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(54) ELECTRIC MASCARA BRUSH THAT CAN VIBRATE AND COUNTER ROTATE

(57) The present invention recites an electric mascara brush that can vibrate and counter rotate. The brush includes a main body, a rod and a bottle. The main body defines a receiving space therein. The main body has a power source and a reversible DC motor which are disposed in the receiving space. The power source electrically connects to the DC motor. An automatic power off IC connects the power source to the DC motor. The DC motor includes a rotor and an axle about which the rotor rotates. At least one counterweight block is disposed on the rotor so that a center of mass of the rotor is offset from the axle. The rod has a first end directly or indirectly attached to the axle in a rotational operative relationship and a second end attached with an applicator head. The bottle defines a liquid chamber and an opening. The opening communicates with the liquid chamber, and the rod extending into the liquid chamber through the opening. The rod is sleeved with a gasket, so that the gasket blocks the opening and seals the liquid chamber when the main body is affixed to the bottle.

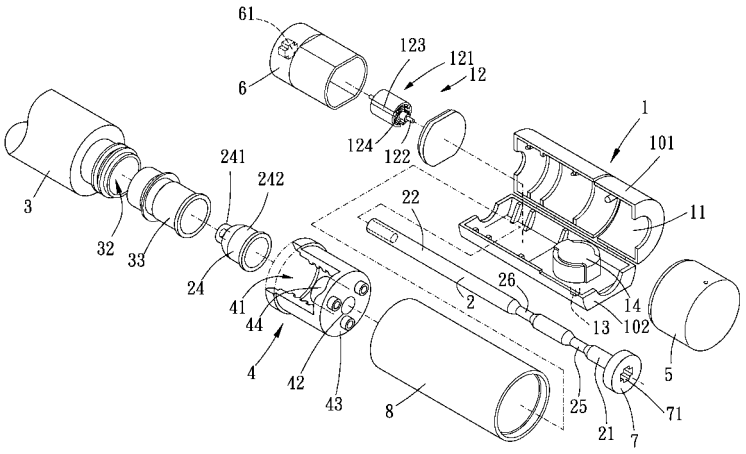

FIG. 1

EP 2 491 813 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an electric mascara brush, and more particularly to an electric mascara brush that can vibrate and counter rotate.

Description of the Prior Art

[0002] Some of the conventional electric mascara brushes have a vibration motor, which has an axle attached with a counterweight block. As such, the counterweight block provides the axle with a centrifugal force and makes the axle to vibrate.

[0003] In addition, the conventional brushes have a rod extending into a bottle containing mascara liquid. Such mascara liquid sometimes permeates into threads of the bottle or gaps between the bottle and the brush, gumming the brush in the bottle.

[0004] The main object of the present invention is to modify conventional electric mascara brushes to fulfill user's needs.

SUMMARY OF THE INVENTION

[0005] The main object of the present invention is to provide an electric mascara brush that can vibrate and counter rotate.

[0006] To achieve the above and other objects, an electric mascara brush of the present invention includes a main body, a rod and a bottle. The main body defines a receiving space therein and has a power source and a reversible DC motor disposed in the receiving space. The power source electrically connects to the DC motor, which includes a rotor and an axle about which the rotor rotates. An automatic power off IC connects the power source to the DC motor. At least one counterweight block is disposed on the rotor so that a center of mass of the rotor is offset from the axle. The rod has a first end directly or indirectly attached to the axle in a rotational operative relationship and a second end attached with an applicator head. The bottle defines a liquid chamber and an opening disposed on one end of the bottle. The opening communicates with the liquid chamber, and the rod extends into the liquid chamber through the opening.

[0007] The rod is sleeved with a gasket, so that the gasket blocks the opening and seals the liquid chamber when the main body is affixed to the bottle. As such, the rod can be driven by the DC motor to vibrate as well as rotate, and the mascara liquid in the liquid chamber does not leak due to the gasket. Therefore, the users' needs can be satisfied.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a breakdown drawing showing an electric mascara brush of the present invention;
Fig. 2 is a combination drawing showing an electric mascara brush of the present invention;
Fig. 3 is a profile showing an electric mascara brush of the present invention;
Fig. 3A is a profile showing a main body of the present invention;
Fig. 3B is a profile showing a DC motor of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] 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.

[0010] Please refer to Fig. 1 to Fig. 3. An electric mascara brush that can vibrate and counter rotate includes a main body 1, a rod 2, a bottle 3, a collar 4 and an end cap 5. The brush may further include a hand grip 8 sleeving around the main body 1 and the collar 4.

[0011] The main body 1 defines a receiving space 11 therein and has a power source 14 and a reversible DC motor 12 which are disposed in the receiving space 11, in which the power source 14 electrically connects to the reversible DC motor 12. Preferably, a switch 13 is disposed between the power source 14 and the DC motor 12. The switch 13 selectively electrically connects the power source 14 with the DC motor 12 and controls a direction of a current flow of the DC motor 12, so that the DC motor 12 selectively turns normally or reversely. In other words, the switch 13 is preferably provides three adjusting positions, which are a close position, a normal position and a reverse position, for the user to choose from. The DC motor 12 includes a rotor 121 and an axle 122, and may further include a stator (field magnet), a brush and a rectifier. The rotor 121 can rotate about the axle 122, and it is provided with at least one counterweight block 123 so that the center of mass of the rotor 121 is offset from the axle 122. As shown in Fig. 3B, the rotor 121 of the present embodiment includes three winding sets 124, each of which makes an angle of 120 degrees to its adjacent one. A gap 125 is defined between every two of the winding sets 124, and the counterweight blocks 123 are disposed in two of the gaps 125 so as to make the center of mass of the rotor offset from the axle 122. Furthermore, the main body 1 includes an upper part 101 and a lower part 102 pivoting to the upper part 101 so that the main body 1 can be opened. The receiving space 11 is, therefore, defined between the upper and lower parts 101 and 102. When the power source runs

dead, the user can simply replace a new one after withdrawing the end cap 5 and opening the upper or lower part 101, 102. In addition, an annular rim may axially extend from a front end of the main body 1 toward the bottle 3, as shown in Fig. 3, or the annular rim may extend from the collar 4 toward the bottle 3 instead, as shown in Fig. 1.

[0012] The rod 2 has a first end 21 and a second end 22, in which the first end 21 is directly or indirectly attached to the axle 122 in a rotational operative relationship, and the second end 22 is attached with an applicator head 23. Thus, the rod 2 is rotated when the axle 122 rotates. A deceleration mechanism 6 is provided between the axle 122 and the rod 2 to adjust the revolution ratio of the rod 2 and the axle 122. A connector 7 is then provided between the deceleration mechanism 6 and the rod 2. In the present embodiment, the connector 7 and the rod 2 is formed in one-piece, yet the two elements may be separately formed. The deceleration mechanism 6 has a non-circular axle 61, and the connector 7 (or the first end 21 of the rod 2) is formed with a non-circular bore 71 to receive the non-circular axle 61 therein, so that the rod 2 and the non-circular axle 61 can be in a rotational operative relationship, more particularly, can rotate simultaneously. The rod 2 is further sleeved with a gasket 24, so that the gasket 24 can block the opening 32 of the bottle 3 and seals the liquid chamber 31 when the main body 1 is affixed to the bottle 3. More specifically, the rod 2 is formed with a waist portion 25 with a smaller diameter, and the gasket 24 has a joint section 241 and a skirt section 242. The joint section 241 has a bore diameter corresponding to the waist portion 25, and the skirt section 242 has a bore diameter larger than that of the joint section 241. Thus the joint section 241 sleeves around the waist portion 25 and the gasket 24 is affixed on the rod 2. Moreover, the rod 2 is further formed with a neck portion 26 with a smaller diameter, and the neck portion 26 locates between the waist portion 25 and the applicator head 23.

[0013] The bottle 3 defines a liquid chamber 31 and an opening 32 disposed on one end of the bottle 3. The opening 32 communicates with the liquid chamber 31. The rod 2 extends into the liquid chamber 31 through the opening 32. More specifically, the opening 32 is disposed with an annular wiper 33 through which the rod 2 extends into the liquid chamber 31, in which the wiper 33 and the gasket 24 are both made from soft resilient material. A front end of the skirt section 24 seals the wiper 33 when the main body 1 is affixed to the bottle 3. And preferably, the hardness of the gasket 24 is bigger than that of the wiper 33 so as to achieve better sealing effect. The wiper 33 has a bore diameter corresponding to the rod 2 to wipe off the mascara liquid adhered to the rod 2. When the neck portion 26 is passing through the opening 32, the air can flow into the liquid chamber 31 via the neck portion 26 so that vacuum environment can be prevented in the liquid chamber 31, and the rod 2 can be easily drawn out of the bottle 3.

[0014] The collar 4 is disposed at a front end of the main body 1, and the collar 4 is formed with inner threads. The bottle 3 is formed with outer threads around the opening 32 to mate with the inner threads of the collar 4. More specifically, the collar 4 defines a larger-diametered bore 41 and a small-diametered bore 42 which communicate with each other. The collar 4 has an inner wall 43 away from the bottle 3, and the smaller-diametered bore 42 is formed on the inner wall 43. The collar 4 is further formed with an annular rim 44 surrounding the smaller-diametered bore 42 and extending from the inner wall 43 toward the bottle 3. The skirt section 242 of the gasket 24 sleeves around the annular rim 44 to further prohibit the mascara liquid from entering the receiving space 11 of the main body 1.

[0015] The end cap 5 rotatably sleeves around the main body 1, and the end cap 5 has an inner surface being formed with two protrusions 51, as shown in Fig. 2. The main body 1 is formed with a transverse slot 15, and the switch 13 is slidably disposed in the slot 15 and is sandwiched between the protrusions 51, as shown in Fig. 3A. As such, the protrusions 51 drive the switch 13 to slide along the slot 15 as the end cap 5 is turned, thereby the switch 13 selectively electrically connects the power source 14 with the DC motor 12 and controls the direction of the current flow. The inner surface of the end cap 5 is formed with several round grooves, and the main body 1 has an outer surface being formed with a point selectively engaging with one of the round grooves. Preferably, as the point locates at one of the grooves, the switch 13 locates either at the close position, the normal position or the reverse position. Further, a connecting means is provided between the end cap 5 and the main body 1 to combine these two elements together.

[0016] In addition, an automatic power off (APO) IC is provided to connect the power source with the DC motor. The APO IC is used to detect whether the DC motor functions well or not. In some occasions, the DC motor may run idle when the gasket is tightly engaged with the wiper. Thus, the APO IC can automatically power off the DC motor to prevent it from damage.

[0017] In summarization, the counterweight blocks are disposed on the rotor instead of the axle, so that he DC motor may have a smaller volume and become vibratable. The gasket is advantageous in prohibiting the mascara liquid from leakage. As a result, the mascara liquid will have little chance to coagulate between the threads or between the rotatable element and the non-rotatable element, which will further reduce the possibility of malfunctions of the electric mascara brush.

1. An electric mascara brush that can vibrate and counter rotate, characterized in comprising:

a main body, defining a receiving space therein, the main body having a power source and a reversible DC motor disposed in the receiving space, the power source electrically connecting

to the DC motor, the DC motor comprising a rotor and an axle about which the rotor rotates, wherein at least one counterweight block is disposed on the rotor so that a center of mass of the rotor is offset from the axle;

a rod, having a first end directly or indirectly attached to the axle in a rotational operative relationship and a second end attached with an applicator head;

a bottle, defining a liquid chamber and an opening disposed on one end of the bottle, the opening communicating with the liquid chamber, the rod extending into the liquid chamber through the opening;

wherein the rod is sleeved with a gasket, so that the gasket blocks the opening and seals the liquid chamber when the main body is affixed to the bottle.

2. The brush of claim 1, characterized in that a deceleration mechanism connects the axle with the rod.

3. The brush of claim 2, characterized in that a connector connects the deceleration mechanism with the rod.

4. The brush of claim 1, characterized in that a switch is disposed between the power source and the DC motor, the switch selectively electrically connects the power source with the DC motor and controls a direction of a current flow, so that the DC motor selectively turns normally or reversely.

5. The brush of claim 1, characterized in that the rod has a waist portion with a smaller diameter, the gasket has a joint section and a skirt section, the joint section has a bore diameter corresponding to the waist portion, and the skirt section has a bore diameter larger than that of the joint section, the joint section sleeves around the waist portion.

6. The brush of claim 5, characterized in that the brush further comprises a collar disposed at a front end of the main body, the collar is formed with inner threads;

wherein the bottle is formed with outer threads around the opening to mate with the inner threads of the collar, and the opening is disposed with an annular wiper through which the rod extends into the liquid chamber, a front end of the skirt section seals the wiper when the main body is affixed to the bottle.

7. The brush of claim 6, characterized in that the collar defines a larger-diametered bore and a smaller-diametered bore which communicate with each other, the collar has an inner wall where the smaller-diametered bore is formed, the inner wall locates remote from the bottle, the collar is further formed with an annular rim surrounding the smaller-diametered bore and extending from the inner wall toward the bottle, the skirt section of the gasket sleeves around the annular rim.

8. The brush of claim 2, characterized in that the deceleration mechanism having a non-circular axle, the first end of the rod is formed with a non-circular bore to receive the non-circular axle, so that the rod and the non-circular axle are in a rotational operative relationship.

9. The brush of claim 4, characterized in that the brush further comprises an end cap rotatably sleeving around the main body, the end cap has an inner surface being formed with two protrusions, the main body is formed with a transverse slot, the switch is slidably disposed in the slot and is sandwiched between the protrusions, so that the protrusions drive the switch to slide along the slot as the end cap being turned, whereby the switch selectively electrically connects the power source with the DC motor and controls the direction of the current flow.

10.The brush of claim 1, characterized in that the rotor comprises three winding sets, each of which makes an angle of 120 degrees to its adjacent winding set, a gap is defined between every two of the winding sets, the least one counterweight block is disposed in one or two of the gaps.

11.The brush of claim 1, characterized in that the main body comprises an upper part and a lower part pivoting to the upper part so that the main body can be opened, the receiving space is defined between the upper and lower parts.

12.The brush of claim 6, characterized in that the rod further has a neck portion with a smaller diameter, the neck portion locates between the waist portion and the applicator head.

13.The brush of claim 9, characterized in that the inner surface of the end cap is formed with several round grooves, the main body has an outer surface being formed with a point selectively engaging with one of the round grooves.

14.The brush of claim 1, characterized in that an automatic power off IC connects the power source with the DC motor.

Claims

1. An electric mascara brush that can vibrate and counter rotate, **characterized in** comprising:

a main body, defining a receiving space therein, the main body having a power source and a reversible DC motor disposed in the receiving space, the power source electrically connecting to the DC motor, the DC motor comprising a rotor and an axle about which the rotor rotates, wherein at least one counterweight block is disposed on the rotor so that a center of mass of the rotor is offset from the axle;

a rod, having a first end directly or indirectly attached to the axle in a rotational operative relationship and a second end attached with an ap-

plicator head;
a bottle, defining a liquid chamber and an opening disposed on one end of the bottle, the opening communicating with the liquid chamber, the rod extending into the liquid chamber through the opening;
a collar, disposed at a front end of the main body, the collar being formed with inner threads, the bottle being formed with outer threads around the opening to mate with the inner threads of the collar, the opening being disposed with an annular wiper through which the rod extends into the liquid chamber, a front end of the skirt section sealing the wiper when the main body is affixed to the bottle;
wherein the rod is sleeved with a gasket, so that the gasket blocks the opening and seals the liquid chamber when the main body is affixed to the bottle;
wherein the rod has a waist portion with a smaller diameter, the gasket has a joint section and a skirt section, the joint section has a bore diameter corresponding to the waist portion, and the skirt section has a bore diameter larger than that of the joint section, the joint section sleeves around the waist portion;
wherein the collar defines a larger-diametered bore and a smaller-diametered bore which communicate with each other, the collar has an inner wall where the smaller-diametered bore is formed, the inner wall locates remote from the bottle, the collar is further formed with an annular rim surrounding the smaller-diametered bore and extending from the inner wall toward the bottle, the skirt section of the gasket sleeves around the annular rim.

2. The brush of claim 1, **characterized in that** a deceleration mechanism connects the axle with the rod.

3. The brush of claim 2, **characterized in that** a connector connects the deceleration mechanism with the rod.

4. The brush of claim 1, **characterized in that** a switch is disposed between the power source and the DC motor, the switch selectively electrically connects the power source with the DC motor and controls a direction of a current flow, so that the DC motor selectively turns normally or reversely.

5. The brush of claim 2, **characterized in that** the deceleration mechanism having a non-circular axle, the first end of the rod is formed with a non-circular bore to receive the non-circular axle, so that the rod and the non-circular axle are in a rotational operative relationship.

6. The brush of claim 4, **characterized in that** the brush further comprises an end cap rotatably sleeving around the main body, the end cap has an inner surface being formed with two protrusions, the main body is formed with a transverse slot, the switch is slidably disposed in the slot and is sandwiched between the protrusions, so that the protrusions drive the switch to slide along the slot as the end cap being turned, whereby the switch selectively electrically connects the power source with the DC motor and controls the direction of the current flow.

7. The brush of claim 1, **characterized in that** the rotor comprises three winding sets, each of which makes an angle of 120 degrees to its adjacent winding set, a gap is defined between every two of the winding sets, the least one counterweight block is disposed in one or two of the gaps.

8. The brush of claim 1, **characterized in that** the main body comprises an upper part and a lower part pivoting to the upper part so that the main body can be opened, the receiving space is defined between the upper and lower parts.

9. The brush of claim 1, **characterized in that** the rod further has a neck portion with a smaller diameter, the neck portion locates between the waist portion and the applicator head.

10. The brush of claim 6, **characterized in that** the inner surface of the end cap is formed with several round grooves, the main body has an outer surface being formed with a point selectively engaging with one of the round grooves.

11. The brush of one of claims 1 to 10, **characterized in that** an automatic power off IC connects the power source with the DC motor.

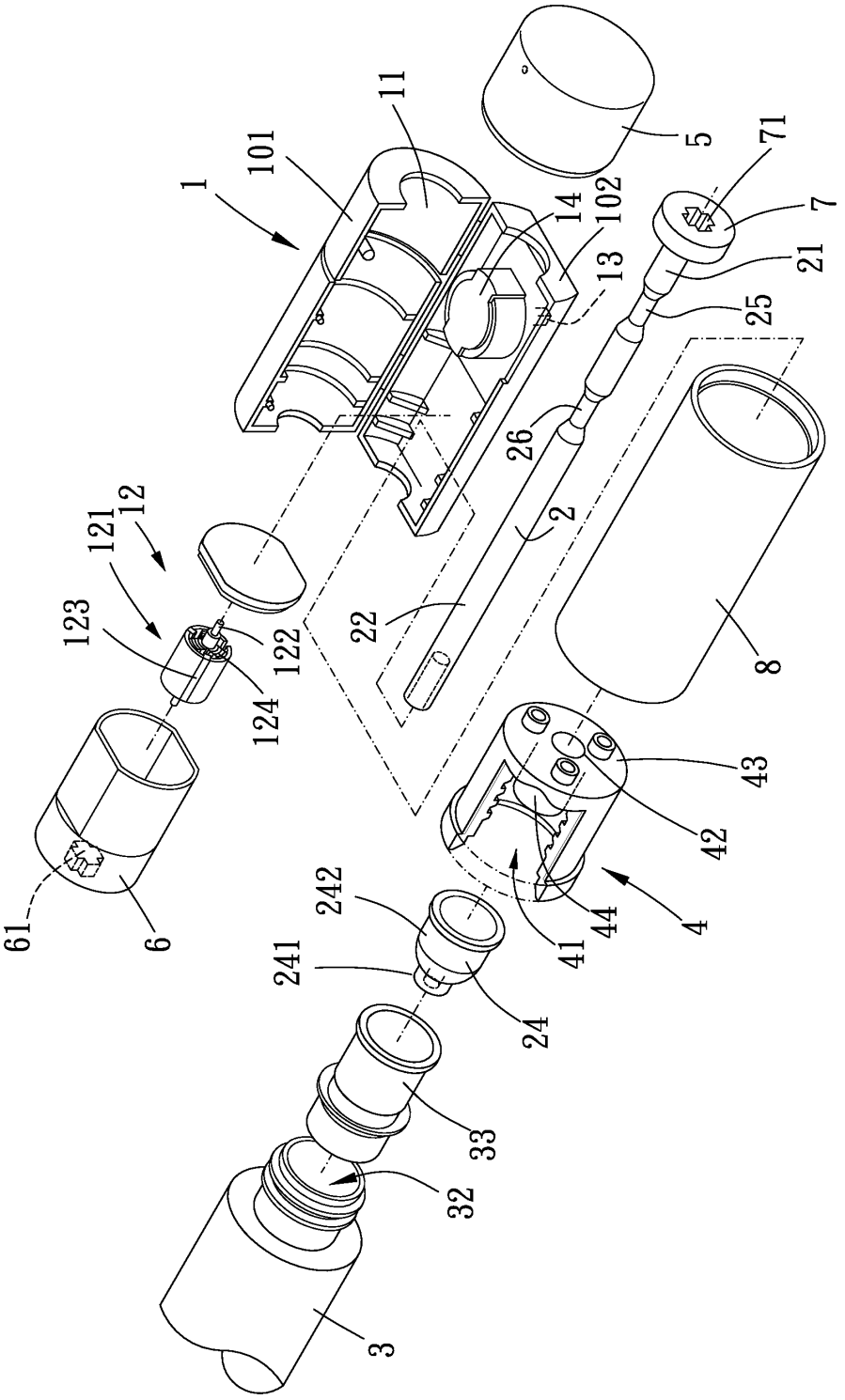
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FIG. 1

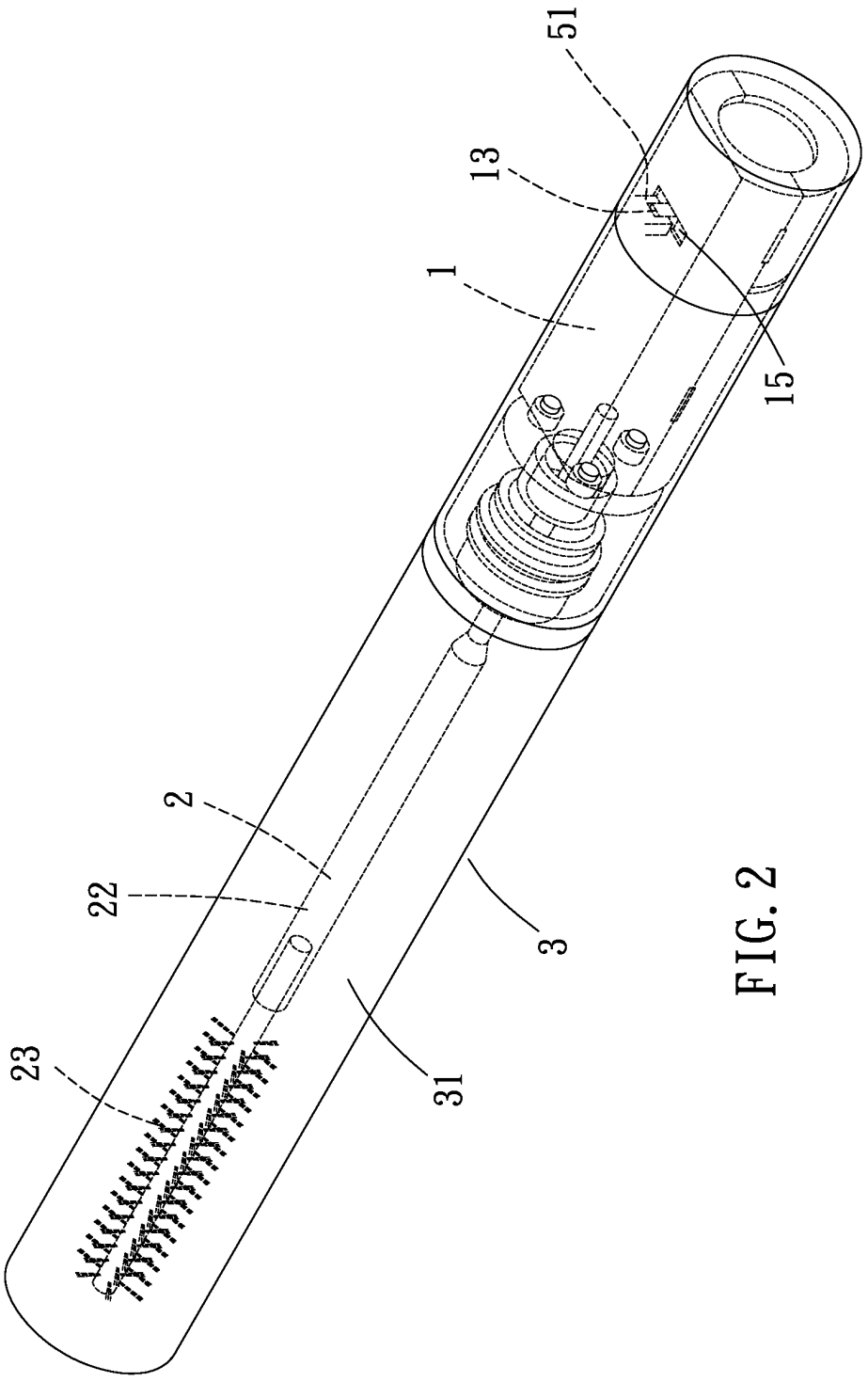

FIG. 2

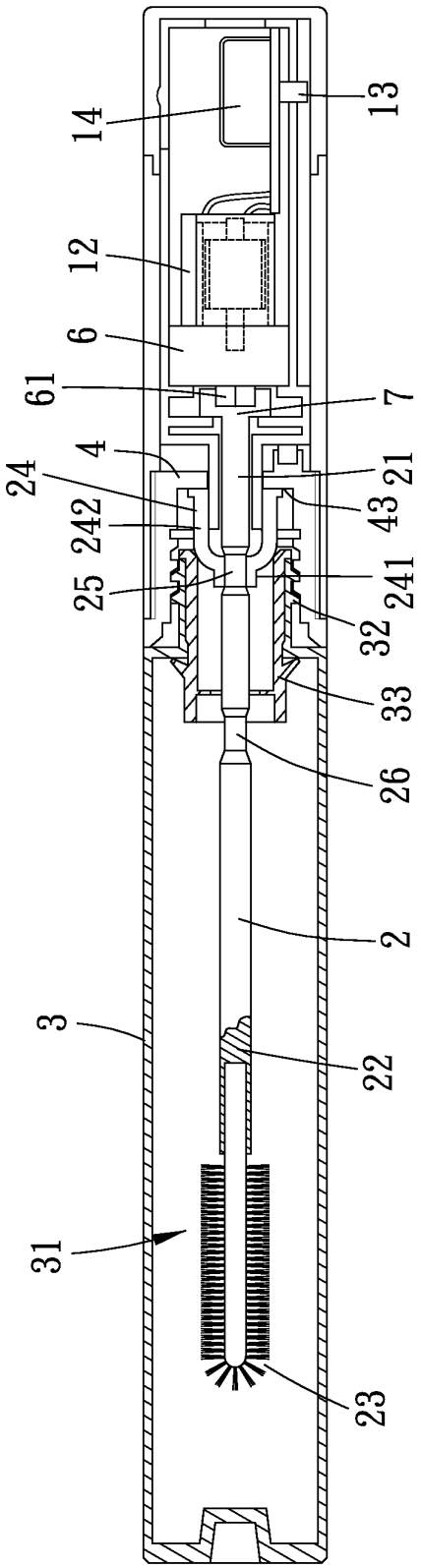

FIG. 3

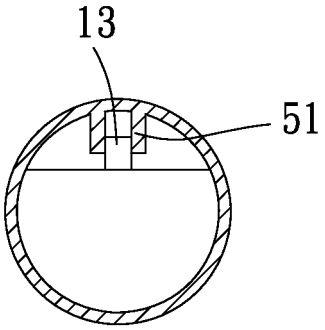

FIG. 3A

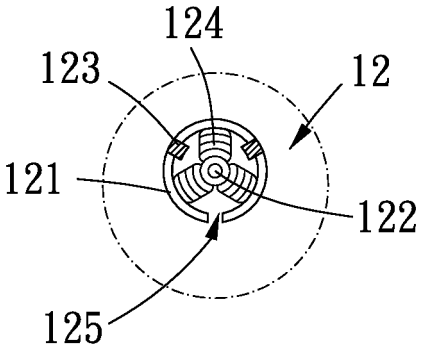

FIG. 3B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074575

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC: A45D, A46B, B65D

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)

CNKI,CNPAT,WPI,EPODOC:vibrat+,oscillat+,plug?,sleeve?,rotat+,switch+,turn+,shank+,wand+,rod+,axes,axis, shaft?,seal+,motor?,weight,dia,diameter,eccentricity,eccenter,eyelash+,eyewinker,mascara

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN101374437A (AMOREPACIFIC CORP) 25 Feb.2009 (25.02.2009) Page 4, line 22 to Page 6, line 7, and Fig. 1	1-6,8,10-12,14
Y	CN1992476A (SAMSUNG ELECTRO MECH) 04 Jul.2007 (04.07.2007) Page 2, lines 8 -12, Page 6, line 4 to Page 7, line 11, and Figs. 1-4	1-6,8,10-12,14
Y	JP2001-327326A (YOSHINO KOGYOSHO CO LTD) 27 Nov.2001 (27.11.2001) Paragraphs 9-18, and Figs.1-3	1-6,8,10-12,14
A	US2004009028A1 (GUERET JEAN-LOUIS) 15 Jan.2004 (15.01.2004) The whole document	1-14

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 Jul.2010 (06.07.2010)	**12 Aug. 2010 (12.08.2010)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer LI, Jiantao Telephone No. (86-10)62085618

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074575

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP1614367A1 (ROUSSELET GUILHEM) 11 Jan.2006 (11.01.2006) The whole document	1-14
A	CN200983954Y (LIU, Jiaohui) 05 Dec.2007 (05.12.2007) The whole document	1-14

Form PCT/ISA /210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/074575

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		JP4264114B2	13.05.2009
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		US7452151B2	18.11.2008
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		AT374541T	15.10.2007
		ES2299976T	01.06.2008
		DE602005002687T	24.07.2008
		EP1614367B1	03.10.2007
CN200983954Y	05.12.2007	None	

Form PCT/ISA /210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074575

CLASSIFICATION OF SUBJECT MATTER

A45D34/04 (2006.01) i
A45D40/26 (2006.01) n
A46B13/02 (2006.01) n

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