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(54) **CURLING TOOL WITH ADJUSTABLE TWISTING FORCE**

(57) A curling tool with adjustable twisting force includes a working portion for connected with a hair roller, a driving device for driving the working portion to rotate, a circuit board for controlling the driving device, a control portion connected with the circuit board to make the driving device drive the working portion to rotate via the circuit board, a torque detecting device connected to the working portion to detect the torque of the working portion and

to send it to the circuit board, a torque display device connected with the torque detecting device for displaying the value of torque, a torque setting portion connected with the circuit board for setting a predetermined torque. When the detected torque reaches the predetermined value, the circuit board makes the driving device drive the working portion to stop rotating so as to prevent hair from over-rotated.

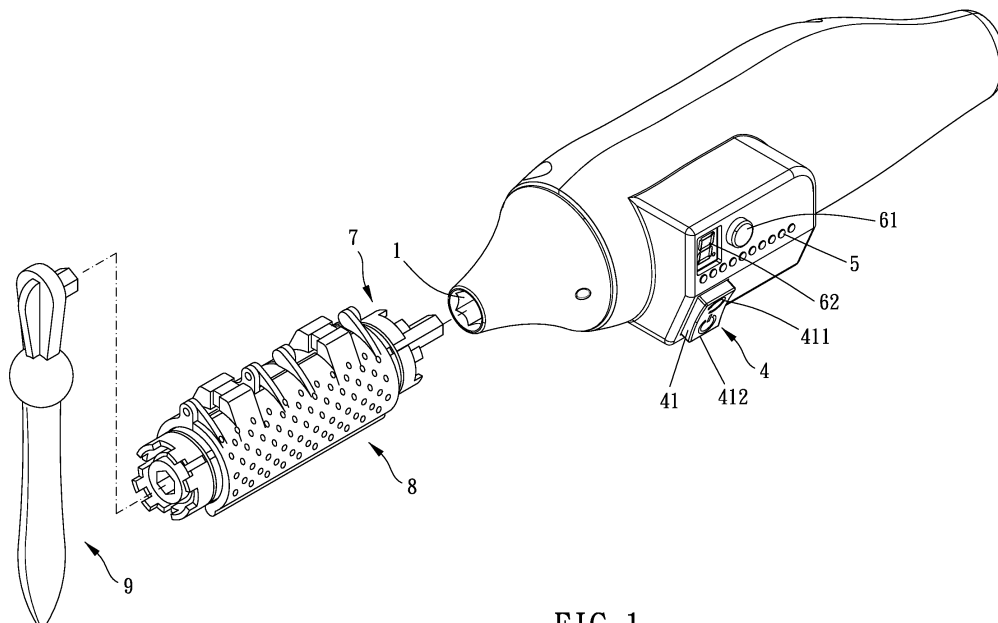


FIG. 1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a curling tool, more especially to a curling tool whose maximum torque is adjustable.

Description of the Prior Art

[0002] Conventionally, hair perm is processed by applying a perm agent on the hair and twining the hair on a hair roller followed by heating the hair roller. An adjustable hair roller is disclosed in patent TW M374774. The hair roller has plural plates which are expandable and resumable. The hair is extended and shaped by the expanded plates. However, the appropriate tension of hair is decided by the health condition of hair. Damaged hair may be further damaged or fracture under higher tension. On the contrary, healthy hair may be applied under higher tension. Hair stylists without sufficient experiences are unable to apply appropriate tension to the hair.

[0003] To improve the conventional hair roller, a curling tool with torque display is disclosed in patent TW I365055. A rotation tool for connecting with the hair roller is included. When the rotation tool rotates, the plates of the hair roller move outward or inward to expand or resume. In addition, a torque detecting device and a torque display device are also included to detect the torque of twined hair and to inform the user. However, the user still has to judge when to stop the rotation tool by himself. Thus, damage of hair resulted by over-rotation is still possible. Besides, a general consumer lacking of experience is difficult to operate.

SUMMARY OF THE INVENTION

[0004] The main object of the present invention is to provide a curling tool with adjustable twisting force, whose maximum torque can be adjusted.

[0005] To achieve the above and other objects, a curling tool with adjustable twisting force of the present invention includes a working portion, a driving device, a circuit board, a control portion, a torque detecting device, a torque display device, and a torque setting portion.

[0006] The working portion is adapted for being disposed with a hair roller. The driving device drives the working portion to rotate via a decelerating device. The circuit board controls the driving device. The control portion is connected with the circuit board to control the driving portion to drive the working portion to rotate about a first direction, about a reverse second direction, or stop rotating. The torque detecting device is connected with the working portion to detect a torque of the working portion about the first direction and to send a value of the torque detected to the circuit board. The torque display

device is connected with the torque detecting device to display a value of the torque detected by the torque detecting device. The torque setting portion is connected with the circuit board to set off a predetermined value of torque. When a value of torque about the first direction received by the circuit board from the torque detecting device reaches the predetermined value of torque, the circuit board triggers the driving device to drive the working portion to stop rotating about the first direction.

[0007] The present invention will become more obvious from the following description when taken in connection with the accompanying drawings, which show, for purpose of illustrations only, the preferred embodiment(s) in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a stereogram of the present invention;
Fig. 2 is a breakdown drawing of the present invention;
Fig. 3 is an illustration of the present invention;
Fig. 4 is a partial profile of the present invention;
Fig. 5 is a breakdown drawing of a hair roller and an outer cover of the present invention;
Fig. 6 is a profile of a hair roller and an outer cover of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] Please refer to Fig. 1 to Fig. 6, the curling tool with adjustable twisting force of the present invention includes a working portion 1, a driving device 2, a circuit board 3, a control portion 4, a torque detecting device, a torque display device 5, a torque setting portion 6, a hair roller 7, and an outer cover 8.

[0010] The working portion 1, the driving device 2, the circuit board 3, the control portion 4, the torque detecting device, the torque display device 5, the torque setting portion 6 are received in a housing. The working portion 1 is adapted for the hair roller 7 to connect with. In the present embodiment, the working portion 1 has a hexagonal hole, and the hair roller 7 has a hexagonal column to mate with the hexagonal hole so that the working portion 1 can bring the hair roller 7 to rotate. Specifically, the working portion 1 rotates at a constant speed. The driving device 2 drives the working portion 1 to rotate via a decelerating device. In the present embodiment, the driving device 2 includes a motor. The circuit board 3 controls the operation of the driving device 2. The control portion 4 is connected with the circuit board 3 to make the driving device 2 to drive the working portion 1 to rotate about a first direction, a reverse second direction, or to stop rotating via the circuit board 3. In the present embodiment, the control portion 4 includes a rocker switch 41 having a rotation switch 411 and a reverse rotation switch 412

at two opposite ends thereof. When the rocker switch 41 is long pressed, the power of the curling tool is switched on. When the rotation switch 411 is pressed, the working portion 1 is driven to rotate about the first direction. When the reverse rotation switch 412 is continuously pressed, the working portion 1 is driven to rotate about the second direction.

[0011] The torque detecting device is connected with the working portion 1 to detect the value of torque of the working portion 1 around the first direction, and then sends it to the circuit board 3. The torque display device 5 is connected with the torque detecting device to show the value of torque detected by the torque detecting device. In the present embodiment, the torque display device 5 includes a plurality of LED lights 51. The number of the LED lights 51 which light on is proportional to the detected value of torque. Thus, the value of torque can be read from the number of the LED lights which light on. However, the torque display device can be any kind of display device, such as LED display. The torque setting portion 6 is connected with the circuit board 3 for setting a predetermined value of torque. When the circuit board 3 receives the detected value of torque reaching the predetermined value of torque, the circuit board 3 makes the driving device 2 drive the working portion 1 to stop rotating about the first direction. In the present embodiment, the torque setting portion 6 includes a setting button 61 and a display device 62. The predetermined value of torque can be adjusted by pressing the setting button 61, and the predetermined value of torque is shown on the display device 62, such as an LCD display.

[0012] The hair roller 7 is adapted for hair to twine on and is coaxially disposed on the working portion 1. The hair roller 7 includes a plurality of shells 71 and a conical pressing element 72. The shells 71 are arranged about an axial direction. Each shell 71 is formed with a recess, and the recesses form a conical space 711. The pressing element 72 is received in the conical space 711 and is linked-up with the working portion 1. More specifically, the pressing element 72 is screwed to a terminal end of the hair roller 7, and the inner diameter of the conical space 711 increases from an end near the working portion 1 toward an opposite end away from the working portion 1. When the working portion 1 rotates about the first direction, the pressing element 72 also rotates with respect to the hair roller 7 so that the pressing element 72 moves along the axial direction. Due to the conical space 711, the moving pressing element 72 pushes the shells 71 outward to make them move away from each other. Thus, the outer diameter of the hair roller 7 is increased. On the contrary, when the working portion 1 rotates about the second direction, the pressing element 72 moves toward an opposite direction to make the shells 71 move toward each other. Thus, the outer diameter of the hair roller 7 is reduced. Preferably, the hair roller 7 further includes at least one elastic ring 73, and the shells 71 are formed with annular grooves on the outer surface thereof for the elastic ring to be embedded in. The elastic

ring 73 makes the shells 71 tend to move toward each other to facilitate the expanding and resuming.

[0013] The outer cover 8 includes two clamping elements 81 which are pivotally connected to each other. A gap is formed between the two clamping elements 81 at an end of the outer cover 8 opposite to the pivot axis. Each clamping element 81 is bending and arc-shaped. An adjusting piece 82 is detachably disposed on the outer cover 8 near the pivot axis. When the adjusting piece 82 is removed, the two clamping elements 81 are able to pivot a larger angle to make a maximum width of the gap larger. When the adjusting piece 82 has a larger length, the two clamping elements 81 are able to pivot a smaller angle to make a maximum width of the gap smaller. The outer cover 8 is sleeved onto the hair roller 7. More specifically, the hair is twined on the hair roller 7, and then the outer cover 8 is further sleeved onto the hair roller 7. For hair roller 7 of different size or varied amount of hair, the maximum size of the outer cover 8 can be alternated by the adjusting piece 82. In other words, the adjusting piece 82 becomes a hindrance of the expanding of the clamping elements 81 to restrict the space of clamping. On the contrary, when the adjusting piece 82 is removed or shorter adjusting piece 82 is used, the hindrance is reduced, so the space of clamping is larger for receiving bigger hair roller 7 or allowing the hair roller 7 to expand more. In the present embodiment, notches are formed on the two clamping elements 81 for the adjusting piece 82 to be disposed on. Besides, the adjusting piece 82 is resilient preferably.

[0014] In use, the hair is twined on the hair roller 7, and then the outer cover 8 is sleeved onto the hair roller 7. And then, connect the working portion 1 with the hair roller 7. The other end of the hair roller 7 is positioned by a positioning element 9, such as a polygonal column, so that the hair roller 7 may not be rotated when the outer cover 8 is expanded. Set the predetermined value of torque with the setting button 61, and press the rotation switch 411 to drive the working portion 1 to rotate about the first direction. When the detected value of torque reaches the predetermined value of torque, the circuit board 3 triggers the working portion 1 to stop rotating to prevent the hair from damaging. After the process of perming is completed, connect the working portion 1 to the hair roller 7, and continuously press the reverse rotation switch 412 to drive the working portion 1 to rotate about the second direction so as to resume the hair roller 7. And then, the hair can be removed from the hair roller 7. In a preferred embodiment, several predetermined values of torque can be set by the manufacturer, and the user can adjust the torque following the user's manual.

[0015] In conclusion, a desired value of torque can be set according to the hair condition or needs. For example, if the hair is damaged, a lower value of torque is desired. If the hair is healthy and a better performance of perming is required, a higher value of torque is desired. The user doesn't have to be aware of the current torque to stop the rotation manually, and the over-rotation is prevented.

Besides, the outer cover can be used on hair rollers in different sizes.

Claims

1. A curling tool with adjustable twisting force, including:

a working portion (1), for being disposed with a hair roller (7);

a driving device (2), driving the working portion (1) to rotate via a decelerating device;

a circuit board (3), controlling the driving device (2);

a control portion (4), connected with the circuit board (3) to control the driving portion (2) to drive the working portion (1) to rotate about a first direction, about a reverse second direction, or stop rotating;

a torque detecting device, connected with the working portion (1) to detect a torque of the working portion (1) about the first direction and to send a value of the torque detected to the circuit board (3);

a torque display device (5), connected with the torque detecting device to display a value of the torque detected by the torque detecting device; a torque setting portion (6), connected with the circuit board (3) to set off a predetermined value of torque, the circuit board (3) triggering the driving device (2) to drive the working portion (1) to stop rotating about the first direction when a value of torque about the first direction received by the circuit board (3) from the torque detecting device reaches the predetermined value of torque.

2. The curling tool with adjustable twisting force of claim 1, wherein the torque setting portion (6) includes a setting button (61) and a display device (62), the predetermined value of torque is adjustable by pressing the setting button (61), the predetermined value of torque is shown on the display device (62).

3. The curling tool with adjustable twisting force of claim 1, wherein the torque display device (5) includes a plurality of LED lights (51), a number of the LED lights (51) which are on is proportional to the value of torque detected by the torque detecting device.

4. The curling tool with adjustable twisting force of claim 1, wherein the working portion (1) has a constant rotating speed.

5. The curling tool with adjustable twisting force of claim 1, further includes a hair roller (7), the hair roller (7) being coaxially disposed on the working portion (1)

and including a plurality of shells (71) and a pressing element (72), the shells (71) being arranged around an axial direction, each shell (71) being formed with a recess on an inner wall thereof, the recesses forming a conical space (711), the pressing element (72) being located in the conical space (711) and being linked up with the working portion (1), the pressing element (72) moving in the conical space (711) along the axial direction to make the shells (71) move away from each other so as to expand an outer diameter of the hair roller (7) when the working portion (1) rotates about the first direction, the pressing element (72) moving toward an opposite direction to make the shells (71) move toward each other so as to reduce the outer diameter of the hair roller (7) when the working portion (1) rotates about the second direction.

6. The curling tool with adjustable twisting force of claim 5, wherein the hair roller (7) further includes at least one elastic ring (73), the shells (71) are formed with annular grooves on outer surfaces thereof for the elastic ring (73) to be embedded in, the elastic ring (73) makes the shells (71) tend to move toward each other.

7. The curling tool with adjustable twisting force of claim 5, further including an outer cover (8) for being disposed outside the hair roller (7), the outer cover (8) including two clamping elements (81) which are pivotally connected to each other, a gap being formed between the two clamping elements (81) at an end of the outer cover (8) opposite to a pivot axis of the two clamping elements (81), each clamping element (81) being bending and arc-shaped, an adjusting piece (82) being detachably disposed on the clamping elements (81) near the pivot axis, the two clamping elements (81) being able to pivot a larger angle to make a maximum width of the gap larger when the adjusting piece (82) is removed, the two clamping elements (81) being able to pivot a smaller angle to make a maximum width of the gap smaller when the adjusting piece (82) has a larger length.

8. The curling tool with adjustable twisting force of claim 1, wherein the control portion (4) includes a rocker switch (41) having a rotation switch (411) and a reverse rotation switch (412) at two opposite ends thereof, a power supply is switched on when the rocker switch (41) is long pressed, the working portion (1) is driven to rotate about the first direction until the value of torque detected by the torque detecting device reaches the predetermined value of torque when the rotation switch (411) is pressed, the working portion (1) is driven to rotate about the second direction when the reverse rotation switch (412) is continuously pressed.

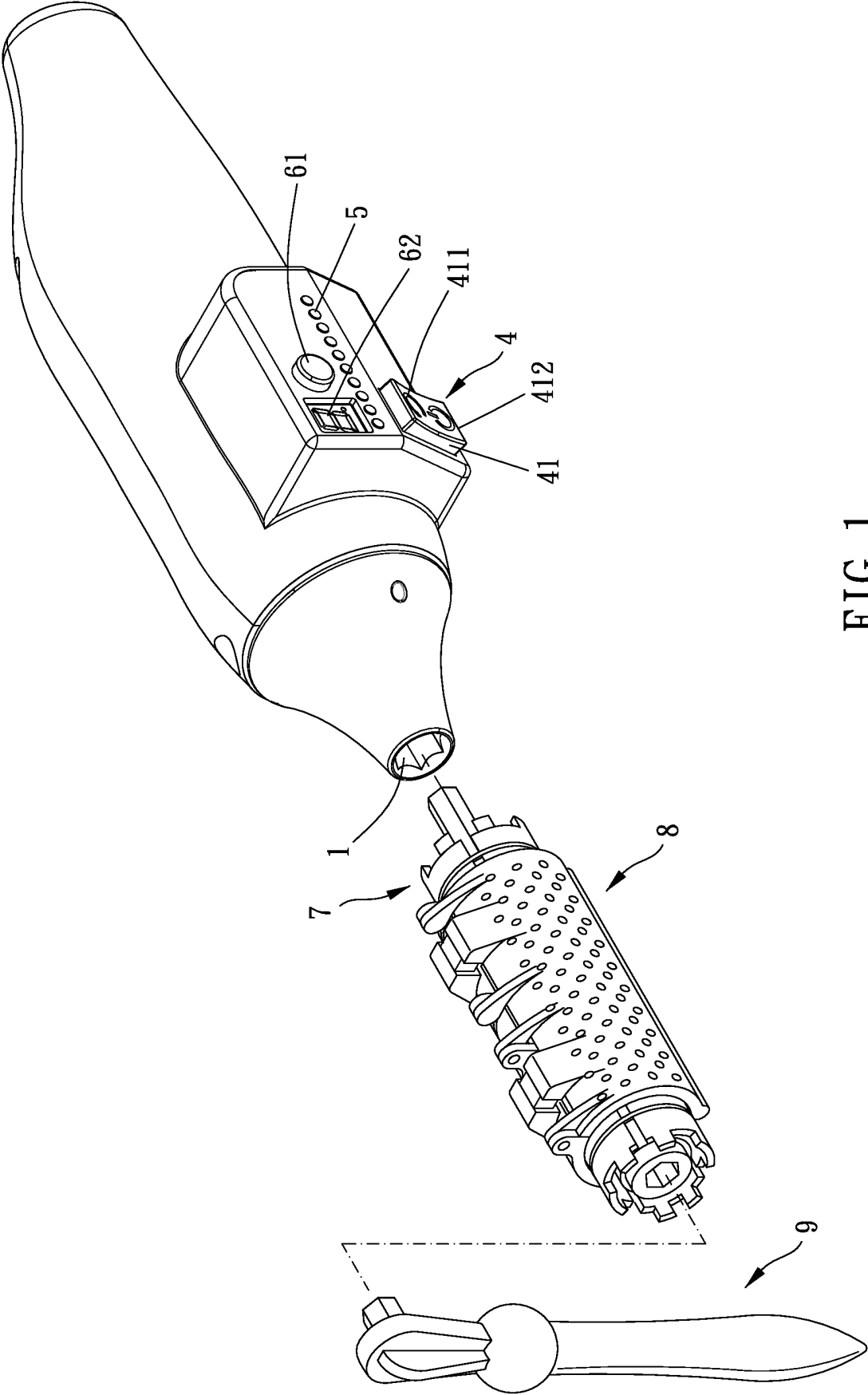


FIG. 1

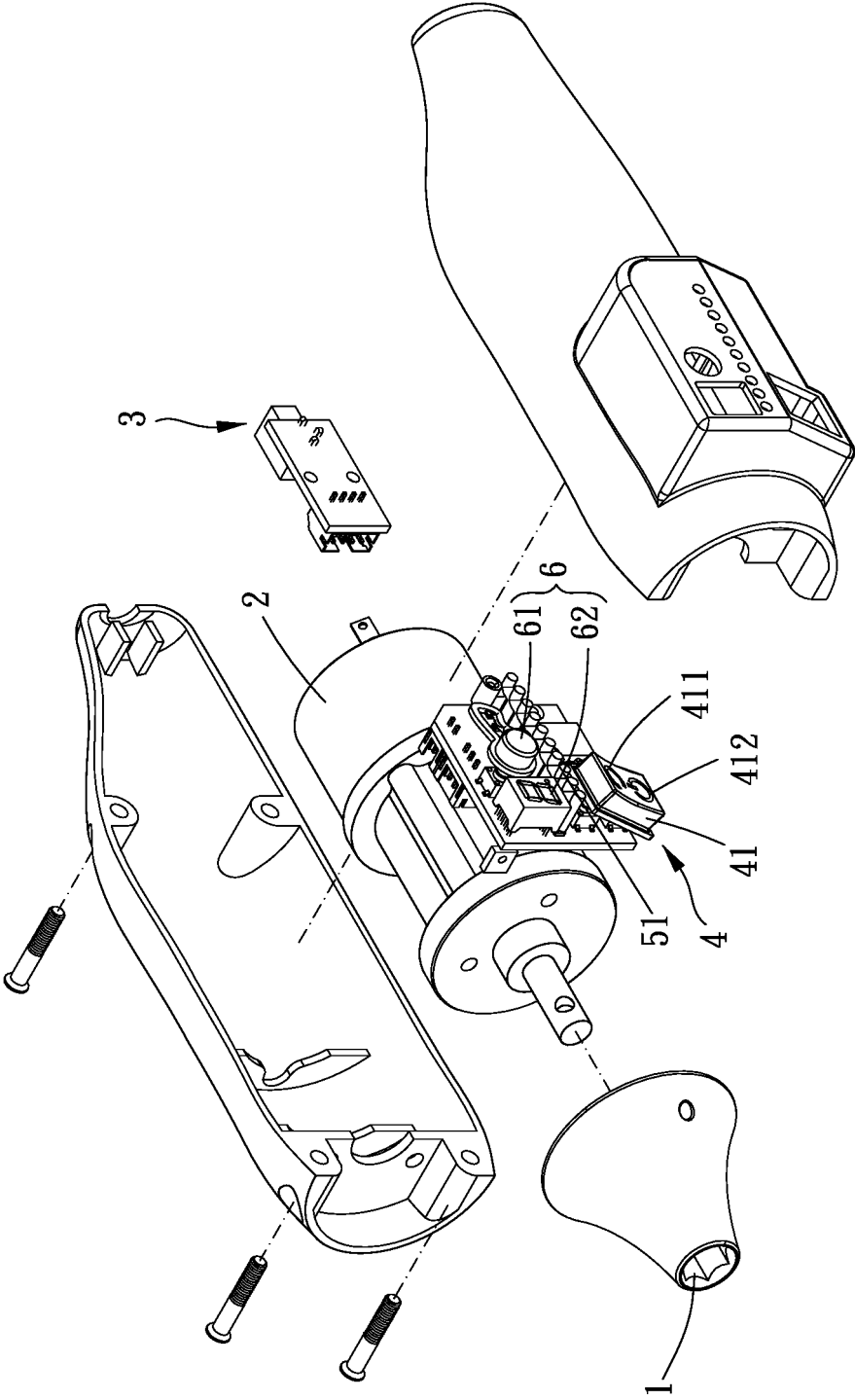


FIG. 2

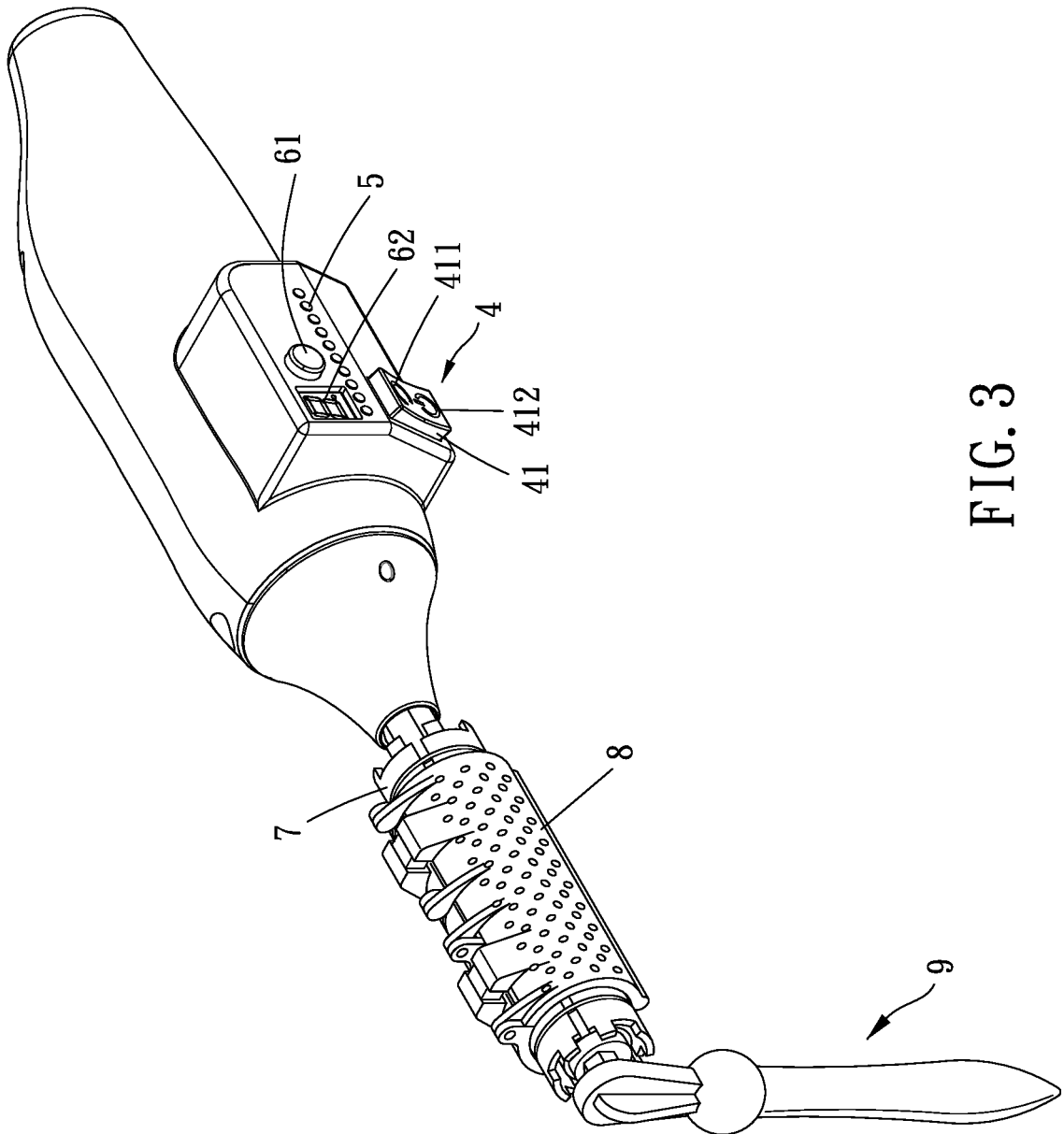


FIG. 3

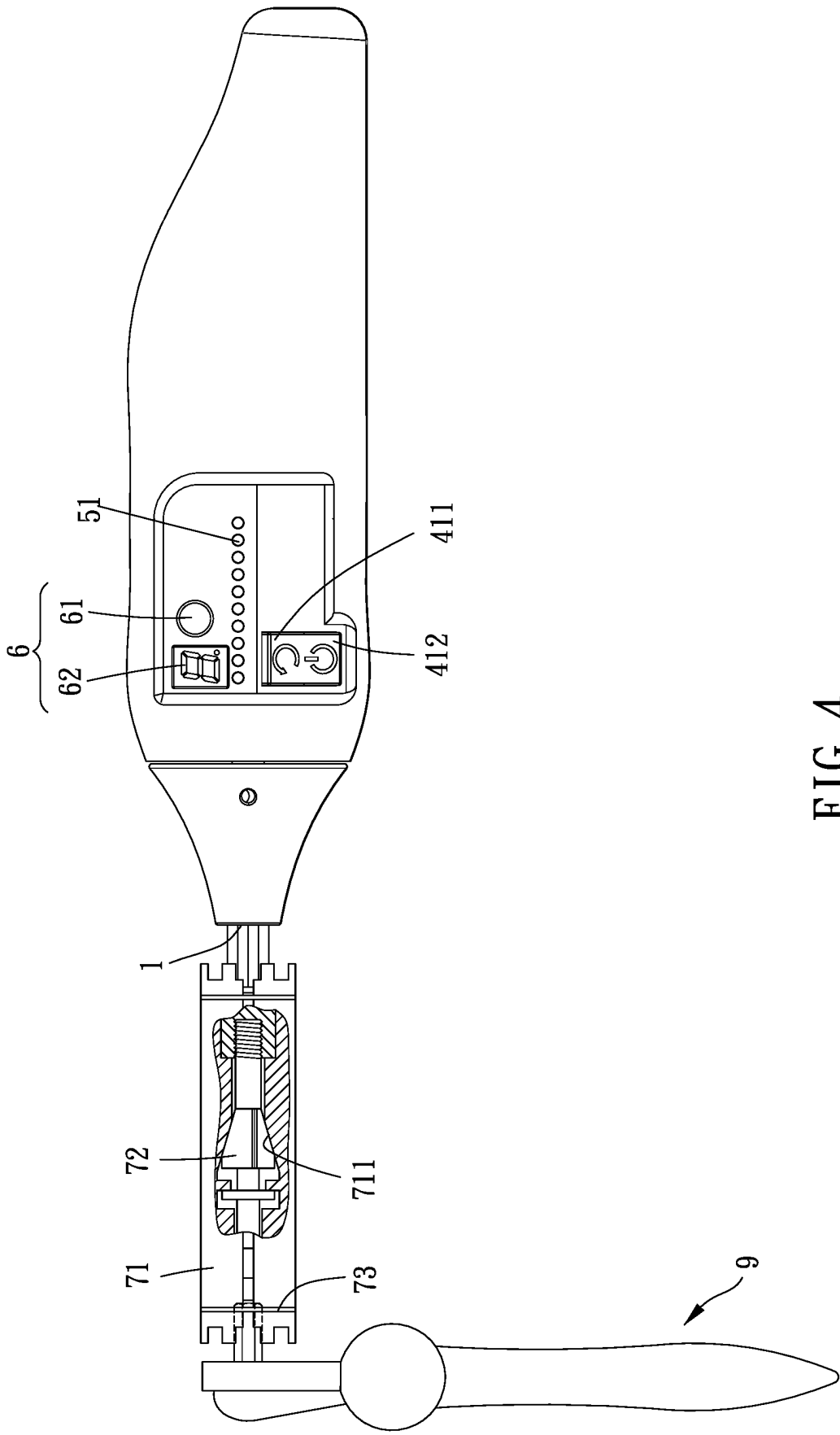


FIG. 4

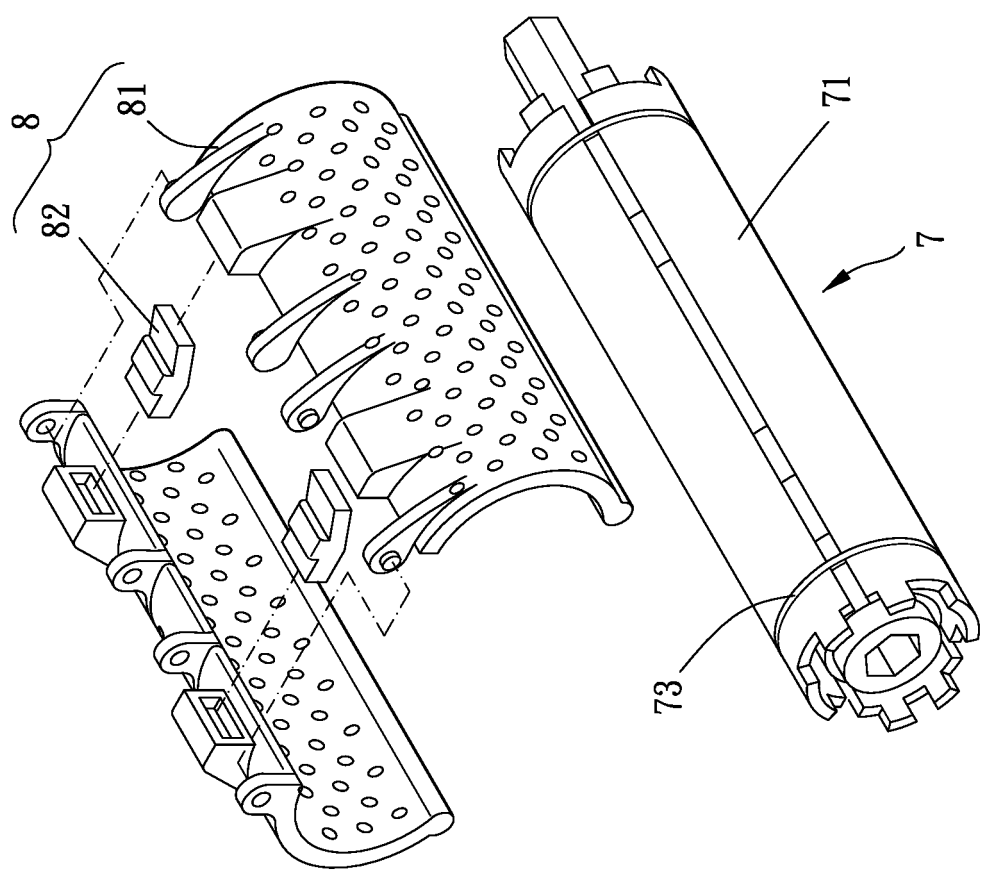


FIG. 5

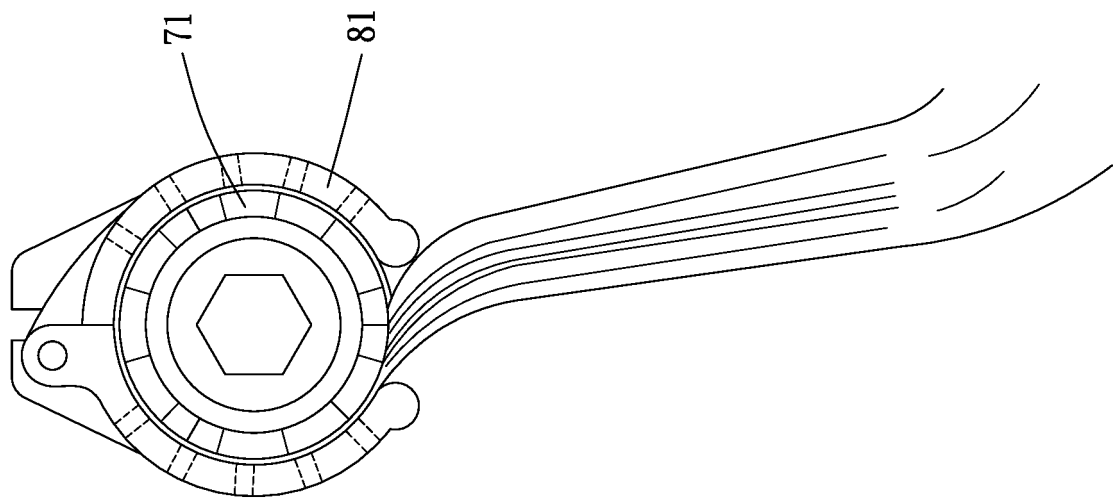


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2014/071534

A. CLASSIFICATION OF SUBJECT MATTER

A45D 2/00 (2006.01) i; A45D 6/00 (2006.01) i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A45D 2/-; A45D 6/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, WPI, EPODOC, CNKI: hair, wind, rotate, detect, torque, torsion, display, CHEN Jiahua, preset

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	CN 201929247 U (CHEN, Jingyun) 17 August 2011 (17.08.2011) description, paragraphs [0029]-[0032] and figures 1-4	1-8
Y	CN 101674748 A (XIAN, Qijiong) 17 March 2010 (17.03.2010) description, paragraph [0081] and figure 11	7
A	CN 202456956 U (YOU GANG MACHINERY CO., LTD.) 03 October 2012 (03.10.2012) the whole document	1-8
A	TWM 374774 U1 (WANG, Tianfa) 01 March 2010 (01.03.2010) the whole document	1-8
A	TWM 409741 U1 (WANG, Tianfa) 21 August 2011 (21.08.2011) the whole document	1-8

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search 26 August 2014	Date of mailing of the international search report 30 September 2014
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer ZHU, Xiaojuan Telephone No. (86-10) 62413065

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/071534

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

10

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
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REFERENCES CITED IN THE DESCRIPTION

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- TW I365055 [0003]