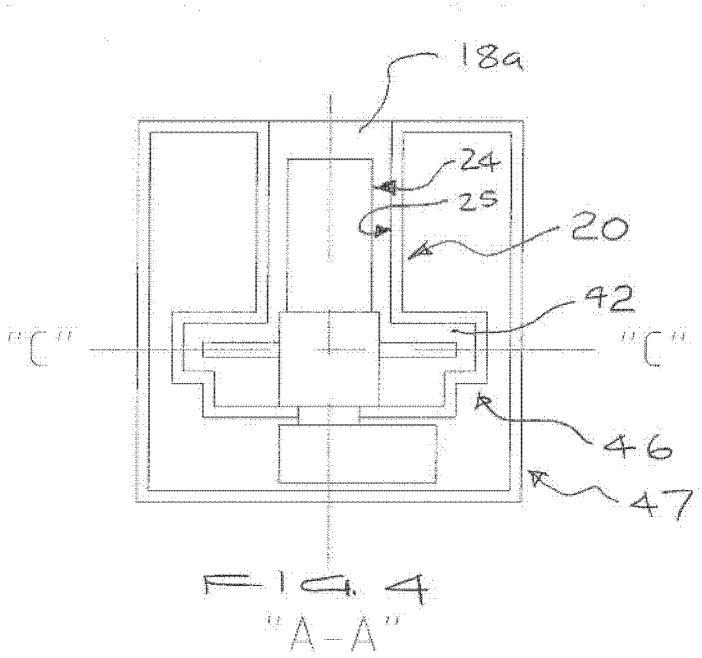


FIG. 4
"A-A"

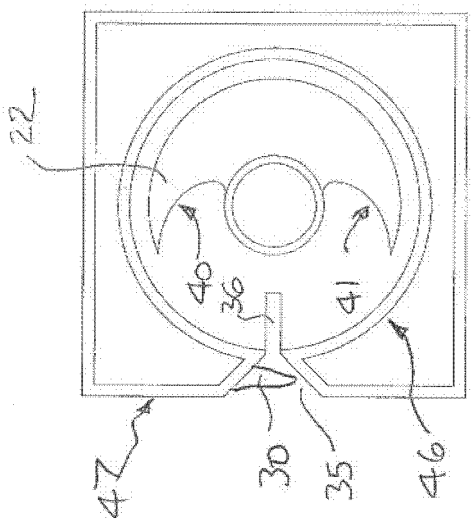


Fig. 5

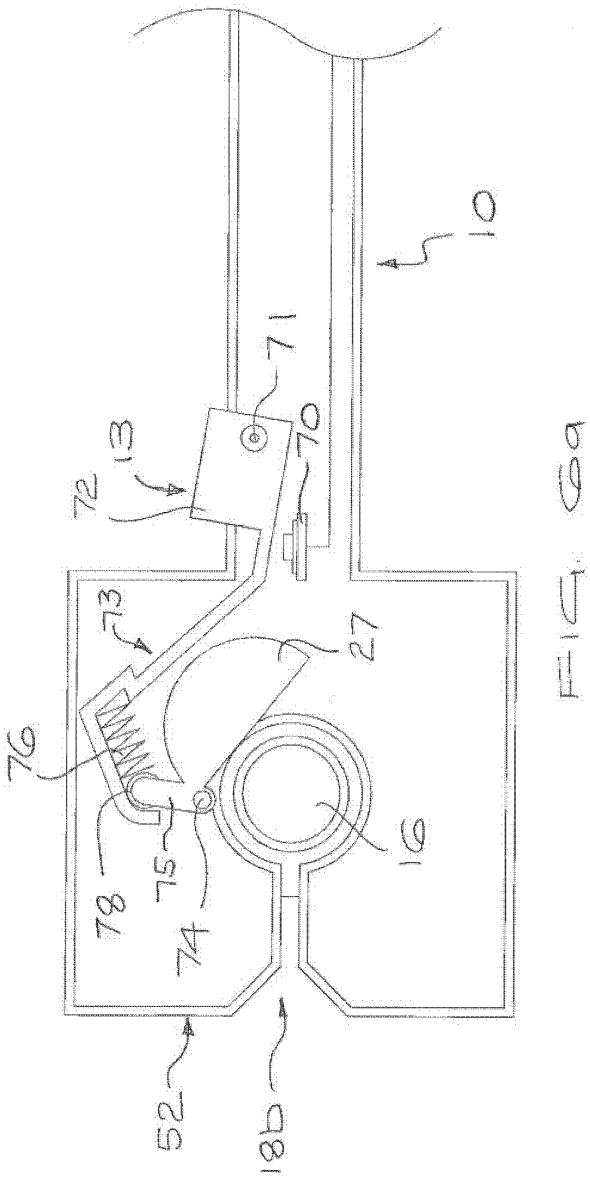


FIG. 6a

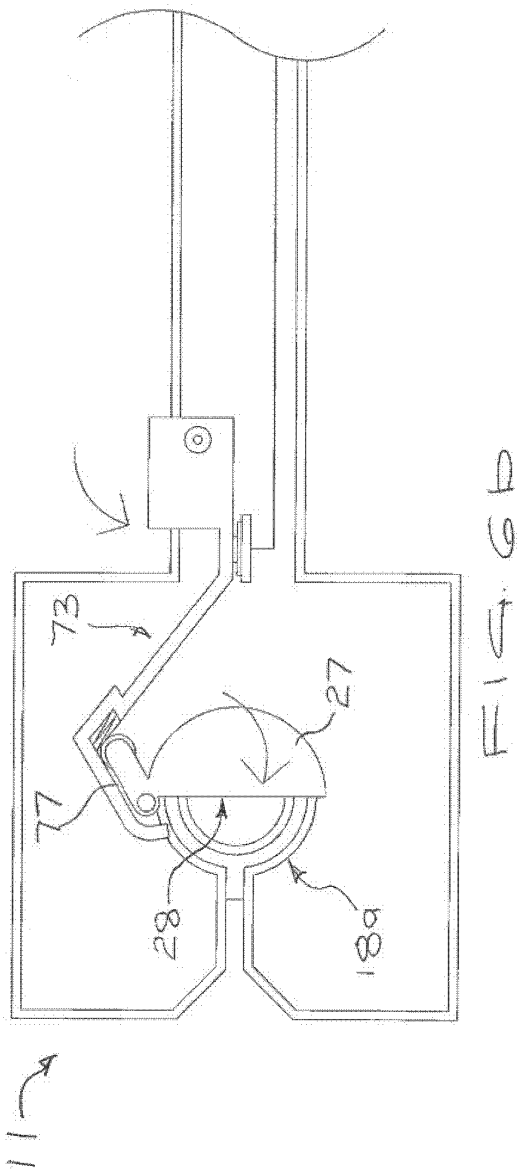
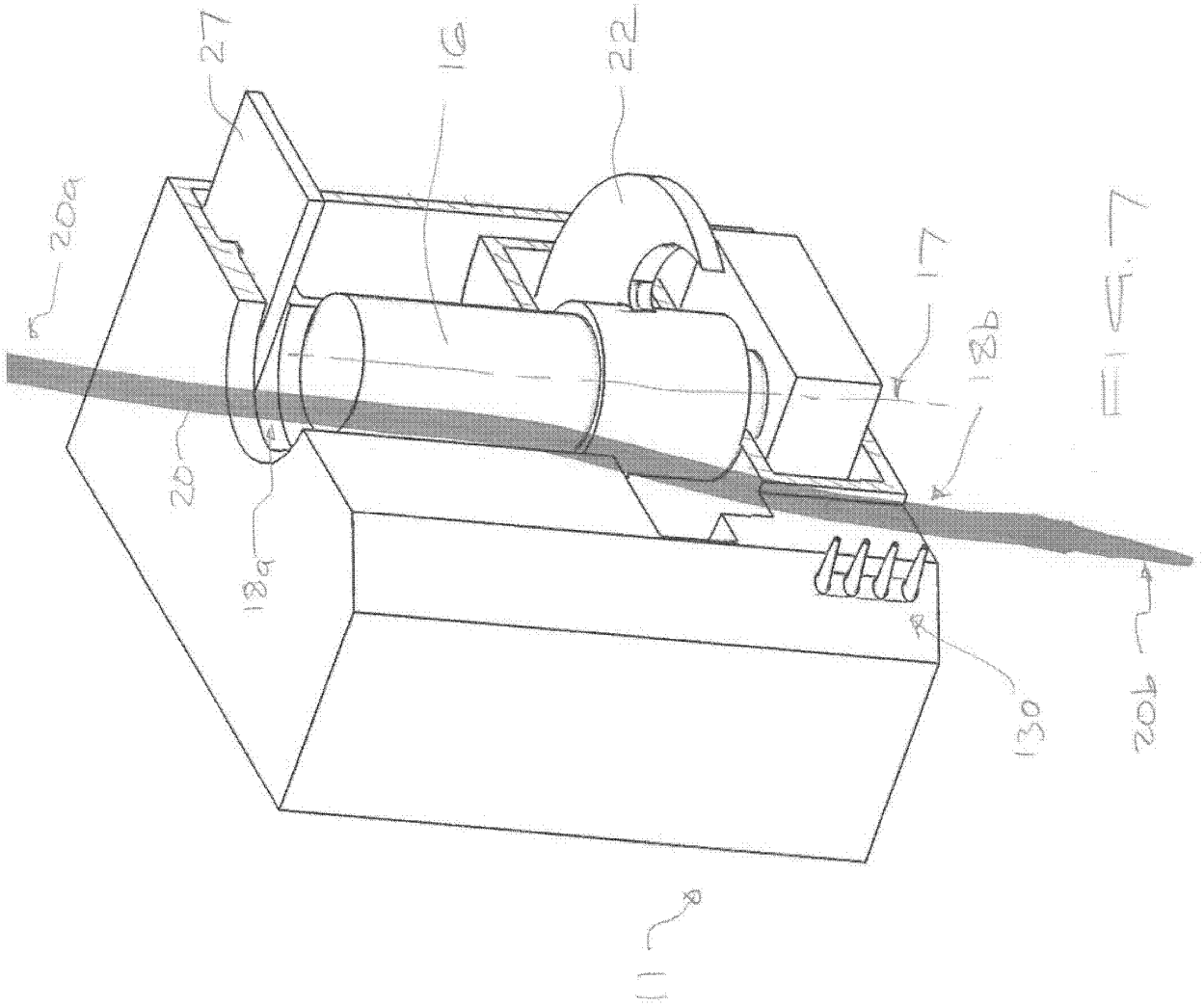


FIG. 6b


27
16
22
20a
17
18b
Fig. 7
20
18a
130
20b
11

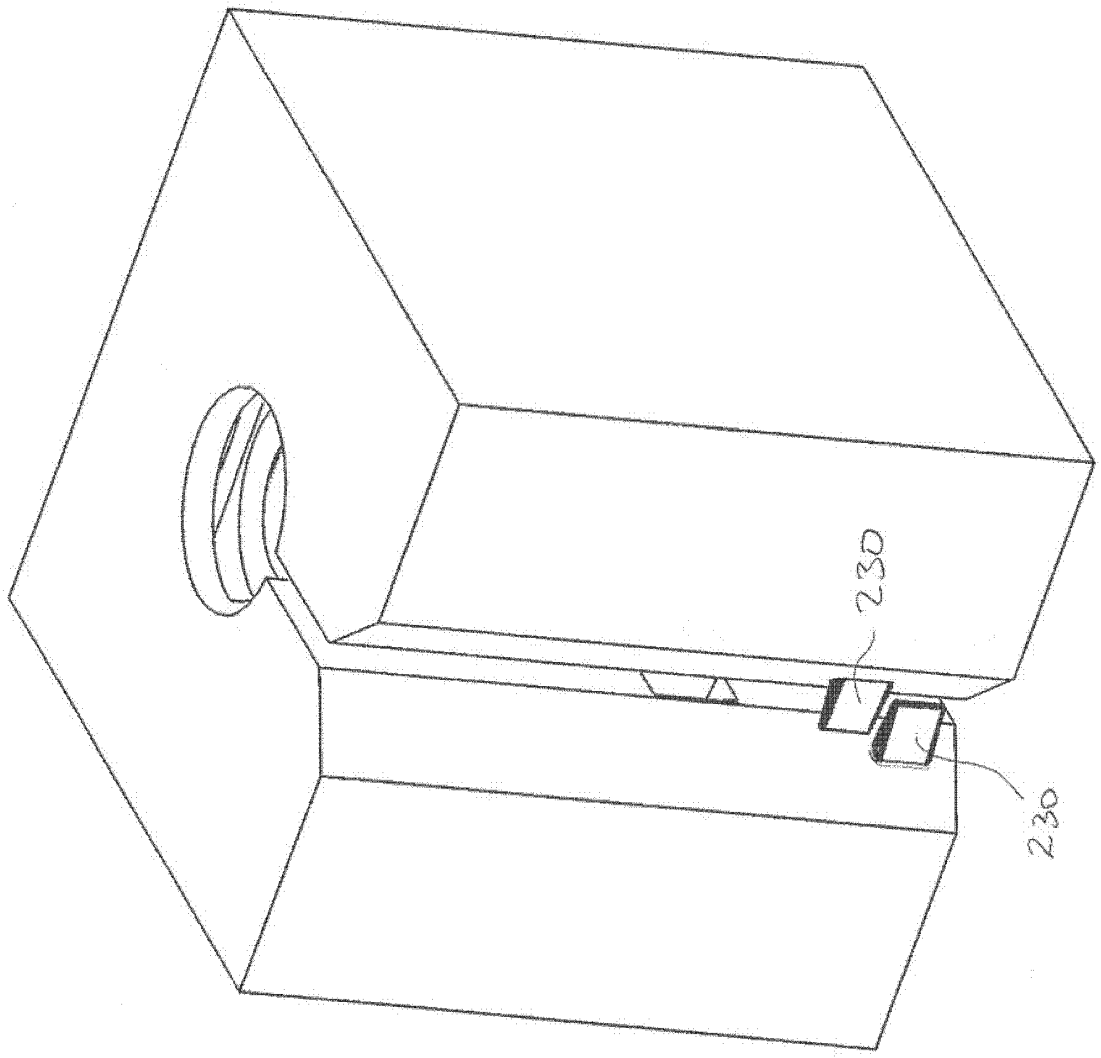


Fig. 8

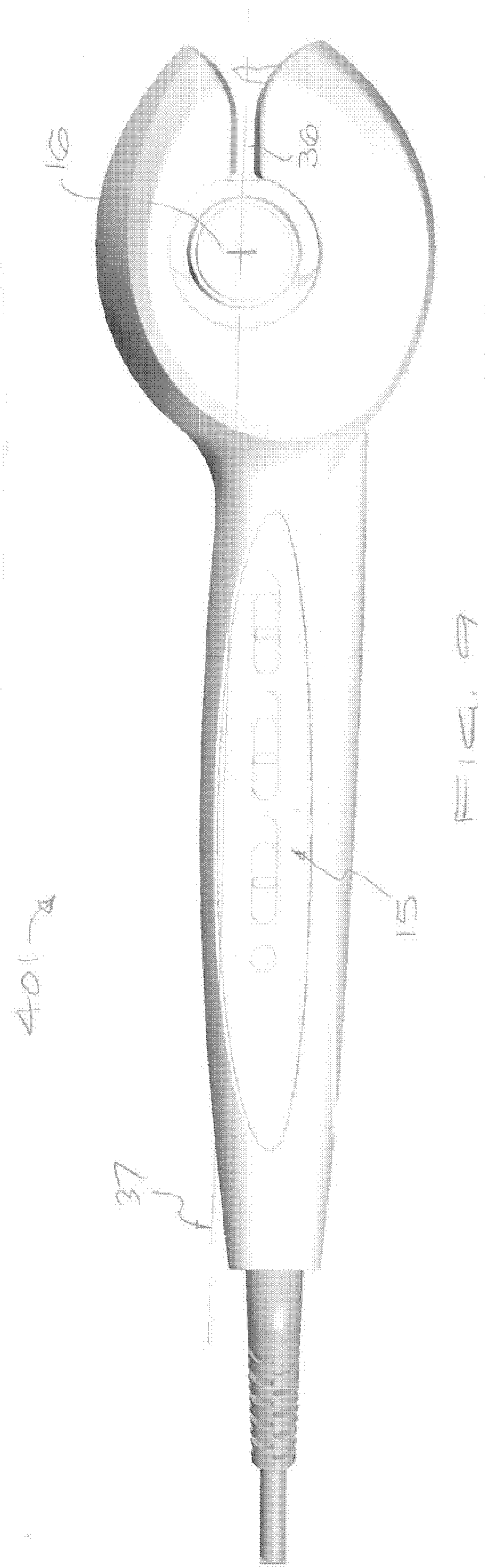


Fig. 9

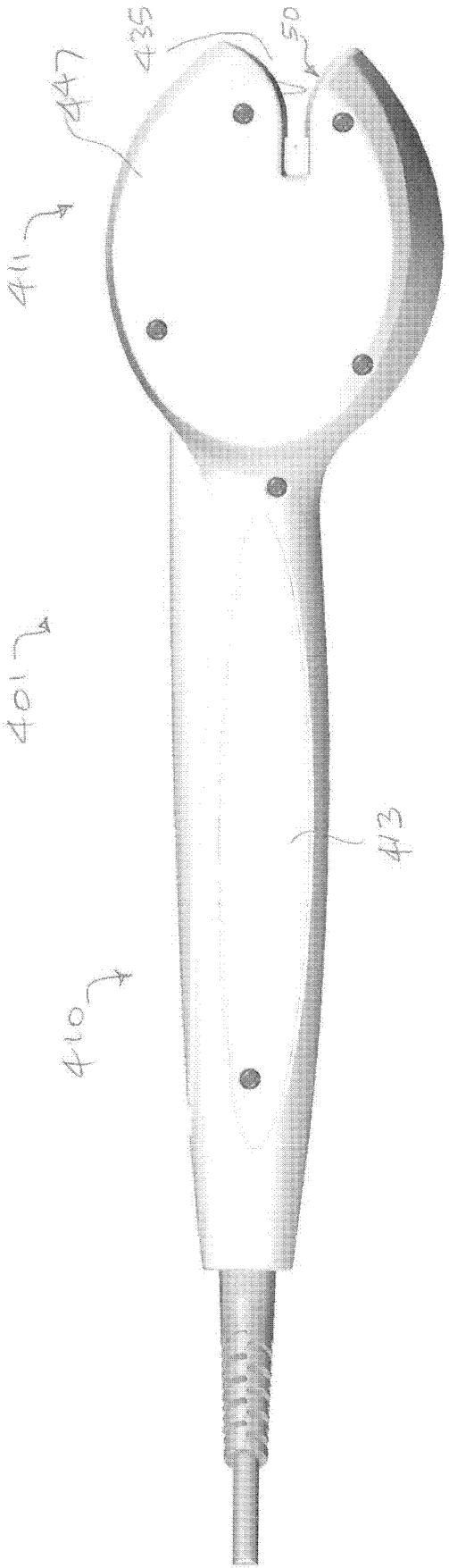


Fig. 10

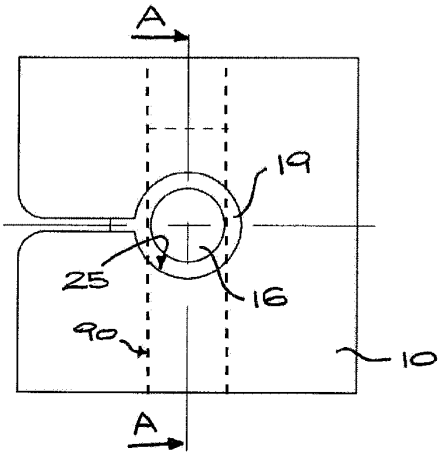


FIG. 11

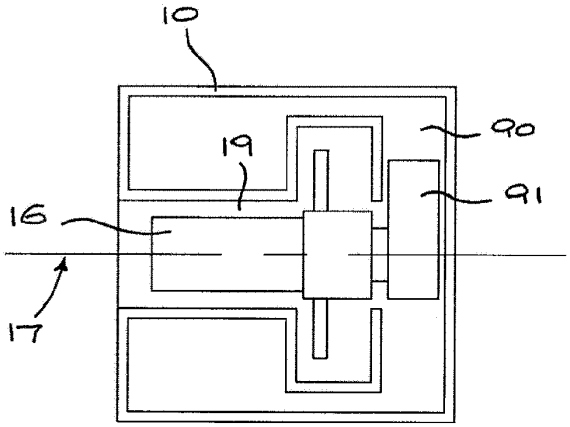


FIG. 12

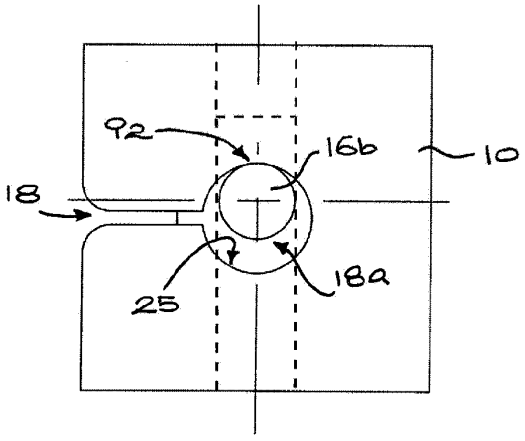


FIG. 13

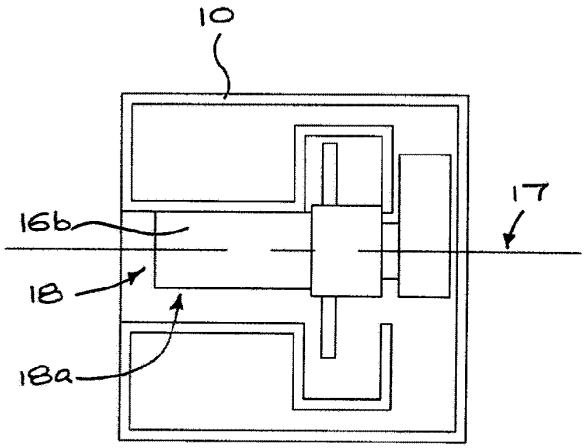


FIG. 14

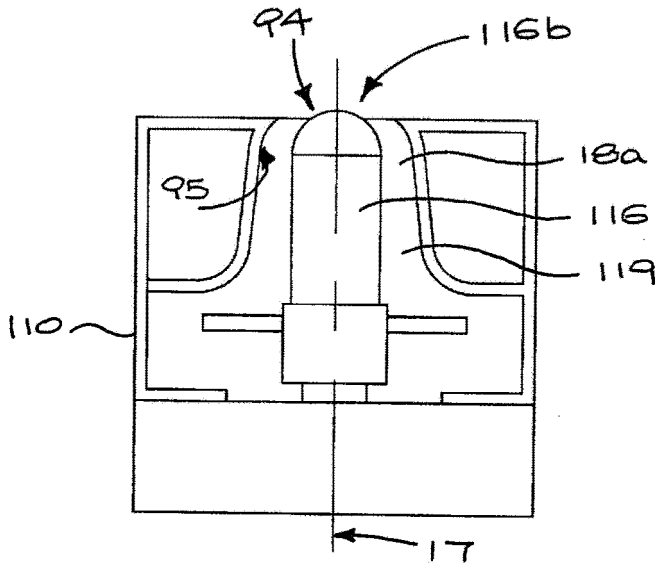


FIG. 15

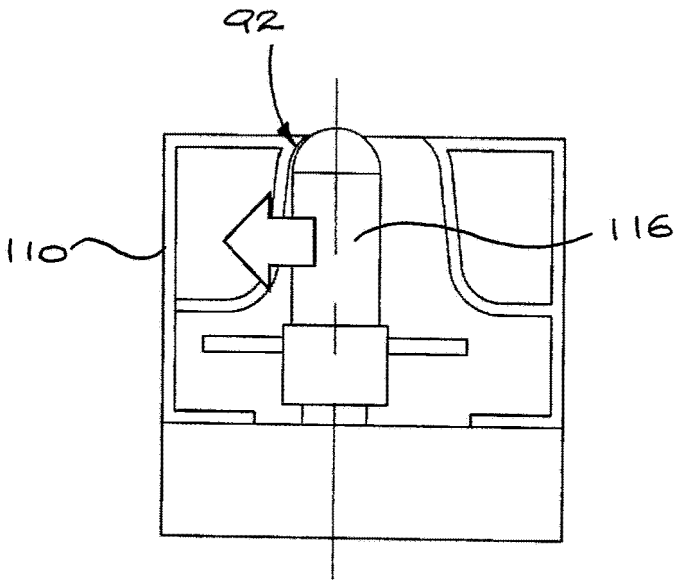


FIG. 16

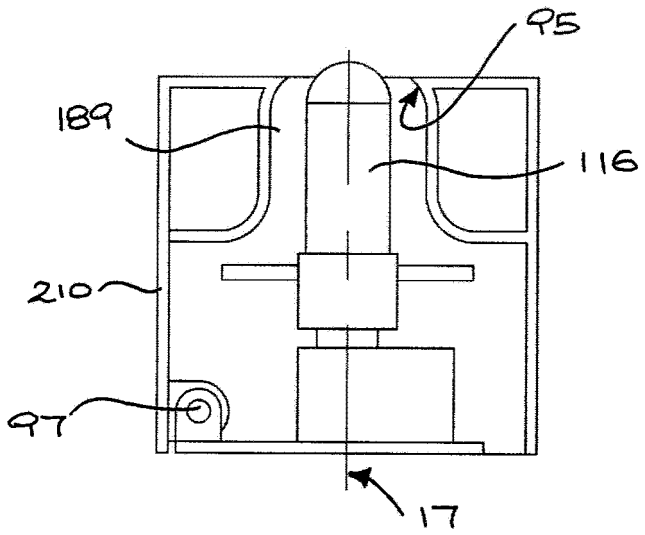


FIG. 17

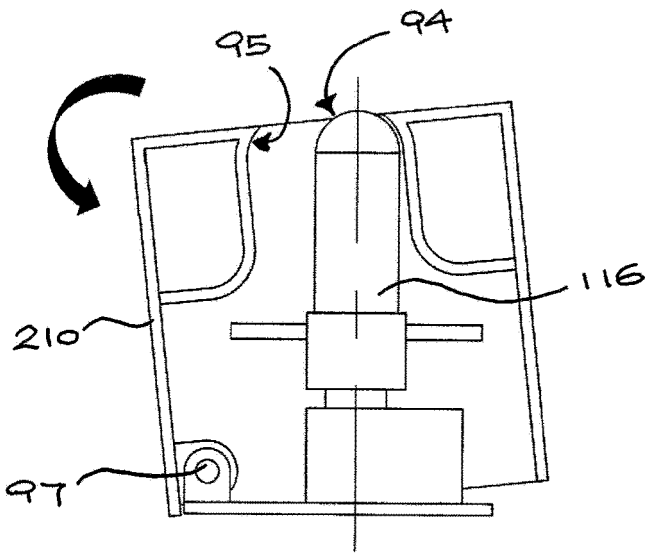


FIG. 18

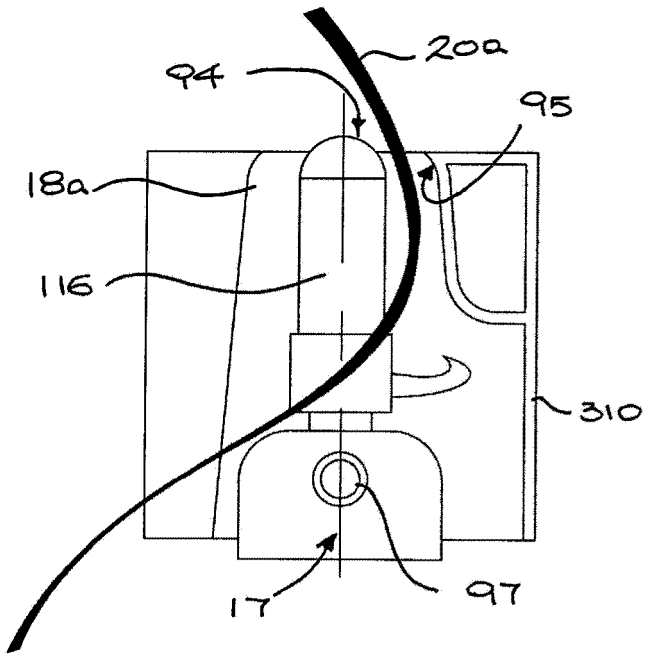


FIG. 19

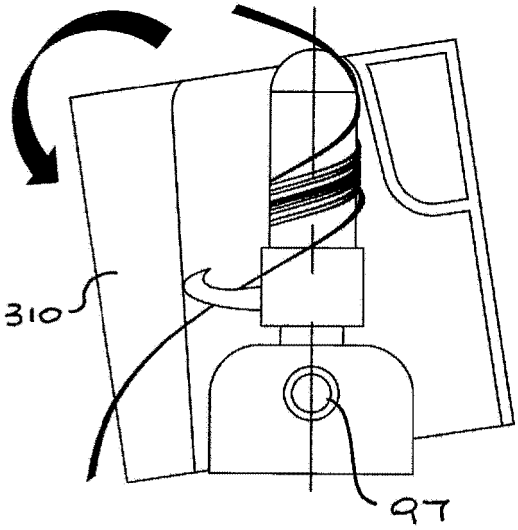


FIG. 20

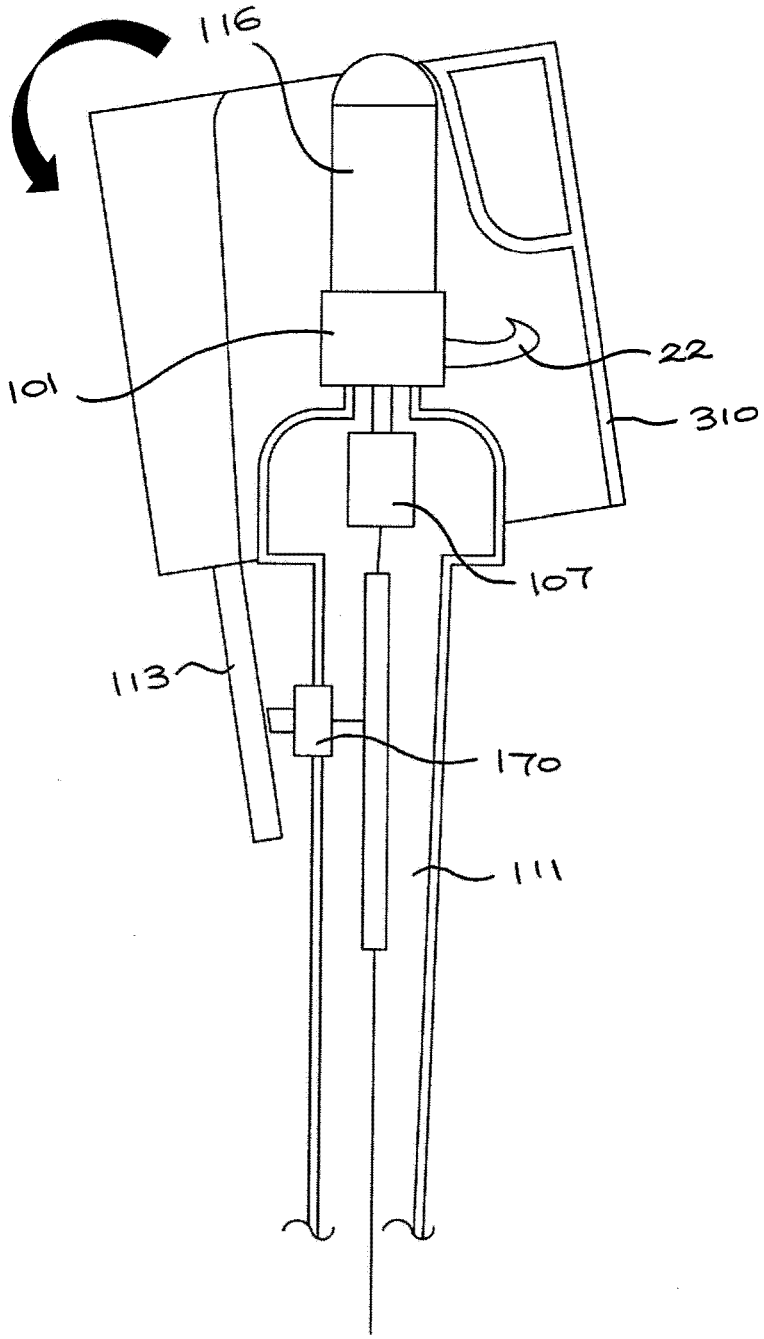


FIG. 21

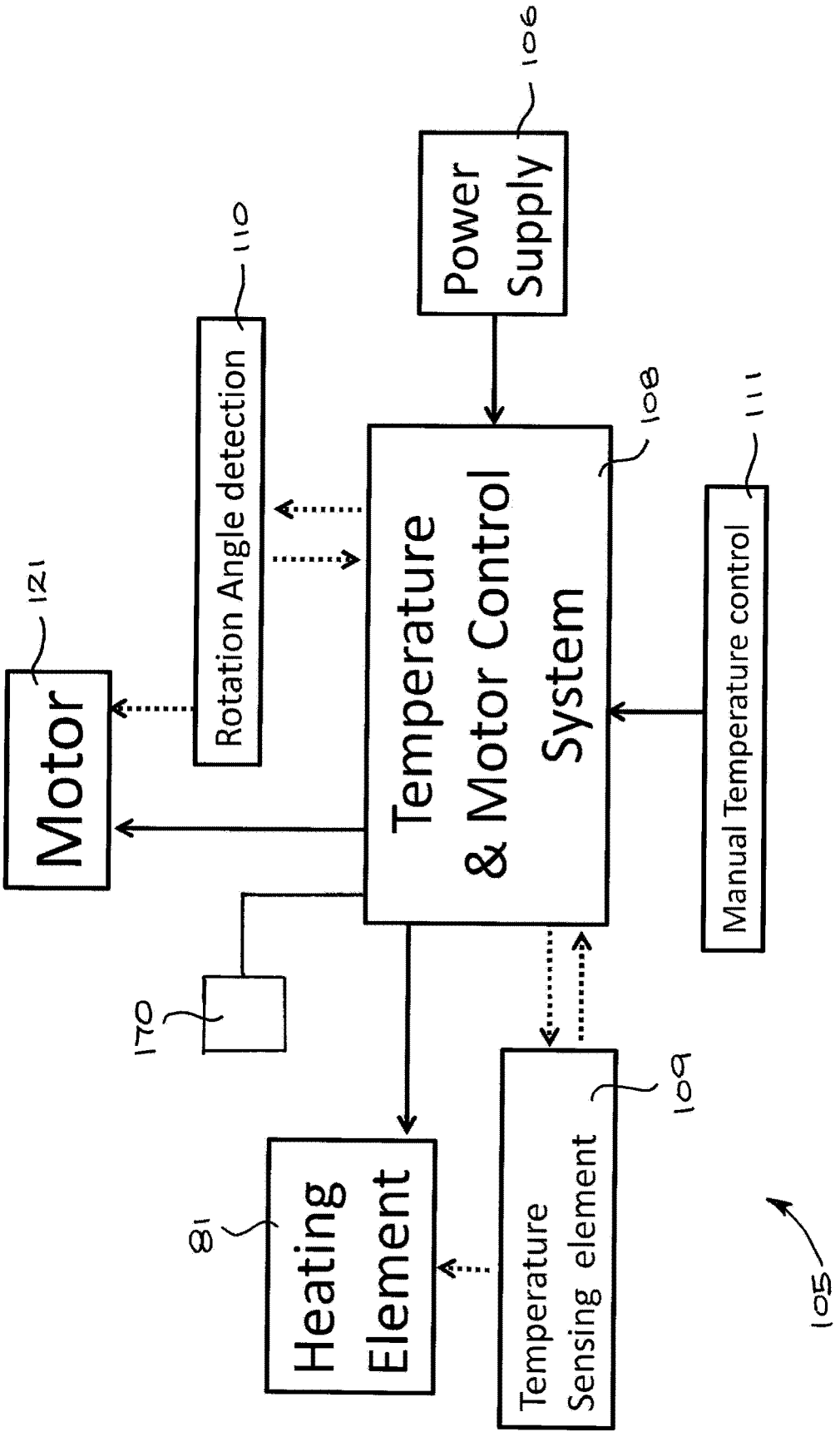

106
Power Supply
110
Rotation Angle detection
121
Motor
Temperature & Motor Control System
108
111
Manual Temperature control
170
109
Temperature Sensing element
81
Heating Element
105

FIG. 22

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20130025620 A **[0002]**
- WO 2013186547 A **[0002] [0003]**