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(21) Appl. No.: **11/381,400**(22) Filed: **May 3, 2006**(57) **ABSTRACT**

Disclosed is an electric mascara application apparatus comprising a main body holding a battery therein, a motor assembly electrically connected to the battery and fixedly installed to the main body for rotating a brush, a rotator rotatably installed on the circumferential outer surface of the main body, a control board fixed to the rotator for controlling the motor assembly, and a display means installed in the control board for displaying the direction of rotation of the motor assembly.

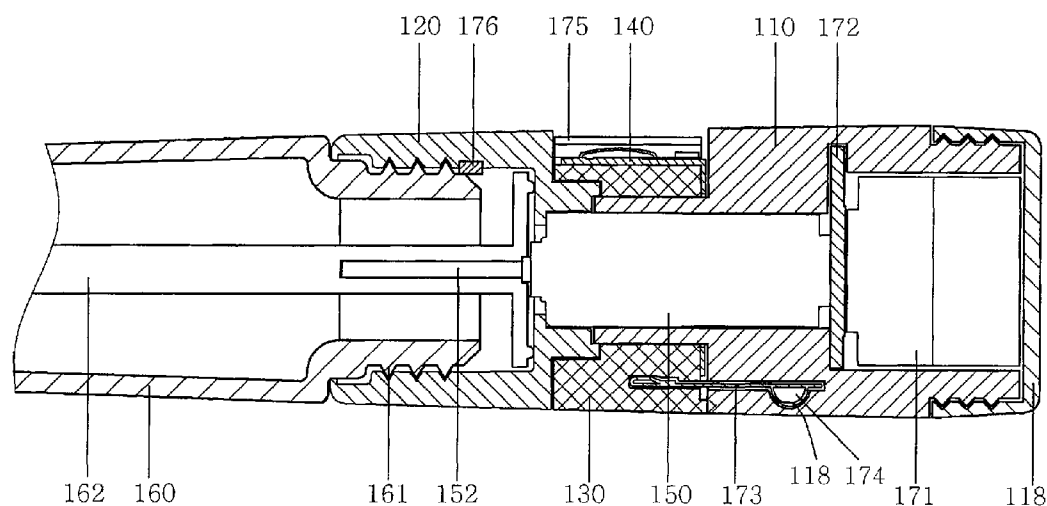
100

FIG. 1

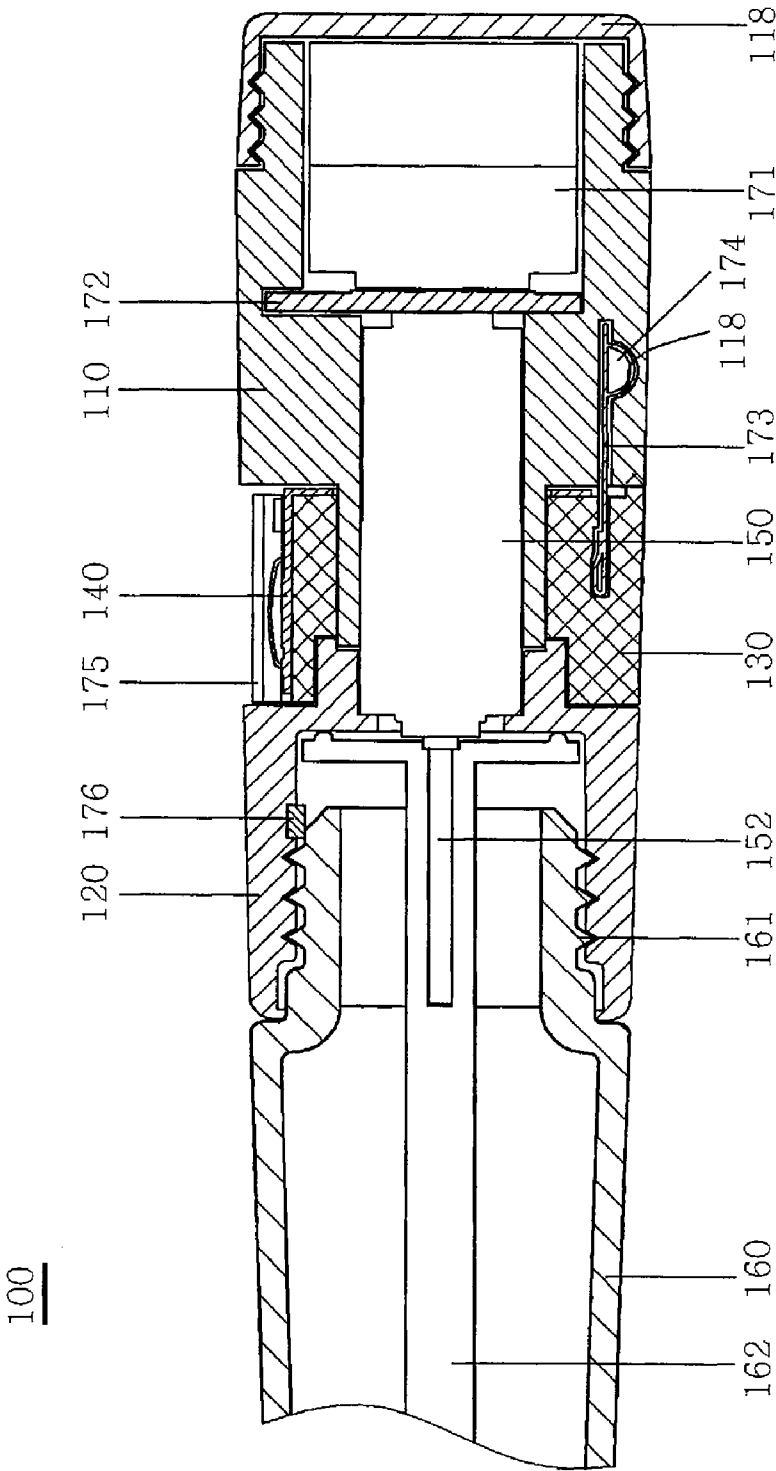


FIG. 2

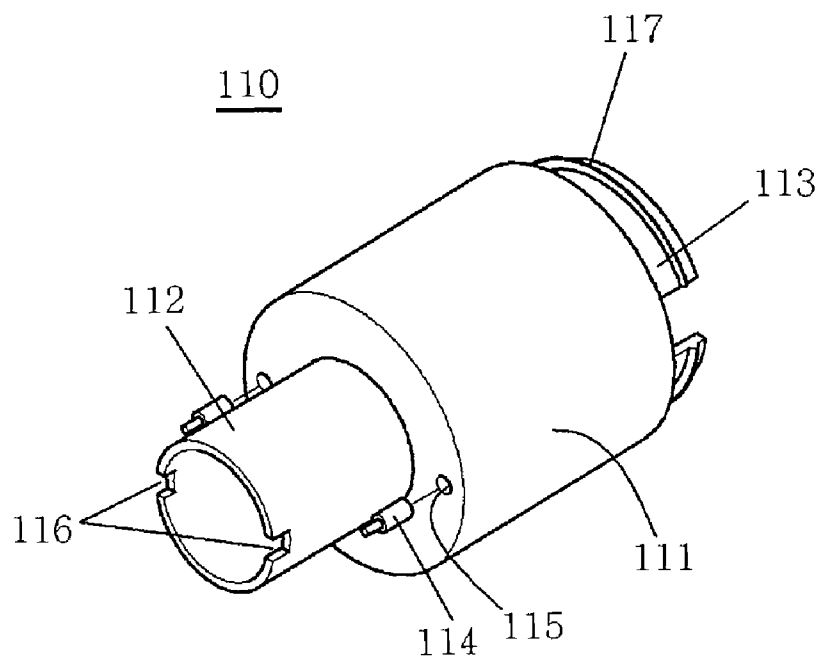


FIG. 3

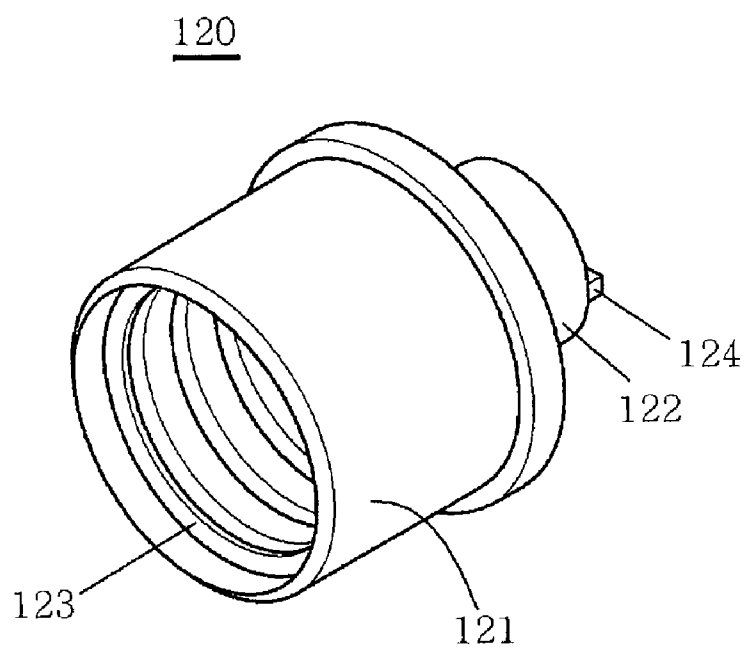


FIG. 4

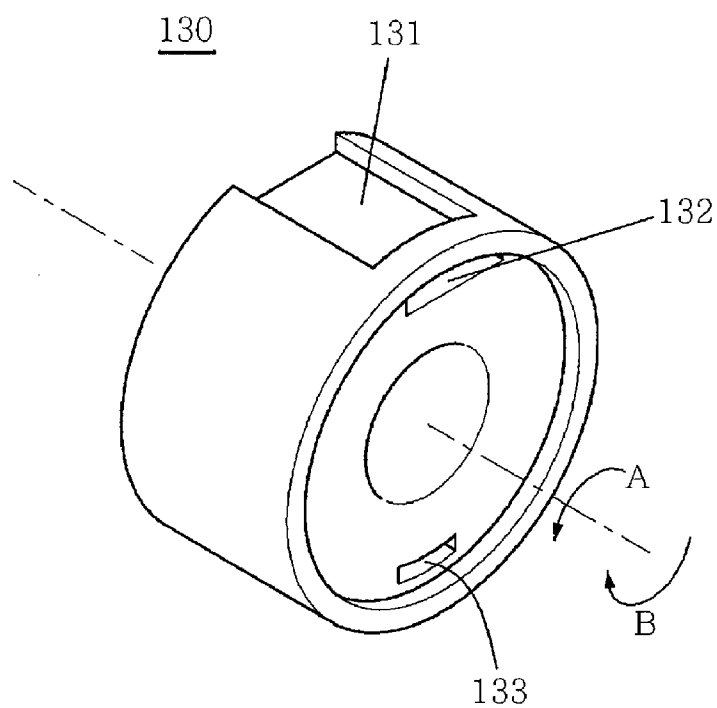


FIG. 5

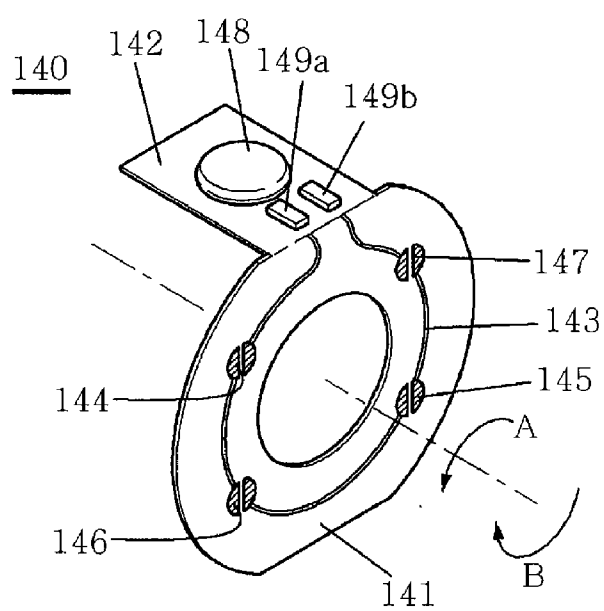


FIG. 6

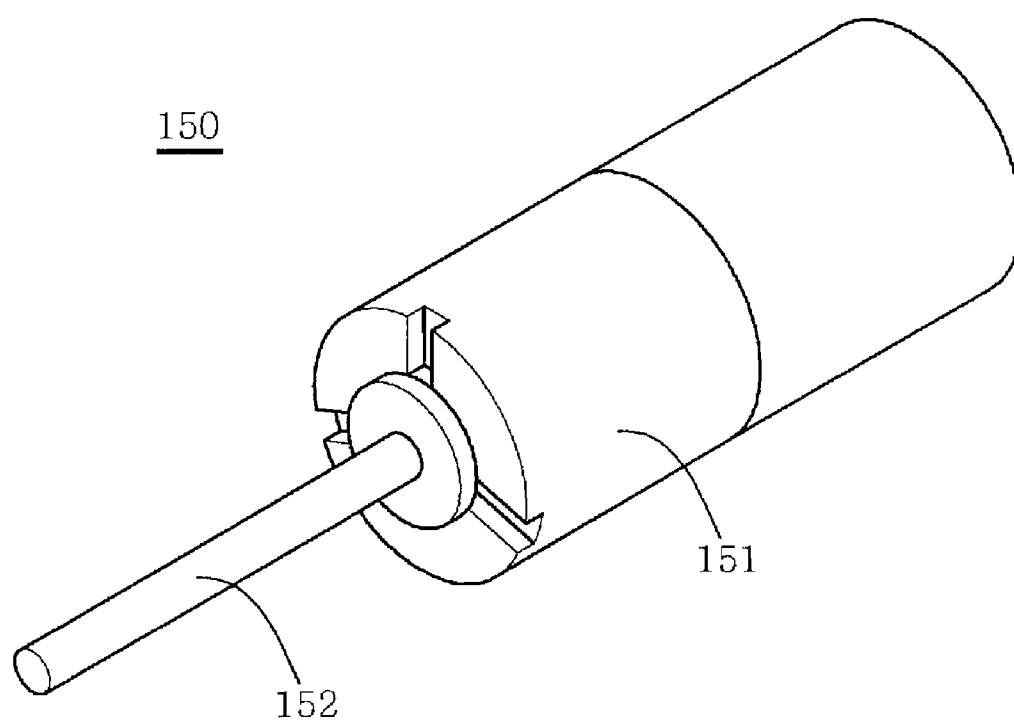
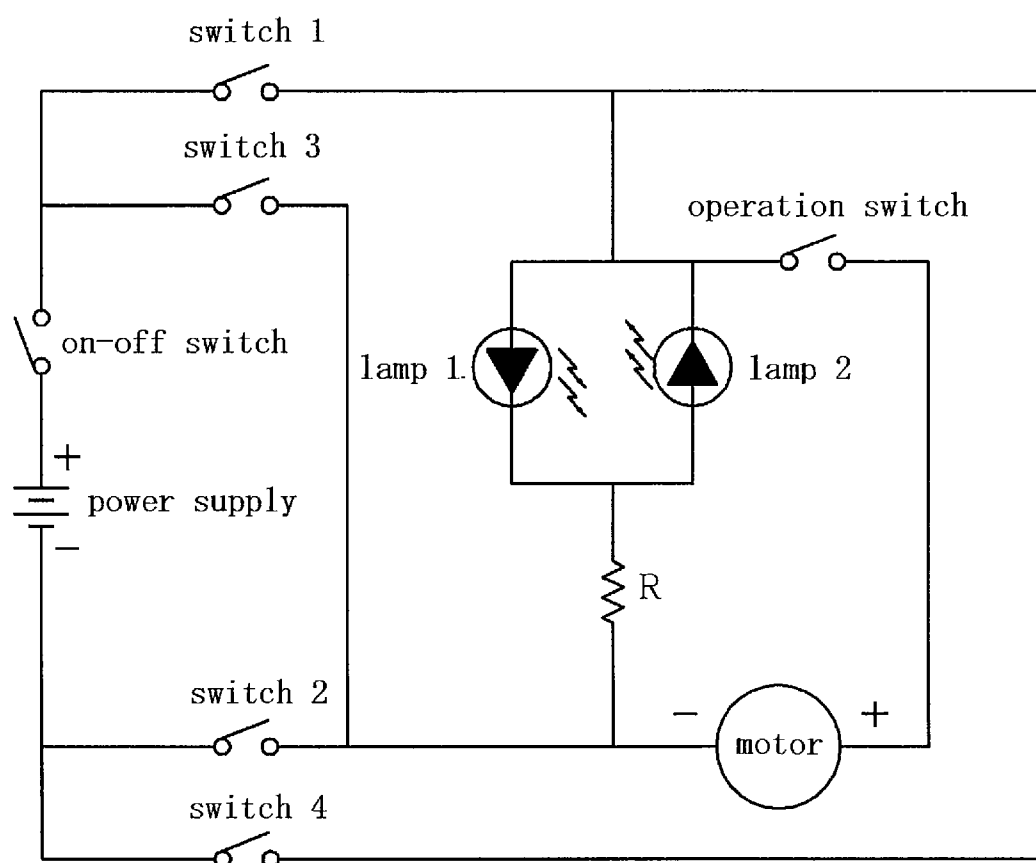


FIG. 7



ELECTRIC MASCARA APPLICATION APPARATUS**CROSS-REFERENCE TO RELATED APPLICATION**

[0001] This application claims priority of Korean Application No. 10-2006-0014615, filed on Feb. 15, 2006.

BACKGROUND OF THE INVENTION**[0002] 1. Field of the Invention**

[0003] The present invention relates to an electric mascara application apparatus. More particularly, the present invention relates to an electric mascara application apparatus in which a brush to touch eyelashes is electrically driven.

[0004] 2. Background of the Related Art

[0005] Mascara is one of the cosmetics to be used to darken and thicken eyelashes, in former days, one has used the mascara to handle one's eyelashes by manually rotating it in desired direction using one's wrist and fingers.

[0006] However, it is difficult even for one skilled in applying make-up to perfectly apply mascara all of the time. Further, it is more difficult for beginners, who are unskilled at applying mascara, to neatly apply mascara to their eyelashes.

[0007] In order to solve this problem, an electric mascara application apparatus was developed and disclosed in Japanese Patent Laid-Open Publication No. 2005-95531.

[0008] The prior art electric mascara application apparatus comprises an electrically-driven mascara brush and a container for holding liquid mascara therein. The mascara brush comprises a brush head, a brush shaft which acts as the central axis of the brush head and to which the brush head is fixed, and a hollow handle. A gear assembly embedded in the hollow handle reduces the speed of a motor to a desired level (number of revolutions per minute), so that the brush shaft and the brush head can be rotated. An interface for controlling the operation of the brush head, such as starting and stopping, and for controlling the direction of rotation of the brush head is slidably provided on the outer surface of the handle, so that a user can control the mascara application apparatus by moving the interface in sliding manner.

[0009] However, the above-mentioned prior art mascara application apparatus is disadvantageous in that a user has to check the direction of rotation of a brush head before use by driving the brush head because the apparatus does not have a display unit for displaying the direction of rotation of the brush head or the direction of rotation of the motor.

[0010] The above-mentioned prior art mascara application apparatus is further disadvantageous in that battery or electric power can be unnecessarily consumed or wasted if the mascara application apparatus is turned on by mistake, so that the brush can rotate while the brush cover is closed because the operating status of the apparatus cannot be checked by a user while the brush cover is closed.

SUMMARY OF THE INVENTION

[0011] Accordingly, the present invention has been made keeping in mind the above problems occurring in the related art, and an object of the present invention is to provide an electric mascara application apparatus capable of displaying

the direction of rotation of a motor so that a user can easily check the direction of rotation of a brush.

[0012] It is another object of the present invention to provide an electric mascara application apparatus having a motor, the operation of which is started through two-step manipulation of an interface: a first step of selecting the direction of rotation of the motor (or of the mascara brush) and a second step of starting the operation of the motor, so that battery or electric power is not wasted by mistake.

[0013] In order to achieve the above-described objects and advantages, according to one embodiment of the present invention, there is provided an electric mascara application apparatus comprising a driving means for rotating a brush, a control means for controlling the driving means, and a display means controlled by the control means by being electrically connected to the control means, for displaying the direction of rotation of the driving means.

[0014] The electric mascara application apparatus may further comprise an operation means electrically connected to the control means for controlling the operation of the driving means, wherein the operation means cannot be operated until the display means displays the direction of rotation.

[0015] The operation means may be a dome-shaped switch.

[0016] The display means comprises a light emitting lamp or a light emitting diode.

[0017] The electric mascara application apparatus may further comprise an on-off means for electrically connecting or disconnecting the driving means and the control means to or from an external power supply means.

[0018] In order to achieve the above objects, according to a further aspect of the present invention, there is provided an electric mascara application apparatus, comprising a main body having a battery therein, a motor assembly fixedly installed to the main body in a manner such that the motor assembly is electrically connected to the battery, for rotating a brush, a rotator rotatably coupled to the circumferential outer surface of the main body, a control board fixed to the rotator for controlling the motor assembly, and a display lamp installed to the control board for displaying the direction of rotation of the motor assembly.

[0019] The electric mascara application apparatus may further comprise a sub body coupled to the main body in a manner such that the rotator can rotate, wherein a brush cover can be detachably coupled to the sub body.

[0020] The electric mascara application apparatus may further comprise an elastic pin fixed to the end of the rotator, so that the elastic pin is alternately inserted into at least one groove formed on the outer surface of the main body while the rotator rotates.

[0021] The electric mascara application apparatus may further comprise an operation switch electrically connected to the control board for controlling the operation of the motor assembly, such that the operation switch cannot be operated until the display lamp lights up.

[0022] The operation switch may have a dome shape.

[0023] The display lamp may comprise a light emitting lamp or a light emitting diode.

[0024] The electric mascara application apparatus may further comprise an on-off switch for electrically connecting or disconnecting the motor assembly and the control board to or from the battery.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

[0026] FIG. 1 is a cross-sectional view illustrating an electric mascara application apparatus according to one embodiment of the present invention;

[0027] FIG. 2 is a perspective schematic view illustrating a main body of the electric mascara application apparatus shown in FIG. 1;

[0028] FIG. 3 is a perspective schematic view illustrating a sub body of the electric mascara application apparatus shown in FIG. 1;

[0029] FIG. 4 is a perspective schematic view illustrating a rotator of the electric mascara application apparatus shown in FIG. 1;

[0030] FIG. 5 is a perspective schematic view illustrating a control board of the electric mascara application apparatus shown in FIG. 1;

[0031] FIG. 6 is a perspective view illustrating a motor assembly of the electric mascara application apparatus shown in FIG. 1; and

[0032] FIG. 7 is a circuit diagram of the control board shown in FIG. 5.

DETAILED DESCRIPTION OF THE INVENTION

[0033] Advantages and features of the present invention and methods of accomplishing the same may be understood more readily with reference to the following detailed description of preferred embodiments and the accompanying drawings. The present invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete and will fully convey the concept of the invention to those skilled in the art, and the present invention is only to be defined by the appended claims. Like reference numerals refer to like elements throughout the specification.

[0034] Now, embodiments of the present invention will be described in more detail with reference to the accompanying drawings.

[0035] Referring to FIG. 1, an electric mascara application apparatus 100 comprises a main body 110, a sub body 120, a rotator 130, a control board 140, a motor assembly 150, and a brush cover 160.

[0036] The main body 110 acts as a handle when using the electric mascara application apparatus 100, and comprises a first cylinder 111, a first rotator coupler 112 and a cover coupler 113, as shown in FIG. 2.

[0037] The first cylinder 111 is a hollow cylinder and has two through holes 115 in a planar side surface to which the first rotator coupler 112 is fixed, the two through holes 115 being opposite the first rotator coupler 112, and being formed near the first rotator coupler 112. Contact pins 114 are inserted into respective through holes 115. According to the embodiment of the present invention, the contact pins 114 are pogo pins that can be freely inserted into and taken out of the first cylinder 111.

[0038] The first rotator coupler 112 is a hollow cylinder and has a diameter smaller than that of the first cylinder 111. The first rotator coupler 112 has two opposite notches 116 at the front end thereof.

[0039] The cover coupler 113 has a diameter which is smaller than that of the first cylinder 111 but is larger than that of the first rotator coupler 112. The cover coupler 113 is also a hollow cylinder and has threads 117 on the outer surface thereof.

[0040] A plurality of batteries 171 for driving the motor assembly 150 is encased in the main body 110, and in particular is disposed across the first cylinder 111 and the cover coupler 113. A battery board 172 for electrically connecting the batteries 171 and the motor assembly 150 thereon and for controlling the motor assembly 150 is fixedly installed in the first cylinder 111. A battery cover 118 engages with the cover coupler 113 in which the batteries 171 are received, in a threaded manner, in order to prevent the batteries from being removed.

[0041] Referring to FIG. 3, the sub body 120 comprises a second cylinder 121 and a second rotator 122.

[0042] The second cylinder 121 is a hollow cylinder having a diameter nearly the same as that of the first cylinder 111. The second cylinder 121 has threads 123 on the inner surface thereof, so that a brush cover 160 can be coupled thereto in a threaded manner. An on-off switch 176, such as a push-button switch, for electrically connecting or disconnecting the motor assembly 150 and the control board 140 to or from batteries acting as a power supply is installed on the inner surface of the second cylinder 121. The on-off switch 176 is in a closed state when the brush cover 160 is closed, but is in an open state when the brush cover 160 is opened. Accordingly, according to the embodiment of the present invention, the electric mascara application apparatus cannot be driven while the brush cover 160 is closed.

[0043] The second rotator coupler 122 is also a hollow cylinder shape having a diameter nearly the same as the diameter of the first rotator coupler 112.

[0044] Referring to FIG. 4, the rotator 130 has a hollow cylinder shape. A combined body comprising the first rotator coupler 112 and the second rotator coupler 122, in which the second rotator coupler 122 is disposed in the first rotator coupler 112, is disposed in the cavity of the rotator 130. The rotator 130 is installed in a manner such that the rotator 130 can be rotated in the direction of the axis of the combined body of the first and second rotator couplers 112 and 122. Here, the inner diameter of the rotator 130 is almost the same

as the diameter of the combined body of the first rotator coupler 112 and the second rotator coupler 122. In addition, the inner diameter is almost the same as the outer diameter of the motor assembly 150.

[0045] The rotator 130 has a flat planar part 131 on the circumferential outer surface and a hole 132 and a groove 133 on a planar side surface thereof. An elastic piece 173 is movably installed to the main body 110 and fixedly engaged with the groove 133, so that a protrusion formed at one end portion of the elastic piece 173 is alternately brought into contact with two grooves 118 formed on the circumferential inner surface of the main body 110. The distance between two grooves 118 corresponds to the distance between a first connection terminal 144 and a third connection terminal 146, or corresponds to the distance between a second connection terminal 145 and a fourth connection terminal 147. Accordingly, while the rotator 130 rotates in the direction of an axis, every time the connection terminals 144, 145, 146 and 147 are brought into contact with the contact pins 114, the protrusion 174 is received in one of the grooves 118, making a short and sharp sound like a click, so that a user can easily check whether the connection terminals 144, 145, 146 and 147 are in contact with the contact pins 114.

[0046] The control board 140 is a control unit. Referring to FIG. 5, the control board 140 is made of a flexible substrate and comprises a ring-shaped contact part 141, a flat panel-shaped switch/lamp part 142, and a circuit 143 for controlling the motor assembly 150.

[0047] The ring-shaped contact part 141 is installed at an end of the rotator 130 in the axial direction, and the flat panel-shaped switch/lamp part 142 is fixed to the flat planar surface 131 of the rotator 130, passing through the hole 132.

[0048] In the contact part 141, the first connection terminal 144 and the second connection terminal 145 are disposed opposite each other in the diagonal direction, and the third connection terminal 146 and the fourth connection terminal 147 are disposed opposite each other in the diagonal direction. The switch/lamp part 142 comprises an operation switch 148 for controlling the operation status of the motor assembly 150, and two lamps 149a and 149b for displaying the direction of rotation of the motor assembly 150: one lamp displaying the clockwise direction and the other displaying the counterclockwise direction. Here, the first and second connection terminals 144 and 145 are disposed to face each other based on one of the contact pins 114 installed in the main body 110, and the third and fourth connection terminals 146 and 147 are disposed to face each other based on the other of the contact pins 114.

[0049] Each of the first, second, third and fourth connection terminals 144, 145, 146 and 147 comprises two separate terminals, so that the two separate terminals are electrically connected when the connection terminals 144, 145, 146 and 147 are brought into contact with the contact pins 114, installed in the main body 110, by the rotation of the rotator.

[0050] The switch/lamp 142 comprises the operation switch 148 for driving the motor assembly 150 and the display lamps 149a and 149b for displaying the direction of rotation of the motor assembly 150. The operation switch 148 and the display lamps 149a and 149b are electrically connected to the first, second, third and fourth connection terminals 144, 145, 146 and 147 via the circuit 143 provided

on the control board 140. Here, the display lamps 149a and 149b are a display means and can be implemented with a light emitting lamp or a light emitting diode.

[0051] The operation switch 148 is an operation means and is a dome-shaped switch made of steel. The switch/lamp part 142 is covered with a thin transparent cover 175 that is elastic, so that it is protected from external impact. The display lamps 149a and 149b preferably emit different colors of light so that a user can easily identify the direction of rotation of a brush. Moreover, the direction of rotation can be marked or printed on the surface of the lamps 149a and 149b at their respective upper end portions or lower end portions.

[0052] Referring to FIG. 6, the motor assembly 150 is a driving means and comprises a cylindrical body 151 and a central shaft 152.

[0053] The cylindrical body 151 has a diameter nearly the same as the diameters of the first rotator coupler 112 and the second rotator coupler 122 and the inner diameter of the rotator 130. The cylindrical body 151 is inserted into and installed to be fixed in the first rotator coupler 112, the second rotator coupler 122 and the rotator 130.

[0054] In the cylindrical body 151, a motor and a plurality of planetary gears are installed in order to generate the rotating force to rotate a brush and to adjust the number of revolutions per minute (RPM) of the brush.

[0055] The central shaft 152 is installed in and protrudes from the sub body 120, so that the brush 162 is fixedly coupled to the central shaft 152.

[0056] A brush cover 160 extends in the longitudinal direction, and has a closed end and an open end. The brush cover 160 has threads 161 on the circumferential outer surface near the open end, so that the brush cover 160 can be combined with the sub body 120 in a threaded manner.

[0057] The electric mascara application apparatus 100 having the above-mentioned construction operates in the following manner.

[0058] If a user rotates the rotator 130 leftward or rightward until the rotator 130 makes a click sound, the contact part 141 of the control board 140, mounted on the rotator 130, are also rotated, so that the first and second connection terminals 144 and 145, or the third and fourth connection terminals 146 and 147 are brought into contact with the contact pins 114.

[0059] At this time, one of the lamps 149a and 149b lights up, and the user can check the direction of rotation of the brush 162 by the light of the display lamps 149a and 149b. After checking the direction of rotation of the brush 162, the user pushes the operation switch 148 to drive the motor assembly 150, so that the brush 162 rotates in the direction desired by the user.

[0060] The operation of the apparatus will be described in more detail with reference to the circuit diagram shown in FIG. 7.

[0061] The element "on-off switch" in FIG. 7 corresponds to the on-off switch 176 in FIG. 1, the elements "switch 1," "switch 2," "switch 3" and "switch 4" in FIG. 7 correspond to the first connection terminal 144, the second connection terminal 145, the third connection terminal 146

and the fourth connection terminal 147, respectively, the on/off state of the “switch 1,” “switch 2,” “switch 3” and “switch 4” correspond to the contact/non-contact state between the contact pins 114 and the first connection terminal 144, the second connection terminal 145, the third connection terminal 146 and the fourth connection terminal 147, and the opening and shutting of the “operation switch” means to switch the operation status of the operation switch 148 of the switch/lamp part 142.

[0062] First, when a user opens the brush cover 160, the on-off switch 176 is restored to its initial position so that power is ready to be supplied to the motor assembly 150 and the control board 140. In this instance, if the rotator 130 is rotated in the direction A in FIG. 4, the control board 140 shown in FIG. 5 is rotated in the same direction, so that the first connection terminal 144 and the second connection terminal 145 are brought into contact with the two contact pins 114 installed in the main body 110. In this state, in the circuit diagram, the “on-off switch” is closed, and the “switch 1” and the “switch 2” are closed, so that the circuit is electrically connected. At this time, the “lamp 1” lights up, so that a user can identify that the brush 162 will rotate in the forward direction, that is, clockwise.

[0063] In this state, if a user pushes the operation switch 148, the motor assembly 150 rotates in the forward direction, so that the brush 162 also rotates in the forward direction. This means that the “operation switch” in the circuit diagram is electrically connected, and the motor rotates in the forward direction.

[0064] Next, when a user rotates the rotator 130 in the direction B in FIG. 4 while the brush cover 160 is open, the control board 140 shown in FIG. 5 is also rotated in the same direction. At this time, the third connection terminal 146 and the fourth connection terminal 147 are brought into contact with the two contact pins 114 respectively installed in the main body 110. This means that the “on-off switch” is closed, and the “switch 3” and the “switch 4” are closed in the circuit diagram, so that the circuit is electrically connected. At this time, the lamp 2 lights up, so that a user can identify that the brush 162 will rotate in the reverse direction, that is, counterclockwise.

[0065] In this state, if a user pushes the operation switch 148, the motor assembly 150 rotates in the backward direction, so that the brush 162 is also rotated in the backward direction. This means that the “operation switch” is shut in the circuit diagram, so that the motor rotates in the reverse direction.

[0066] On the other hand, when a user closes the brush cover 160 after use of the apparatus, the on-off switch 176 is forced to be pushed and the motor assembly 150 and the control board 140 cannot be supplied with power. This means that the “on-off switch” is open in the circuit diagram, so that the circuit is electrically disconnected.

[0067] The above described electric mascara application apparatus has the following advantages.

[0068] First, since a user can check the direction of rotation of a brush before use of the mascara application apparatus, a user can conveniently apply makeup to his or her eyelashes.

[0069] Second, the motor of the apparatus does not start to rotate until the operation switch is pushed after the display

lamp is lit up by rotation of the rotator. Accordingly, the apparatus is prevented from being driven by mistake, thereby battery or electric power is not unnecessarily consumed or wasted, without being noticed by a user.

[0070] Third, since the on-off switch is always open while the brush cover is closed, power to the motor assembly and the control board is infallibly interrupted. That is, since, in the state in which the brush cover is not opened, the mascara application apparatus cannot be driven. Accordingly, it cannot occur that the apparatus consumes and wastes battery power without being noticed by a user.

[0071] While the present invention has been shown and described with reference to exemplary embodiments thereof, it will be understood by those having ordinary skill in the art that various changes with respect to form and details may be made thereto without departing from the spirit and scope of the present invention as defined by the following claims. Therefore, it is to be understood that the above-described embodiments have been provided only in a descriptive sense and are not to be construed as placing any limitation on the scope of the invention.

1. An electric mascara application apparatus, comprising:

a driving means for rotating a brush;

a control means for controlling the driving means; and

a display means for displaying the direction of rotation of the driving means, the display means electrically connected to the control means and controlled by the control means.

2. The electric mascara application apparatus according to claim 1, further comprising an operation means for controlling the operation of the driving means, the operating means electrically connected to the control means and enabling to be operated after the display means displays the direction of rotation.

3. The electric mascara application apparatus according to claim 2, wherein the operation means is a dome-shaped switch.

4. The electric mascara application apparatus according to claim 1, wherein the display means is a light emitting lamp or a light emitting diode.

5. The electric mascara application apparatus according to claim 1, further comprising an on-off means for electrically connecting or disconnecting the driving means and the control means to or from an external power supply means.

6. An electric mascara application apparatus, comprising:

a main body receiving a battery therein;

a motor assembly for rotating a brush, the motor assembly fixedly installed in the main body to be electrically connected to the battery;

a rotator rotatably coupled to a circumferential outer surface of the main body;

a control board for controlling the operation of the motor assembly, the control board fixedly installed on the rotator; and

a display lamp for displaying the direction of the rotation of the motor assembly, the display lamp installed to the control board.

7. The electric mascara application apparatus according to claim 6, further comprising a sub-body coupled to the main

body to afford the rotator's rotation, wherein a brush cover for covering the brush is detachably connected to the sub-body.

8. The electric mascara application apparatus according to claim 6, further comprising an elastic pin fixedly installed on an end of the rotator, the elastic pin having protrusions to be alternately inserted into at least one groove formed on the main body under the rotation of the rotator.

9. The electric mascara application apparatus according to claim 6, further comprising an operation switch for controlling operation of the motor assembly, the operating switch being electrically connected to the control board and enabling to be operated after the display lamp lights up.

10. The electric mascara application apparatus according to claim 9, wherein the operation switch has a dome shape.

11. The electric mascara application apparatus according to claim 6, wherein the display lamp is a light emitting lamp or a light emitting diode.

12. The electric mascara application apparatus according to claim 6, further comprising an on-off switch for electrically connecting or disconnecting the motor assembly and the control board to or from the battery.

13. The electric mascara application apparatus according to claim 2, wherein the display means is a light emitting lamp or a light emitting diode.

14. The electric mascara application apparatus according to claim 2, further comprising an on-off means for electrically connecting or disconnecting the driving means and the control means to or from an external power supply means.

15. The electric mascara application apparatus according to claim 7, further comprising an operation switch for controlling operation of the motor assembly, the operating switch being electrically connected to the control board and enabling to be operated after the display lamp lights up.

16. The electric mascara application apparatus according to claim 8, further comprising an operation switch for controlling operation of the motor assembly, the operating switch being electrically connected to the control board and enabling to be operated after the display lamp lights up.

17. The electric mascara application apparatus according to claim 7, wherein the display lamp is a light emitting lamp or a light emitting diode.

18. The electric mascara application apparatus according to claim 8, wherein the display lamp is a light emitting lamp or a light emitting diode.

19. The electric mascara application apparatus according to claim 7, further comprising an on-off switch for electrically connecting or disconnecting the motor assembly and the control board to or from the battery.

20. The electric mascara application apparatus according to claim 8, further comprising an on-off switch for electrically connecting or disconnecting the motor assembly and the control board to or from the battery.

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