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(54) **A MULTI-FUNCTIONAL FACIAL CLEANSING INSTRUMENT**

(57) A multi-functional facial cleansing instrument, comprises a shell, a brush head assembly, a motor and a power supply assembly. The power supply assembly, motor and a bracket supporting the motor are arranged within the shell. The brush head assembly includes a brush head, a brush head bracket assembly and a brush head socket. The brush head bracket assembly includes an upper bracket and a lower bracket. The brush head is fixed on an upper surface of the upper bracket of the brush head. The brush head socket includes a plurality of pawls; and the lower bracket includes a plurality of mounting grooves which match the pawls. The pawls are configured in a structure of wide bottom and narrow top, zero-clearance fitting the sides of the socket grooves. The motor is a high frequency reciprocating vibration motor.

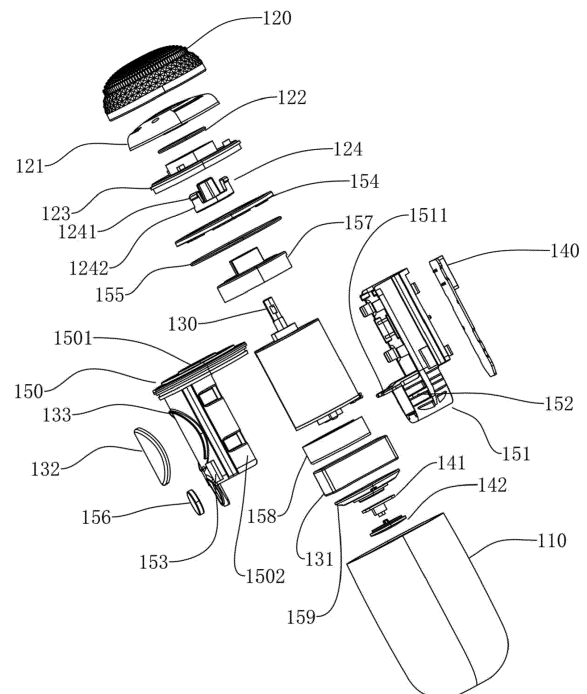


Fig. 1

## Description

### TECHNICAL FIELD

**[0001]** The present disclosure relates to the field of care device, and in particular to a multi-functional face cleansing instrument.

### BACKGROUND

**[0002]** In daily life, people usually clean their facial skin manually. However, manual cleaning of facial skin can only remove dirt and dust from the skin surface, making limited contribution to removal of remained cosmetics and deeper cleaning of the skin. Therefore, an electric facial cleansing instrument is invented to improve above performance.

**[0003]** Electric cleansing devices on the existing market usually have low vibration frequency, insufficient vibration strength and amplitude, which lead to a poor cleaning result with a relatively large noise during vibration. Although some devices may achieve ideal vibration frequency and amplitude, structure of the device is relatively complicated and connecting compatibility among components is poor, resulting in issues, such as low energy conductivity, loud noise during using, a high failure rate, etc. Further, installation of such devices is inconvenient and the cost is relatively high.

### SUMMARY

**[0004]** The disclosure intends to solve at least one of the existing technical problems and therefore discloses a multi-functional facial cleansing instrument, which can effectively clean the skin and provide users a better cleansing experience by transmitting vibration effectively with a reduced energy loss and noise, presenting an easy assembly as well.

**[0005]** To address the shortcomings associated with the prior art, present disclosure provides a high frequency vibration multi-functional facial cleansing instrument with a lower noise.

**[0006]** According to one aspect of the present disclosure, the multi-functional facial cleansing device includes a shell, a brush head assembly, a motor and a power supply assembly; wherein the power supply assembly, the motor and a bracket supporting the motor are arranged in the shell; wherein the brush head assembly includes a brush head, a brush head bracket assembly and a brush head socket; wherein the brush head bracket assembly includes an upper brush head bracket and a lower brush head bracket; wherein the brush head is fixed on the upper surface of the upper brush head bracket; wherein the brush head socket includes a plurality of pawls; wherein the lower brush head bracket includes a plurality of pawls mounting grooves matching the pawls respectively; wherein the pawls are configured in a structure of wide bottom and narrow top, zero-clearance fitting

the sides of the mounting grooves.

**[0007]** According to a further aspect of the present disclosure, the brush head assembly includes an inner waterproof ring, a lower surface of the upper bracket of the brush head is provided with a groove for positioning the inner waterproof ring; the inner waterproof ring is compacted into the groove by the upper brush head bracket and the lower brush head bracket.

**[0008]** According to a further aspect of the present disclosure, pawls are arranged at one end of the brush head socket toward the brush head and disposed along circumferential edge; wherein an inverted buckle is disposed on top of each pawl; the lower brush head bracket includes corresponding inverted buckle mounting grooves, wherein pawls and lower brush head bracket are configured to prevent axial displacement of the brush head assembly by clamping restriction which the inverted buckle and inverted buckle mounting grooves provide.

**[0009]** According to a further aspect of the present disclosure, power output of the motor is fixedly connected with a mounting portion of the brush head socket.

**[0010]** According to a further aspect of the present disclosure, the brush head includes a replaceable cleaning brush head and/or a replaceable massage brush head, wherein the cleaning brush head includes a silicon brush head which includes silicon bristle ranging from 3-5mm in length and 0.7mm in diameter, while the massage brush head includes a massage head and a ring buckle.

**[0011]** According to a further aspect of the present disclosure, the motor bracket includes a first support portion and a second support portion which are engaged with each other; the first support portion includes a first sealing surface and a first sealing portion which is fixedly connected to the first sealing surface, the second support portion includes a second sealing surface which is connected to the first sealing portion; the motor is arranged in a cavity enclosed by the first sealing surface and the first sealing portion and a buffering means is arranged between the motor and the motor bracket, wherein the buffering means includes a first buffering cushion and a second buffering cushion which respectively cover the front end and rear end of the motor; an outer waterproof ring is further arranged at an end of the motor bracket toward the brush head assembly, and the outer surface of the motor bracket is provided with a groove for positioning the outer waterproof ring, and the outer waterproof ring is compacted into the groove by the shell; a buffering foam is arranged between the motor bracket and the shell.

**[0012]** According to an alternative aspect of the present disclosure, the first sealing portion includes a cylindrical structure and the second sealing surface includes a connecting portion that is engaged with an end of the first sealing portion; a plurality of apertures are arranged along the circumference of the connecting portion, and the second buffering cushion includes a plurality of protrusions, each of which protrudes from the aperture and abuts against the shell.

**[0013]** According to another aspect of the present disclosure, the motor is a high frequency reciprocating vibration motor comprising a cylindrical housing, a rotating shaft, a plurality of stators and a plurality of rotors arranged in the housing; wherein the stator includes multiple Y-shaped stator teeth wound by coil winding respectively, and the rotating shaft is arranged in the shaft center of the housing, wherein multiple rotor teeth corresponding to multiple Y-shaped stator teeth are disposed along the circumference of the rotating shaft.

**[0014]** According to a further aspect of the present disclosure the split angle of Y-shaped stator teeth ranges from 95° to 115°.

**[0015]** According to a further aspect of the present disclosure, the rotor tooth is a permanent magnet and includes a tooth top and a tooth root, wherein magnetic poles of the tooth top and the tooth root are opposite and magnetic poles of adjacent tooth top are also opposite.

**[0016]** According to another aspect of the present disclosure, the power supply unit includes a battery, PCB, a charging coil and a charging coil bracket configured on the motor bracket for supporting the charging coil.

**[0017]** The high-frequency reciprocating vibration motor disclosed herein can output high frequency and high amplitude vibration while the brush head assembly with zero-clearance fitting can effectively transmit vibration and reduce energy loss. The motor makes lower noise during operation and demonstrates ease of assembly, leading to an ideal cleaning effect and providing users with better experience.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0018]** The present disclosure will be further described below in conjunction with the accompanying drawings and embodiments.

Fig. 1 is an exploded perspective view of the multi-functional facial cleansing instrument provided in one embodiment;

Fig. 2 is an exploded perspective view of the multi-functional facial cleansing instrument provided in another embodiment;

Fig. 3 is a cross-sectional view of a brush head assembly in the multi-functional facial cleansing instrument in Fig. 1;

Fig. 4 is a structural schematic diagram of the lower brush head bracket and brush head socket in the instrument in Fig. 1;

Fig. 5 is an axial cross-sectional view of the motor in the multi-functional facial cleansing instrument in Fig. 1; and

Fig. 6 is a radial cross-sectional view of the motor in the multi-functional facial cleansing instrument in Fig. 1.

## DETAILED DESCRIPTION

**[0019]** It will be apparent to a person of ordinary skill in the art that the present invention is not limited to the details of the exemplary embodiments described above, but can be embodied in other specific forms without departing from the spirit or essential characteristics thereof. Therefore, the embodiments shall be in all respects regarded as exemplary and non-limiting, and the scope of the present invention is defined by the appended claims rather than the above description, so it is intended to include all changes that fall within the meaning and scope of equivalent elements of the claims in the present invention. Any reference numerals in the claims shall not be taken as limiting the claims in which they involve.

**[0020]** In addition, it should be understood that although this specification is described in terms of embodiments, however it should not be considered that each embodiment contains one independent technical scheme. This description of the specification is merely for clarity. A person of ordinary skill in the art shall take the specification as a whole, and the technical schemes in each embodiment can be appropriately combined to form other embodiments that can be understood by a person of ordinary skill in the art.

**[0021]** Furthermore, descriptions of 'upper', 'lower', 'left', and 'right' used in present disclosure are merely relative to the mutual positional relation of the components in the drawings of present disclosure.

**[0022]** Two embodiments are discussed below. It will be appreciated that the brush head assembly of multi-functional facial cleansing instrument, such as a cleaning brush head or a massage brush head, is replaceable. Therefore, the cleaning brush head in embodiment 1 can be combined with the shell in embodiment 2, and the massage brush head in embodiment 2 can also be combined with the shell in embodiment 1.

### Embodiment 1

**[0023]** Referring to Fig. 1, in the present embodiment, the disclosure provides a multi-functional facial cleansing instrument comprising a shell 110 and a brush head assembly coupled to the shell 110, in which a power supply assembly, a motor 130 connected with the brush head assembly and bracket supporting the motor are arranged. The brush head assembly includes a brush head 120, a brush head bracket assembly, an inner waterproof ring 122 and a brush head socket 124. A power supply unit, motor 130 and a support for supporting motor are arranged in shell; and a buffering means is arranged between the motor 130 and a motor bracket.

**[0024]** In the present embodiment, the brush head 120 in the brush head assembly is a silicone brush head. When the motor 130 produces a fixed amplitude, the longer the bristle of the brush head is, the larger the swing amplitude is. However, neither excessively long bristle nor large swing amplitude is beneficial to form ideal clean-

ing performance and convenience of use. Length of the bristle ranging from 3 mm to 5 mm could be an ideal option and bristle of 4mm length is selected in the present embodiment. Further, diameter of the brush can affect cleaning performance and comfort of use and therefore bristle of 0.7 mm diameter is selected in the present embodiment.

**[0025]** In the present embodiment, the brush head bracket assembly includes an upper brush head bracket 121 and a lower brush head bracket 123, wherein a brush head 120 is fixed on an upper surface of the upper brush head bracket 121 and a lower surface of the upper brush head bracket 121 is provided with a groove for positioning the inner waterproof ring 122. The inner waterproof ring 122 is compacted into the groove by the upper brush head bracket 121 and the lower brush head bracket 123, which effectively prevents liquid from entering into the motor 130 from the gap of/between the brush head brackets 121 and 123. In order to effectively transmit the vibration generated by the motor 130 to the brush head 120, the brush head socket 124 is provided with more than two pawls 1242. In the present embodiment a three-pawls arrangement is provided, wherein three pawls 1242 are arranged along the periphery of the circumference as far as possible within the allowable range of the structure; and an inverted buckle 1241 is arranged on top of each pawl (as shown in Fig. 3); and the corresponding inverted buckle groove is configured to engage with the inverted buckle, so that the axial displacement of brush head assembly can be restricted to form a more stable performance during vibration. Furthermore, each pawl 1242 is configured to a structure of wide bottom and narrow top, zero-clearance fitting to the side of the pawl mounting groove respectively. In the present embodiment, the side surface of the pawl fitting the pawl mounting groove 1244 is a slope with an angle of 5° from the vertical direction and height of 2 mm (as shown in Fig. 4). There is no gap between the pawls 1242 and the surface of the pawls mounting grooves 1244 after assembling. The zero clearance fitting can transmit vibration effectively, reducing energy loss and noise during vibration. Meanwhile, pawl slope 1242 with a certain angle can avoid collision interference during assembly of lower brush head bracket 123 and brush head socket 124 through guiding. Preferably, other brush head components besides brush head socket 124 are detachably connected to the brush head socket 124 by engagement of the pawls, so that the brush heads can be changed into different types or different sizes.

**[0026]** When the motor is in operation, the higher the vibration frequency of the motor 130 is, and the smaller the vibration amplitude of the brush head 120 will be. If the vibration frequency of the motor 130 is fixed, the bigger mass of the brush head 120 is, and the smaller the vibration amplitude will be. Therefore, the brush head assembly in the present embodiment is configured in a hollow arrangement, wherein the upper and lower brush head brackets 121, 123 are engaged with each other to

support the silicone brush head 120.

**[0027]** The motor bracket includes a first support portion 150 and a second support portion 151, which are engaged with each other. The first support portion 150 includes a first sealing surface 1501 and a first sealing portion 1502 which is fixedly connected to the first sealing surface 1501; and the second support portion 151 includes a second sealing surface 1511 which is connected to the first sealing portion 1502. The motor 130 is arranged in a cavity enclosed by the first sealing surface 1501 and the first sealing portion 1502. Preferably, the end of the motor bracket adjacent to the second buffering cushion 158 is further provided with a mounting groove 152 for arranging a battery 131. One end of the power output shaft of the motor 130 passes through the second buffering cushion 158 and is fixed on the second sealing surface 1511, and the other end is fixedly connected to the brush head socket 124 through the first buffering cushion 157 and the first sealing surface 1501.

**[0028]** Specifically, the first sealing portion 1501 includes two semi-circular groove structures that are mutually engaged with each other. As the first buffering cushion and the second buffering cushion covering the front end and rear end of the motor respectively, the first sealing portion 1501 is engaged with the second sealing surface 1511, so that the first cushion 157 and the second cushion 158 are compacted by engagement structure above, and thereby fixing the motor 130. Since there is no direct contact between the motor 130 and the motor bracket, motor vibration conducted to the shell can be effectively reduced to improve user experience.

**[0029]** In addition, a buffering foam 153 is further attached on each of the outer surfaces of the first support portion 150 and the second support portion 151. The buffering foam 153 is arranged between the shell 110 and the motor bracket to stabilize the motor bracket and buffer the vibration conduction.

**[0030]** An outer waterproof ring 155 is further configured at one end of the motor bracket toward the brush head assembly, and the outer surface of the motor bracket is provided with a groove for positioning the outer waterproof ring, and the outer surface of the waterproof ring 155 is abutted against the shell 110, preventing liquid from penetrating into the motor bracket from the gap hereof.

**[0031]** The motor 130 in the present embodiment is a high-frequency reciprocating vibration motor, comprising a housing, a rotating shaft, and a stator and a rotor arranged in the housing. Referring to Fig. 5, the housing includes an upper cover 511, a lower cover 512 and a housing body 510, wherein the upper cover 511 and the lower cover 512 are respectively fixed to two ends of the housing body 510 to form a relatively sealed space; and a rotating shaft 513 is inserted at the axle center of the housing, fixedly connected with the upper cover 511 and the lower cover 512 through a bearing, wherein one end adjacent to the brush head of the rotating shaft extends to exterior of the upper cover and is connected to the

brush head socket 124.

**[0032]** Referring to Fig. 6, the stator includes multiple Y-shaped stator teeth, each of which is wound by a coil winding 5202; and a plurality of rotor teeth (5211, 5212) matching the stators are configured along the circumferential direction of the rotating shaft 513; split angle of the Y-shaped stator teeth 5203 ranges from 95° to 115°; Specifically, each of the rotor teeth (5211 and 5212) is a permanent magnet comprising a tooth top 5211 and a tooth root 5212, wherein magnetic pole of the tooth top 5211 is opposite to that of the tooth root 5212 and magnetic poles of adjacent tooth top are opposite to each other.

**[0033]** In the present embodiment, the interior of the motor is configured to have six stator teeth and six rotor teeth, wherein the six stator teeth are evenly disposed along the circumference and the six rotor teeth are permanent magnets, the magnetic poles of adjacent rotor tooth top are opposite.

**[0034]** The chip on the PCB 140 converts the electrical energy provided by the battery 131 into a high frequency oscillating pulse current, which forms an alternating magnetic field by the coil winding 5202 on the stator tooth. When the magnetic fields generated by the stator teeth attract the teeth top of the rotor, the magnetic fields generated by the stator teeth repel the teeth top of the rotor, thereby driving the rotating shaft to rotate in the direction of the stator teeth. Similarly, when the pulse current is reversed, the rotating shaft rotates in an opposite direction. Therefore, the high-frequency oscillating pulse current is used to generate a high-frequency alternating magnetic field and thereby achieves high-frequency reciprocating rotation of the rotating shaft, causing the same rotation for the brush head assembly, which silicone brush bristle would utilize to demonstrate the facial cleansing performance.

**[0035]** Further, the split angle of the Y-shaped stator has a great influence on strength and amplitude of the vibration. Specifically, when the split angle of the Y-shaped stator 5203 ranges from 95° to 115°, a certain amplitude and torque will be generated by the motor 130, which lead to the best effect with a relatively small noise; when the split angle of the Y-shaped stator is less than 95°, a smaller amplitude will be generated by the motor and when the split angle of the Y-shaped stator 5203 exceeds 115°, the noise of the motor 130 will increase.

**[0036]** Further, when the split angle of the Y-shaped stator 5203 is at two specific values such as 105° and 110°, output amplitude of the motor 130 can be configured to optimally match the brush head assembly in the above embodiment. In practical use, a setting of the above vibration strength, amplitude and brush head parameters including diameter, length and hardness of the bristle can be configured to achieve the best cleaning effect and optimize comfort.

**[0037]** A power supply unit includes a battery 131, a charging coil 132, and a charging coil bracket 133 configured on the motor bracket to support the charging coil 132. In the present embodiment, a charging coil bracket

133 is configured to fixedly connect to the motor bracket.

**[0038]** The present embodiment includes a PCB 140, a button 142 arranged at the end of the shell, and a micro switch 141. Specifically, the PCB 140 is configured between the second support portion 151 and the shell 110; and the PCB 140, the micro switch 141, the motor 130, and the battery 131 are electrically connected, which is the prior art. A button soft rubber 159 is arranged at the connection portion between the button 142 and the shell; and a magnet 156 is also provided on the motor bracket.

**[0039]** In the present embodiment, the motor 130 is not in direct contact with the motor bracket as the motor 130 is provided with a buffering means, which not only fixes the motor, but also effectively reduces the noise and the vibration transmitted to the shell.

## Embodiment 2

**[0040]** Fig. 2 is an exploded perspective view of the multi-functional facial cleansing instrument provided in embodiment 2. This embodiment includes the same interior structure of the brush head assembly and motor in embodiment 1, but differs from embodiment 1 in their brush heads and shells.

**[0041]** The brush head in this embodiment is a massage brush head which includes a massage head 220 and a ring buckle 2201. During use, a cotton pad soaked with cosmetic liquid can be fixed on the surface of the massage head by way of the ring buckle 2201. When the power is turned on, as the high-frequency vibration massage brush head massages the skin, high-frequency vibration is to facilitate the introduction of cosmetic liquid into facial skin. The massage head can be made of metal or other materials, and different vibration frequencies can be selected depending on the depth of introduction of the skin tissue.

**[0042]** The first sealing portion 2502 in embodiment 2 includes a cylindrical structure; the second sealing surface 251 includes a connecting portion that is engaged with the end portion of the first sealing portion 2502, and a plurality of apertures 2512 are disposed along and upward to circumference of the connecting portion; the second buffering cushion 258 is in a discoid shape, wherein a plurality of protrusions 2581 extending from the apertures and abutting against the shell are provided along and upward to the circumference of the second buffering cushion 258. The protrusions 2581 abut against the shell 210 to stabilize the motor bracket, which can reduce the vibration and noise generated by the motor 230. Further, the first buffering cushion 257 is also in a discoid shape and is configured between the first sealing surface 2501 and a front end of the motor 230.

**[0043]** In addition, the PCB 240 is arranged between the battery 231 and the shell 210; and the charging coil bracket 233 is detachably connected to the motor bracket.

**[0044]** Although the present invention has been described above in details with general description and spe-

cific embodiments, it should be understood by those skilled in the art that certain modifications and improvements can still be made without departing from the spirit of the present invention shall fall within the scope of the claims.

## Reference Numeral List

### [0045]

110 shell;  
 120 brush head;  
 121 upper brush head bracket;  
 122 inner waterproof ring;  
 123 lower brush head bracket;  
 124 brush head socket;  
 1241 inverted buckle;  
 1242 pawl;  
 1243 inverted buckle mounting groove;  
 1244 pawl mounting groove;  
 130 motor;  
 131 battery;  
 132 charging coil;  
 133 charging coil bracket;  
 140 PCB;  
 141 micro switch;  
 142 key;  
 150 first support portion;  
 1501 first sealing surface;  
 1502 first sealing portion;  
 151 second support portion;  
 15 second sealing surface;  
 153 buffering foam;  
 155 outer waterproof ring;  
 156 magnet;  
 157 first buffering cushion;  
 158 second buffering cushion;  
 159 soft rubber;  
 210 shell;  
 220 massage head;  
 2201 ring buckle;  
 230 motor;  
 231 battery;  
 233 charging coil bracket;  
 240 PCB;  
 250 first support portion;  
 2502 first sealing portion;  
 251 second sealing surface;  
 2512 aperture;  
 257 first buffering cushion;  
 258 second buffering cushion;  
 2581 protrusion;  
 510 housing body;  
 511 upper cover;  
 512 lower cover;  
 513 rotating shaft;  
 5201 coil winding;  
 5202 stator tooth;

5203 Y-shaped stator;  
 521 rotor;  
 52 brush rotor tooth top;  
 5212 rotor tooth root.

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## Claims

1. A multi-functional facial cleansing instrument, the instrument comprising a shell (210), a brush head assembly, a motor (130) and a power supply unit; **characterized in that:**
  - the power supply unit, the motor (130) and a motor bracket supporting the motor (130) are arranged in the shell (210);
  - the brush head assembly comprises a brush head (120), a brush head bracket assembly and a brush head socket (124);
  - the brush head bracket assembly comprises an upper brush head bracket (121) and a lower brush head bracket (123);
  - the brush head (120) is fixed on the upper surface of the upper bracket (121);
  - the brush head socket (124) comprises a plurality of pawls (1242);
  - the lower brush head bracket (123) comprises a plurality of pawl mounting grooves (1244) which correspond to the pawls (1242) respectively; and
  - the pawls (1242) are configured in a structure of wide bottom narrow top, fitting the sides of the pawl mounting grooves (1244) with zero clearance.
2. The multi-functional facial cleansing instrument according to claim 1, wherein the brush head assembly comprises an inner waterproof ring (122), wherein a lower surface of the upper bracket (121) of the brush head (120) is provided with a groove for positioning the inner waterproof ring (122), and wherein the inner waterproof ring (122) is compacted into the groove by the upper brush head bracket (121) and the lower brush head bracket (123).
3. The multi-functional facial cleansing instrument according to claim 1, wherein the pawls (1242) arranged along circumferential edge are configured at an end of the brush head socket (124) toward the brush head (120); wherein an inverted buckle (1241) is arranged on top of each pawl, and the lower brush head bracket (123) comprises mounting grooves (1243) which match the inverted buckle (1241), and wherein the pawls (1242) and the lower brush head bracket (123) are configured to prevent axial displacement of the brush head assembly by clamping restriction which the inverted buckle (1241) and the inverted buckle mounting grooves (1243) provide.

4. The multi-functional facial cleansing instrument according to claim 1, wherein the power output of the motor is fixedly connected with the mounting portion of the brush head socket (124).
5. The multi-functional facial cleansing instrument according to any one of claims 1 to 4, wherein the brush head (120) comprises a replaceable cleaning brush head and/or replaceable massage brush head.
6. The multi-functional facial cleansing instrument according to claim 5, wherein the cleaning brush head (120) comprises a silicon brush head having silicone bristles ranging from 3mm to 5 mm in length and 0.7 mm in diameter.
7. The multi-functional facial cleansing instrument according to claim 5, wherein the massage brush head comprises a massage head and a ring buckle (2201).
8. The multi-functional facial cleansing instrument according to claim 1, wherein the motor bracket comprises a first support portion and a second support portion which are engaged with each other; wherein the first support portion (150) comprises a first sealing surface (1501) and a first sealing portion (1502) which is fixedly connected to the first sealing surface (1501); wherein the second support portion (151) comprises a second sealing surface (15) which is connected to the first sealing portion (1502); wherein the motor (130) is arranged in a cavity enclosed by the first sealing surface (1501) and the first sealing portion (1502); wherein a buffering means is configured between the motor (130) and the motor bracket, and the buffering means comprises a first buffering cushion (157) and a second buffering cushion (158), which cover the front end and rear end of the motor (130) respectively; wherein an outer waterproof ring (155) is further configured at an end of the motor bracket toward the brush head assembly, and the outer surface of the motor bracket is provided with a groove for positioning the outer waterproof ring (155), and the shell (110) compacts the outer waterproof ring (155) into the groove; and wherein a buffering foam (153) is arranged between the motor bracket and the shell (110).
9. The multi-functional facial cleansing instrument according to claim 8, wherein the first sealing portion (1502) comprises a cylindrical structure and the second sealing surface (15) comprises a connecting portion which is engaged with an end of the first sealing portion (1502); and wherein a plurality of apertures (2512) are arranged along the circumference of the connecting portion, and the second buffering cushion (258) comprises a plurality of protrusions (2581), each of which protrudes from the aperture (2512) and abuts against the shell (110).
10. The multi-functional facial cleansing instrument according to 1, wherein the motor (130) is a high frequency reciprocating vibration motor, comprising a cylindrical housing (510), a rotating shaft (513), a plurality of stators (5203) and a plurality of rotors (521) configured in the housing (510); wherein the stator (5203) comprises a plurality of Y-shaped stator teeth (5202), each of which is wound by a coil winding (5201); wherein the rotating shaft (513) which is provided with a plurality of rotor teeth corresponding to a plurality of Y-shaped stator teeth (5202) along the circumference thereof is inserted at the axle center of the housing (510).
11. The multi-functional facial cleansing instrument according to 10, wherein the split angle of the Y-shaped stator teeth (5202) ranges from 95° to 115°.
12. The multi-functional facial cleansing instrument according to claim 10, wherein each rotor tooth is a permanent magnet, comprising a tooth top (52) and a tooth root (5212); wherein magnetic poles of the tooth top (52) and the tooth root (5212) are opposite and magnetic poles of the adjacent tooth top are opposite.
13. The multi-functional facial cleansing instrument according to claim 1, wherein the power supply unit comprises a battery (131), a charging coil (132) and a charging coil bracket (133) configured on the motor bracket for supporting the charging coil (132).

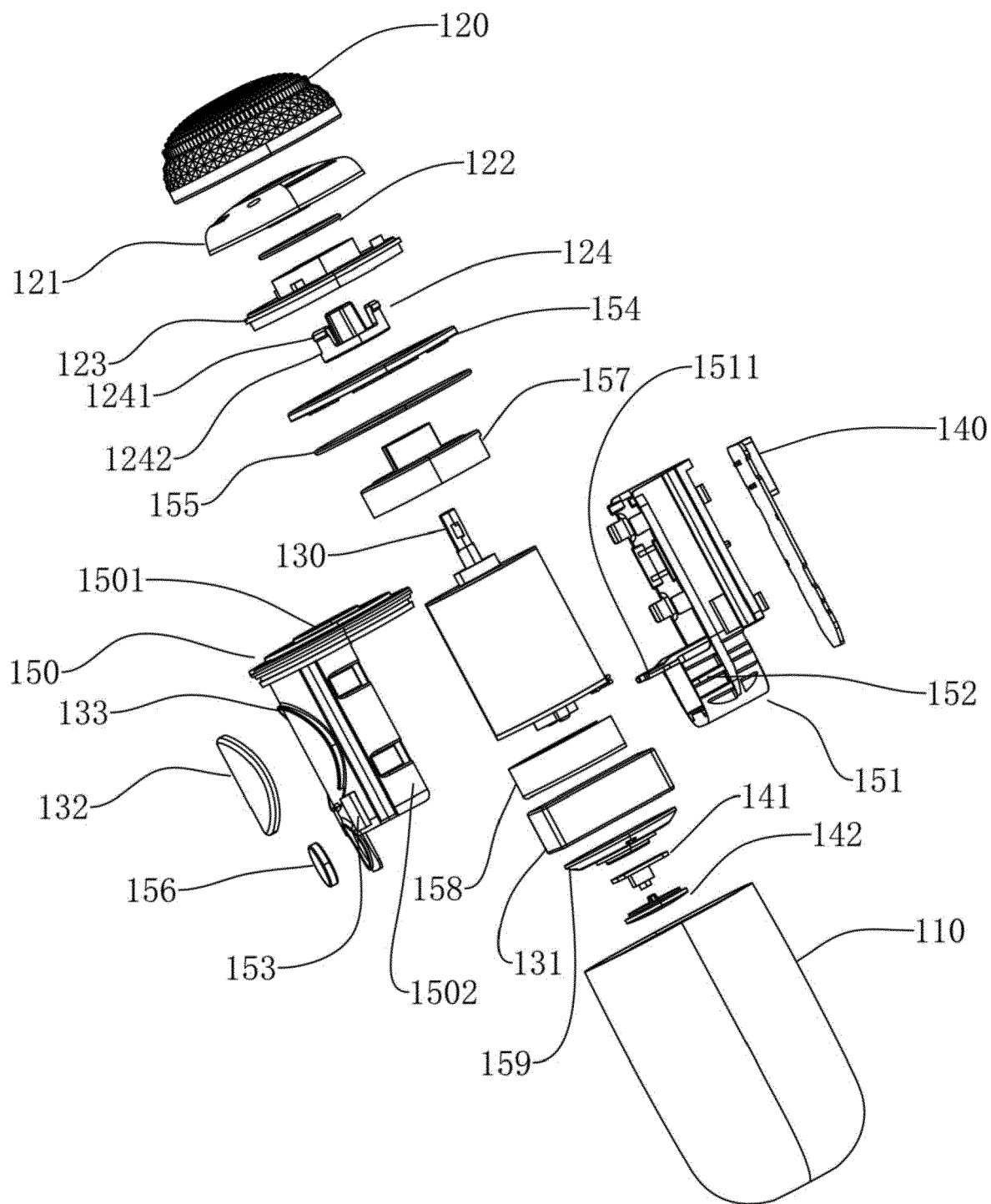


Fig. 1

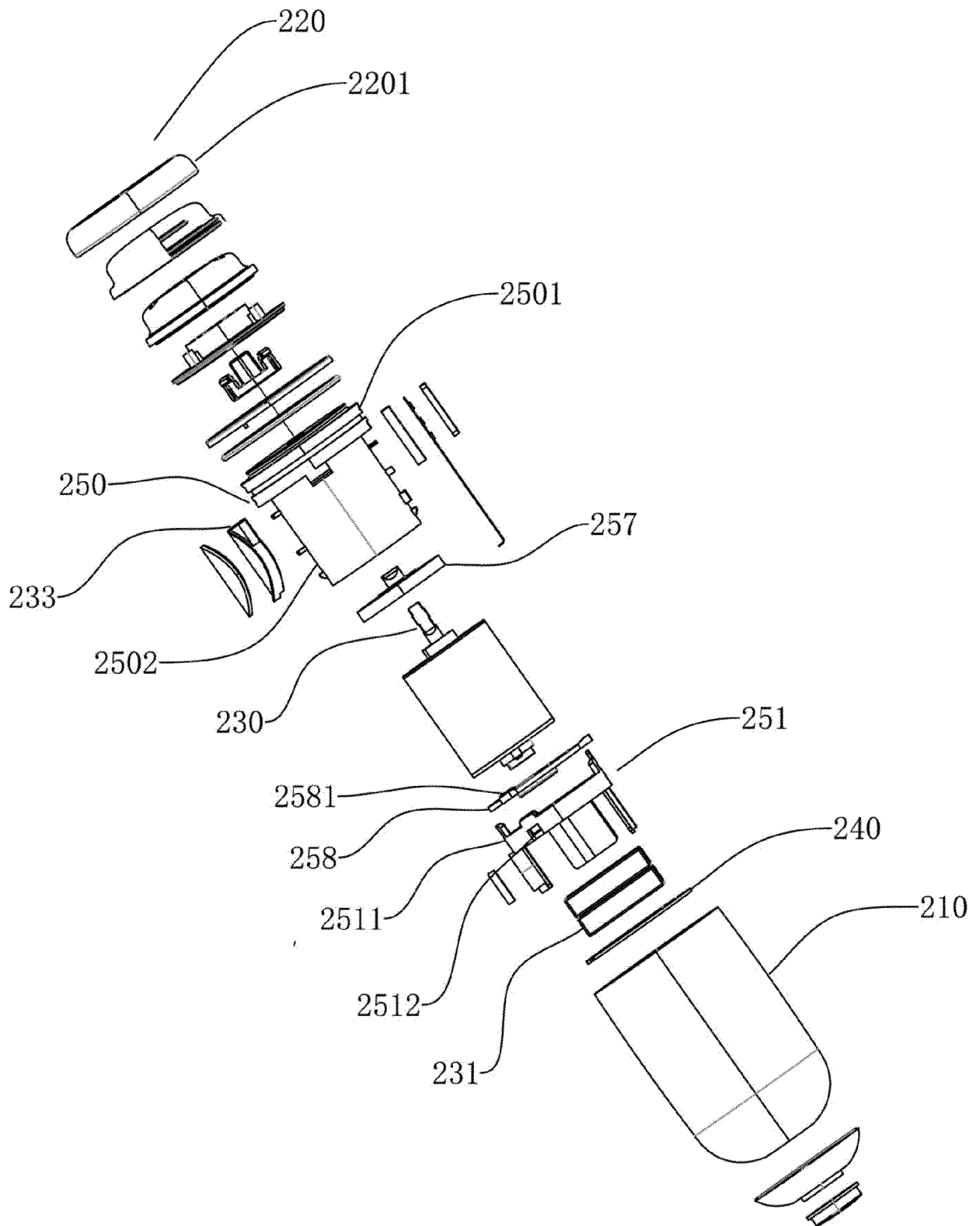


Fig. 2

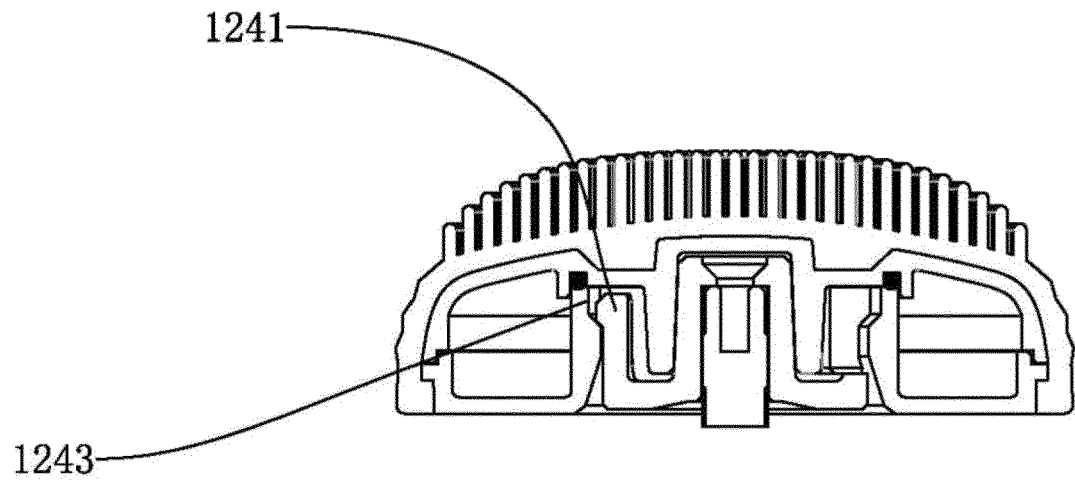


Fig. 3

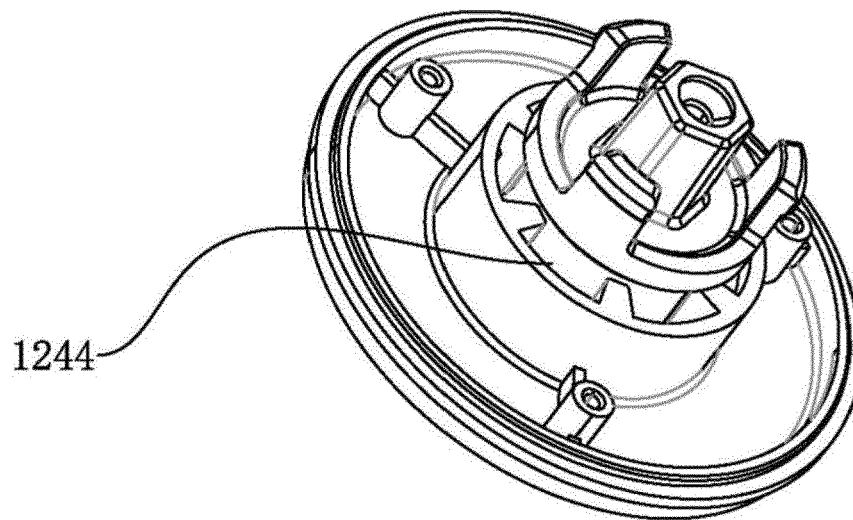


Fig. 4

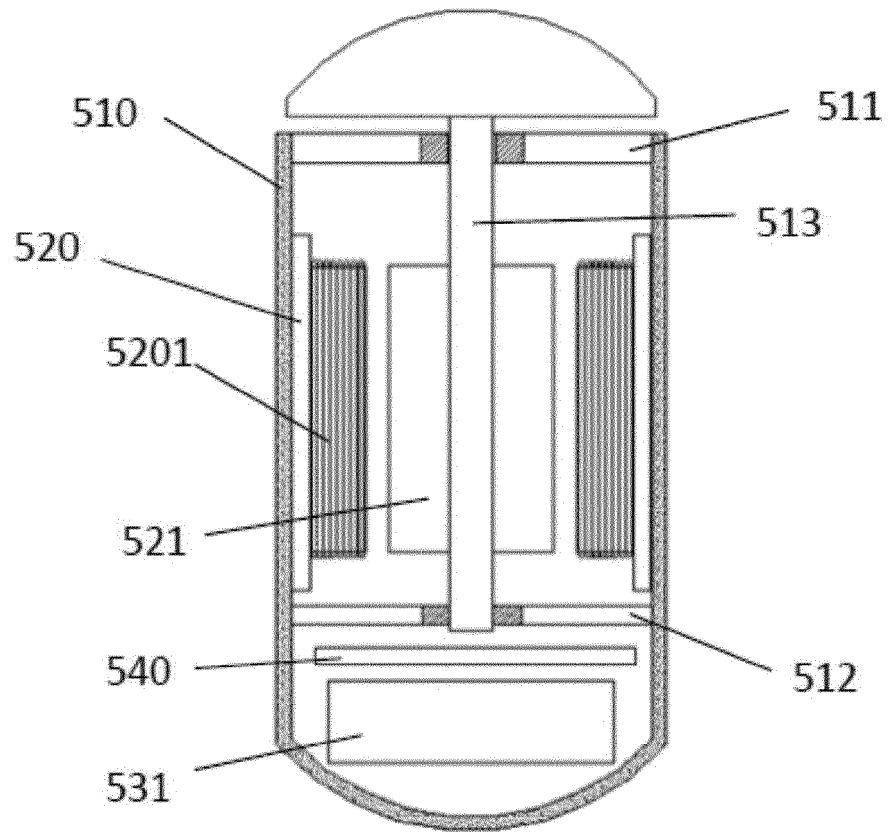


Fig. 5

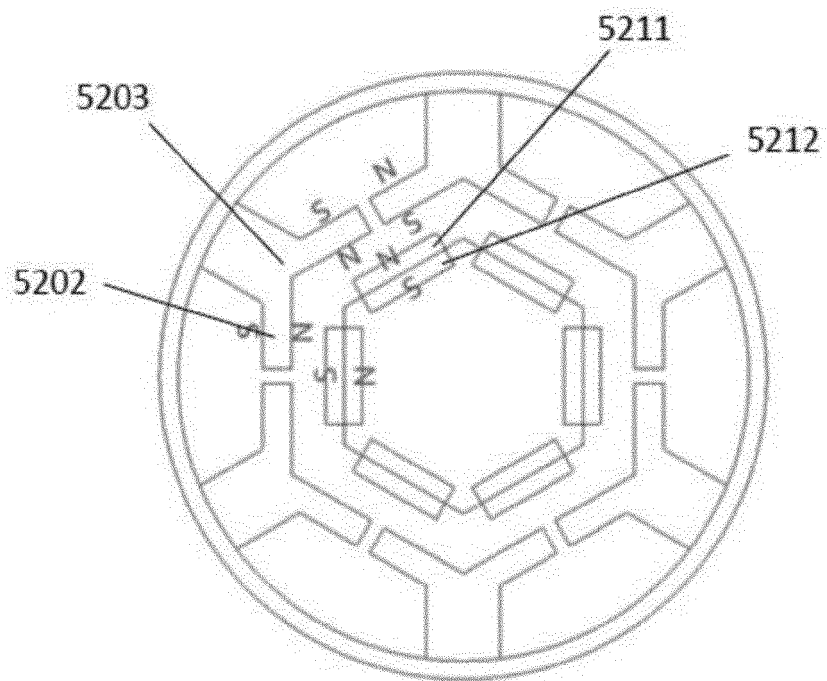


Fig. 6



## EUROPEAN SEARCH REPORT

Application Number  
EP 19 16 4253

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 108 852 116 A (MEIZHI TECH SHENZHEN CO LTD) 23 November 2018 (2018-11-23) * the whole document *	1-13	INV. A46B13/02 A47K7/04 A46B5/00
A	EP 3 141 171 A1 (CAL-COMP ELECTRONICS & COMMUNICATIONS COMPANY LTD [TW] ET AL.) 15 March 2017 (2017-03-15) * figures 2,3,5 *	1-13	
			TECHNICAL FIELDS SEARCHED (IPC)
			A46B A47K
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 September 2019	Examiner Raybould, Bruce
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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