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INTEGRATED ORAL CARE APPARATUS

Abstract

The present application provides an integrated oral care apparatus, including: an uneven housing, a composite member, a medium supply unit, a vector generation unit and a medium delivery member, where the uneven housing has a main extension line and oppositely arranged first end and second end, the main extension line extends from the first end of the uneven housing to the second end of the uneven housing, the vector generation unit connects with the composite member through a vector transmission rod, the vector transmission rod has a medium conveying channel, and the first end of the medium conveying channel is communicated with the composite member; the medium delivery member is configured to bridge between the vector generation unit and the medium supply unit, and has a communication channel, and the communication channel is hermetically coupled between the second end of the medium conveying channel and the medium supply unit.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION [0001] This application is a continuation of U.S. application Ser. No. 18/175,867, filed on Feb. 28, 2023, which claims priority to Chinese Patent Application No. 202210938586O, filed on Aug. 5, 2022, both of which are hereby incorporated by reference in their entireties.

TECHNICAL FIELD
[0002] The present application relates to the technical field of oral care, in particular to an integrated oral care apparatus.
BACKGROUND
[0003] As people attach importance to oral care, electric toothbrush and oral irrigator have gradually become common oral care tools in families.
[0004] At present, the electric toothbrush on the market only has the function of brushing teeth, and the oral irrigator only has the function of rinsing teeth. Therefore, people need to use the oral irrigator and the electric toothbrush respectively when nursing the oral cavity, which causes many inconveniences. Therefore, there is provided a multifunctional electric toothbrush in the prior art, including a toothbrush handle and a toothbrush head, where the toothbrush head is provided with a channel communicated with bristles, and the accommodating cavity of the toothbrush handle is provided with a conveying pipe communicated with the channel.
[0005] However, after the multifunctional electric toothbrush is used for a long time, the sealing reliability between the toothbrush head channel and the conveying pipe becomes deteriorated, and there is a hidden danger of leakage.
SUMMARY
[0006] In view of the above problems, embodiments of the present application provide an integrated oral care apparatus, which has higher sealing reliability between the toothbrush head channel and the conveying pipe.
[0007] To achieve the above object, embodiments of the present application provide the following technical solutions.
[0008] Embodiments of the application provide an integrated oral care apparatus, including: an uneven housing, configured to have a bionic gripping surface suitable for gripping, where the uneven housing has a main extension line, and a first end and a second end which are oppositely arranged, and the main extension line extends from the first end of the uneven housing to the second end of the uneven housing; a composite member, configured to remove foreign substances in a target area, where the composite member is close to the second end of the uneven housing and is far away from the first end of the uneven housing; a medium supply unit, configured to provide the composite member with a fluid medium for accelerating a removal of the foreign substances; a vector generation unit at least partially added to the uneven housing, where the vector generation unit connects with the composite member through a vector transmission rod having a medium conveying channel with a first end that is communicated with the composite member; a medium delivery member, configured to be bridged between the vector generation unit and the medium

supply unit, the medium delivery member having a communication channel that is hermetically coupled between a second end of the medium conveying channel and the medium supply unit.
[0009] In some embodiments, the integrated oral care apparatus further includes: first sealing members, configured to be elastic, the first sealing members being at least partially filled in an assembly gap between the medium delivery member and the vector transmission rod, and an assembly gap between the medium delivery member and an outlet end of the medium supply unit, respectively.
[0010] In some embodiments, the first sealing member is internally provided with an expansion cavity that penetrates through an outer wall surface of the first sealing member, and the fluid medium is configured to be filled in the expansion cavity through the assembly gap.
[0011] In some embodiments, the expansion cavity extends along a circumferential direction of the communication channel.
[0012] In some embodiments, the first sealing member includes a fixing portion and an expansion portion, where the expansion portions are multiple, and multiple expansion portions are connected to a same end of the fixing portion along a flow direction of the fluid medium, and the multiple expansion portions are arranged at intervals along a radial direction of the communication channel, and two adjacent expansion portions enclose to form the expansion cavity.
[0013] In some embodiments, the medium delivery member includes a lead-in section and a lead-out section which are communicated with each other, the lead-out section is connected with the vector delivery rod in an insertion manner, and the lead-in section is connected with the outlet end of the medium supply unit in an insertion manner.
[0014] In some embodiments, a center line of an inner cavity of the lead-in section is spaced from a center line of an inner cavity of the lead-out section.
[0015] In some embodiments, the vector transmission rod is inserted into the lead-out section, and the outlet end of the medium supply unit is inserted into the lead-in section; inner wall surfaces of both ends of the communication channel are respectively provided with mounting grooves, the first sealing members are mounted in the mounting grooves, and openings of the expansion cavities of the first sealing members at both ends of the communication channel are oppositely arranged.
[0016] In some embodiments, the inner wall surface of the communication channel is provided with a guiding inclined plane, which is arranged at an open end of the expansion cavity of the first sealing member and has an included angle relative to the flow direction of the fluid medium and extends to the mounting groove.
[0017] In some embodiments, an end of the vector transmission rod far away from the composite member penetrates into the vector generation unit from an end of the vector generation unit close to the composite member, and passes through the vector generation unit from an end of the vector generation unit far away from the composite member.
[0018] In some embodiments, the vector transmission rod extends along the main extension line, and along an extension direction of the main extension line, the medium conveying channel penetrates through an end of the vector transmission rod far away from the composite member and an end of the vector transmission rod close to the composite member.
[0019] In some embodiments, the medium supply unit includes a medium conveying mechanism and a medium container that are arranged in the uneven housing; the medium container is arranged at one side deviated from the main extension line; along the extension direction of the main extension line, the medium conveying mechanism is separated from the vector generation unit by a preset distance, and the medium conveying mechanism is located on a side of the vector generation unit far away from the composite member; the medium conveying mechanism has a medium outflow end and a medium inflow end, where the medium outflow end is communicated with the communication channel, and the medium inflow end is communicated with the medium container through a pipeline.
[0020] In some embodiments, the medium container includes an outer wall which is integrated with

the bionic gripping surface, and an inner wall which is connected with the outer wall and extends along the main extension line, and the inner wall and the outer wall together form a closed special-shaped cavity extending along the main extension line, and the closed special-shaped cavity is configured to store the fluid medium.

[0021] In some embodiments, the bionic gripping surface includes a first profiling gripping surface and a second profiling gripping surface which are asymmetrically distributed relative to the main extension line, and the first profiling gripping surface and the second profiling gripping surface are spliced to form a closed annular surface.

[0022] In some embodiments, a distance of the first profiling gripping surface relative to the main extension line varies from being equal to being gradually decreased, from the first end of the uneven housing to the second end of the uneven housing, along the extension direction of the main extension line.

[0023] In some embodiments, the composite member includes a support head which is latchably connected with an end of the vector transmission rod far away from the vector generation unit, and the support head is internally provided with a medium guide channel which is communicated with the medium conveying channel, a center line of the medium guide channel is arranged on the main extension line; the supporting head is provided with a bristle planting surface, and a plurality of bundles of bristles are planted on the bristle planting surface at intervals, and a depth of the plurality of bundles of bristles planted on the bristle planting surface is not more than a distance from the bristle planting surface to the main extension line; the bristle planting surface is provided with a splash hole that is communicated with the medium guide channel.

[0024] In some embodiments, an inner pore size of the medium guide channel is matched with an outer diameter of the vector transmission rod; the medium guide channel has a bonding surface parallel to the main extension line, an end of the vector transmission rod far away from the vector generation unit is inserted into the medium guide channel by a certain distance, and a part of the vector transmission rod located in the medium guide channel has a milling plane matched with the bonding surface.

[0025] In some embodiments, the composite member further includes a first spatial position holding member, a second sealing member and a second spatial position holding member, where the first spatial position holding member, the second sealing member and the second spatial position holding member are arranged in the support head along the flow direction of the fluid medium; the first spatial position holding member, the second sealing member and the second spatial position holding member all have internal cavities which are communicated with each other and constitute part of the medium guide channel; the first spatial position holding member is connected with the support head in a clamping manner, so as to fix the second sealing member and the second spatial position holding member in the medium guide channel; where, the bonding surface is arranged on an inner wall surface of the second spatial position holding member, and the second sealing member is configured to fill at least part of a space between the vector transmission rod and the support head, and the vector transmission rod is connected with the first spatial position holding member in a clamping manner.

[0026] In some embodiments, the second spatial position holding member is provided with a connecting through hole which is opposite to the bonding surface, and the second spatial position holding member is provided with an elastic arm arranged in the connecting through hole, and the elastic arm is configured to press against the vector transmission rod through its own elastic structure.

[0027] In some embodiments, the composite member further includes an elastic clamping member, the elastic clamping member is connected with the first spatial position holding member, and a clamping portion of the elastic clamping member extends into the internal cavity of the first spatial position holding member; the outer wall surface of the vector transmission rod is provided with a clamping groove, and the clamping portion of the elastic clamping member is clamped in the

clamping groove in an openable and closable manner.
[0028] Compared with the prior art, the integrated oral care apparatus provided by the embodiment of the application has the following advantages.
[0029] Embodiments of the present application provide an integrated oral care apparatus, including a vector generation unit, a composite member and a medium supply unit, where the vector generation unit is connected with the composite member through a vector transmission rod, the vector transmission rod is integrated with a medium conveying channel, the medium supply unit and the composite member is communicated merely through the medium conveying channel therebetween, that is, the medium supply unit provides the composite member with a medium for removing foreign substances through the medium conveying channel, so as to enable the composite member to remove foreign substances in a target area. In this way, there is no need to set another conveying pipe in the housing between the medium supply unit and the composite member, so that the contour size of the housing between the medium supply unit and the composite member can be reduced, thus the overall contour of the housing is reduced, so as to improve the user's gripping comfort.
[0030] In addition, by setting a medium delivery member between the vector transmission rod and the medium supply unit, the medium delivery member is respectively in sealed communication with the medium supply unit and the vector transmission rod, so that there is a better sealing performance between the medium delivery member and the medium supply unit and between the medium delivery member and the vector transmission rod, that is, the sealing reliability between the vector transmission rod and the medium supply unit is higher.
[0031] In addition to the technical problems solved by the above-described embodiments of the present application, the technical features constituting the technical solutions and the beneficial effects brought by these technical solutions, other technical problems solved by the integrated oral care apparatus provided by the embodiments of the present application, other technical features included in the technical solutions and the beneficial effects brought by these technical features will be further explained in detail in the specific embodiments.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0032] In order to more clearly explain the technical solutions in the embodiments of the present application or in the prior art, the following will briefly introduce the drawings required to be used in the description of the embodiments or the prior art. Obviously, the drawings in the following description are some embodiments of the present disclosure. For those with ordinary skills in the art, other drawings can also be obtained according to these drawings without any creative labor.
[0033] FIG. **1** is a structural schematic diagram of an integrated oral care apparatus according to some embodiments of the present application.
[0034] FIG. **2** is a partially-enlarged structural schematic diagram of part A in FIG. **1**.
[0035] FIG. **3** is an exploded structural schematic diagram of the integrated oral care apparatus according to some embodiments of the present application.
[0036] FIG. **4** is another exploded structural schematic diagram of the integrated oral care apparatus according to some embodiments of the present application.
[0037] FIG. **5** is a structural schematic diagram of a medium delivery member according to some embodiments of the present application.
[0038] FIG. **6** is a structural schematic diagram of a first sealing member according to some embodiments of the present application.
[0039] FIG. **7** is a structural schematic diagram of a vector generation unit and a vector transmission rod according to some embodiments of the present application.

[0040] FIG. **8** is a structural schematic diagram of a composite member according to some embodiments of the present application.
[0041] FIG. **9** is an exploded structural schematic diagram of the composite member in FIG. **8**.
[0042] FIG. **10** is a structural schematic diagram of a first spatial position holding member according to some embodiments of the present application.
[0043] FIG. **11** is a structural schematic diagram of a second spatial position holding member according to some embodiments of the present application.
[0044] FIG. **12** is a structural schematic diagram of the connection between an elastic clamping member and the first spatial position holding member according to some embodiments of the present application.

REFERENCE NUMERALS

[0045] **10**—Uneven housing; [0046] **101**—First end; **102**—Second end; **103**—Main extension line; **104**—First profiling gripping surface; **105**—Second profiling gripping surface; **106**—Inner wall; **107**—Closure cover; [0047] **20**—Composite member; [0048] **21**—Support head; **211**—Guide protrusion; [0049] **22**—Medium guide channel; [0050] **23**—Bristle; [0051] **24**—Splash hole; [0052] **25**—First spatial position holding member; **251**—Clamping protrusion; **252**—Positioning groove; **253**—Mounting hole; [0053] **26**—Second sealing member; [0054] **27**—Second spatial position holding member; **271**—Bonding surface; **272**—Elastic arm; **273**—Connecting through hole; [0055] **28**—Elastic clamping member; **281**—Clamping portion; **282**—Bending portion; [0056] **29**—Nozzle member; [0057] **30**—Medium supply unit; [0058] **31**—Medium conveying mechanism; **311**—Medium inflow end; **312**—Medium outflow end; [0059] **32**—Medium container; **33**—Conveying pipe; [0060] **40**—Vector generation unit; [0061] **50**—Vector transmission rod; **51**—Medium conveying channel; **52**—Milling plane; **53**—Clamping groove; [0062] **60**—Medium delivery member; **61**—Communication channel; **62**—Lead-in section; **63**—Lead-out section; **64**—Connection section; **65**—Mounting groove; **66**—Guiding inclined plane; [0063] **70**—First sealing member; **71**—Expansion cavity; **72**—Fixing portion; **73**—Expansion portion; [0064] **81**—Power supply module; **82**—Charging module; **83**—Control panel; **84**—Combination bracket; **85**—Waterproof member; **86**—Support member; **87**—First shock-absorbing pad; **88**—Second shock-absorbing pad; **89**—Tail cover; **891**—Tail channel.

DESCRIPTION OF EMBODIMENTS

[0065] In order to make the above purposes, features and advantages of the embodiments of the present application more obvious and understandable, the technical solutions in the embodiments of the present application will be described clearly and completely with reference to the accompanying drawings in the embodiments of the present application. Obviously, the embodiments to be described are only part of the embodiments of the present application, not all embodiments. Based on the embodiments in the present application, all other embodiments obtained by those ordinary skilled in the art without creative labor are within the scope of protection of the present application.
[0066] As mentioned in the background art, in the multifunctional electric toothbrush in the related art, the sealing reliability between a toothbrush head channel and a conveying pipe decreases, and the leakage between the toothbrush head channel and the conveying pipe easily occurs. According to the inventor's research, the reason for this problem is that when an electric toothbrush is running, the relative vibration amplitude between the toothbrush head channel and the conveying pipe is relatively large, and the water pressure at a water outlet end of a pump body is too large, which leads to the fatigue deformation of the sealing structure and the reduction of the sealing reliability.
[0067] To solve the above problem, an embodiment of the present application provides an integrated oral care apparatus, including a vector generation unit, a composite member and a medium supply unit, where, the vector generation unit is connected with the composite member through a vector transmission rod; the vector transmission rod is integrated with a medium conveying channel; the medium supply unit and the composite member is communicated merely

through the medium conveying channel therebetween, that is, the medium supply unit provides the composite member with a medium for removing foreign substances through the medium conveying channel, so as to enable the composite member to remove foreign substances in a target area. In this way, there is no need to additionally set a conveying pipe in a housing between the medium supply unit and the composite member, so that the contour size of the housing between the medium supply unit and the composite member may be reduced, thus the overall contour of the housing may be reduced, thereby improving the user's gripping comfort.

[0068] Meanwhile, by setting a medium delivery member between the vector transmission rod and the medium supply unit, a vibration amplitude between the vector transmission rod and the medium delivery member and a vibration amplitude between the medium supply unit and the medium delivery member may be reduced respectively, the influence of a fluid medium on a sealing structure may be dispersed, the fatigue life of the sealing structure may be improved, and the sealing reliability is higher.

[0069] Referring to FIGS. **1**, **3** and **4**, the present embodiment provides an integrated oral care apparatus for cleaning the user's mouth.

[0070] The integrated oral care apparatus includes an uneven housing **10**. The uneven housing **10** may be a plastic member, has a small weight and is easy to hold.

[0071] The uneven housing **10** is configured to have a bionic gripping surface suitable for holding, that is, an outer wall surface of the uneven housing **10** is the bionic gripping surface, the term "bionic" means that the surface is suitable for the shape of a user's hand when the uneven housing **10** is gripped by a user. That is, when the user grips the uneven housing **10**, the outer wall surface of the uneven housing **10** may be in contact with different positions of the user's hand. Users may use the integrated oral care apparatus with high comfort. Exemplarily, the uneven housing **10** is provided with a concave structure corresponding to the user's finger portion.

[0072] The uneven housing **10** has a main extension line **103**, which extends from a first end **101** of the uneven housing **10** to a second end **102** of the uneven housing **10**. That is, the main extension line **103** may be understood as a length direction of the uneven housing **10**, and the uneven housing **10** is approximately a rod-shaped structure with a preset length in the direction of the main extension line **103**. Correspondingly, in the direction of the main extension line **103**, the uneven housing **10** has the first end **101** and the second end **102** which are arranged oppositely to each other, that is, the first end **101** and the second end **102** of the uneven housing **10** are respectively located at the opposite ends of the uneven housing **10**.

[0073] The term "uneven" refers to a non-rotationally symmetrical structure, that is, the uneven housing **10** is a non-rotationally symmetrical housing, so as to be suitable for a gripping shape of the user's hand and improve the user's comfort.

[0074] In some embodiments, the bionic gripping surface includes a first profiling gripping surface **104** and a second profiling gripping surface **105** which are asymmetrically distributed relative to the main extension line **103**, and the first profiling gripping surface **104** and the second profiling gripping surface **105** are spliced to form a closed annular surface.

[0075] The first profiling gripping surface **104** and the second profiling gripping surface **105** may be similar in shape, for example, they are both approximately cylindrical, and their structures are relatively simple. And the first profiling gripping surface **104** and the second profiling gripping surface **105** are arranged asymmetrically with respect to the main extension line **103**, for example, the distance between the first profiling gripping surface **104** and the main extension line **103** is larger than that between the second profiling gripping surface **105** and the main extension line **103**, so that they enclose a complete annular surface structure.

[0076] In some embodiments, the integrated oral care apparatus further includes a composite member **20**, which is close to the second end **102** of the uneven housing **10** and far away from the first end **101** of the uneven housing **10**, that is, the composite member **20** is installed at the second end **102** of the uneven housing **10**.

[0077] The composite member **20** is configured to remove foreign substances in a target area. Where, the target area is the inside of the user's oral cavity, and the composite member **20** may be understood as a cleaning head for oral cavity cleaning. For example, the cleaning head includes a toothbrush head, and the toothbrush head removes foreign substances such as food residue attached to the user's teeth.

[0078] The integrate oral care apparatus may have different modes, such as a tooth brushing mode, a tooth rinsing mode, and a mixed mode which may simultaneously perform tooth brushing and tooth rinsing, depending on a type and a using mode of the composite member **20**.

[0079] In some embodiments, the integrated oral care apparatus further includes a medium supply unit **30** configured to provide the composite member **20** with a fluid medium for accelerating a removal of foreign substances.

[0080] The fluid medium may be liquid or gas. When the fluid medium is liquid, the fluid medium may be water, or liquid mixed with a detergent, a disinfectant, etc. The medium supply unit **30** is a pumping unit that supplies the above-mentioned fluid medium to the composite member **20**. Through the medium supply unit **30**, the composite member **20** may be assisted in oral cleaning operation to optimize the oral cleaning effect.

[0081] In some embodiments, the integrated oral care apparatus further includes a vector generation unit **40**, which is configured to output a motion vector and may be understood as a power member for the integrated oral care apparatus. Depending on an operation mode of the integrated oral care apparatus, the motion vector includes but is not limited to vibration, swing, etc.

[0082] The vector generation unit **40** is at least partially added into the uneven housing **10**, that is, part of the vector generation unit **40** is located inside the uneven housing **10**, part of the vector generation unit **40** is located outside the uneven housing **10**, and the vector generation unit **40** that is located outside the uneven housing **10** extends to the outside of the uneven housing **10** and is connected with the composite member **20** to provide the motion vector to the composite member **20**.

[0083] In some embodiments, the vector generation unit **40** further includes a vector transmission rod **50** with a rod-shaped structure, and the vector generation unit **40** connects with the composite member **20** through the vector transmission rod **50**. Where, the vector generation unit **40** includes a power member for outputting a motion vector, and the vector transmission rod **50** penetrates into and is connected with the power member for transmitting the motion vector to the composite member **20**.

[0084] That is, the vector transmission rod **50** spans the inner and outer sides of the uneven housing **10**. One end of the vector transmission rod **50** that is located inside the uneven housing **10** is connected with the power member of the vector generation unit **40**, and the other end of the vector transmission rod **50** that is located outside the uneven housing **10** is connected with the composite member **20**, so that the motion vector output by the power member may be transmitted to the composite member **20** through the vector transmission rod **50**.

[0085] In some embodiments, the power member in the vector generation unit **40** is capable of outputting an eccentric power, and the power member includes a driving shaft, which is connected with the vector transmission rod **50** penetrating into the vector generation unit **40**, so as to transmit the eccentric power to the vector transmission rod **50**, so that the composite member **20** vibrates or swings relative to the target area.

[0086] Exemplarily, the vector generation unit **40** provided by the embodiment of the present application may be a miniature reciprocating vibrator, such as an acoustic motor, and its power member includes a driving shaft, a stator and a rotor, where the stator includes a permanent magnet which is fixedly arranged, the driving shaft is inserted into the rotor, and the driving shaft is sleeved with an iron core block which is located in the permanent magnet and wound with a coil winding.

[0087] When the coil winding is energized by a forward direction current, the coil winding of the iron core block forms a magnetic field; and when the magnetic field interacts with a magnetic field

of the permanent magnet, the rotor swings counterclockwise for a certain angle. On the contrary, when the coil winding is energized by a reverse direction current, a magnetic field formed by the coil winding of the iron core block has a direction which is opposite to that of the previous magnetic field, and when the magnetic field interacts with the magnetic field of the permanent magnet, the rotor swings in a reverse direction for a certain angle. When the coil is alternately energized forward and backward at a preset frequency, the rotor will swing back and forth according to this frequency; while in a non-energized state, the iron core block will be positioned at a middle position of the two opposite poles of the permanent magnet under the balance of the attractive forces therebetween.

[0088] In some embodiments, referring to FIGS. **1**-**4** and **7**, in order to communicate the medium supply unit **30** with the composite member **20**, the vector transmission rod **50** has a medium conveying channel **51**, that is, along the extension direction of the vector transmission rod **50**, at least part of the interior of the vector transmission rod **50** is hollow, so as to form the medium conveying channel **51** for the fluid medium to flow. A first end of the medium conveying channel **51** communicates with the composite member **20**, so that the fluid medium may be conveyed to a position of the composite member **20** via the medium conveying channel **51**.

[0089] An axis of the driving shaft of the power member may be spaced from the main extension line **103**. For example, the driving shaft of the power member may be located at one side of the vector transmission rod **50**, with a power adapter between them, which realizes the power transmission through the power adapter.

[0090] In some embodiments, one end of the vector transmission rod **50** far away from the composite member **20** penetrates into the vector generation unit **40** from an end of the vector generation unit **40** close to the composite member **20**, and passes through the vector generation unit **40** from an end of the vector generation unit **40** far away from the composite member **20**. That is, in the direction of the main extension line **103**, the vector transmission rod **50** penetrates into the power member of the vector generation unit.

[0091] In this way, the size occupied by the vector generation unit **40** in the uneven housing **10** may be reduced, and the circumferential size of the integrated oral care apparatus may be reduced, which is easy for the user to grip.

[0092] According to different assembly requirements, the vector transmission rod **50** may be a bent rod. In some embodiments, the vector transmission rod **50** may also extend along the main extension line **103**, that is, the vector transmission rod **50** is a straight rod with a relatively simple structure, and has a smaller occupation space

[0093] When the vector transmission rod **50** is a straight rod, the vector transmission rod **50** may extend along the main extension line **103**, and the medium conveying channel **51** penetrates through one end of the vector transmission rod **50** far away from the composite member **20** and one end of the vector transmission rod **50** close to the composite member **20**. That is, the vector transmission rod **50** is a hollow rod with a hollow interior, so that the end of the vector transmission rod **50** away from the composite member **20** is used for introducing the fluid medium. Accordingly, the medium supply unit **30** may be arranged at the end of the vector generation unit **40** far away from the composite member **20**, so as to reduce the circumferential size of the integrated oral care apparatus and make it easy for the user to grip.

[0094] In some embodiments, a center line of the medium conveying channel **51** may also be arranged on the main extension line **103**, that is, it may be understood that the center line of the medium conveying channel **51** is used as the main extension line **103** of the integrated oral care apparatus, and the uneven housing **10** is arranged outside the circumference of the vector transmission rod **50**.

[0095] Considering that when the integrated oral care apparatus is in operation, the vector transmission rod **50** will swing or vibrate under the drive of the vector generation unit **40**, and when the medium supply unit **30** is in operation, for example, when the integrated oral care

apparatus is in a mode of tooth rinsing or a mixed mode, the medium supply unit **30** and the vector transmission rod **50** will vibrate simultaneously, a relative vibration amplitude at a connection position between the medium supply unit **30** and the vector transmission rod **50** is relatively large.

[0096] To avoid a leakage, referring to FIGS. **1** to **5**, in some embodiments, the integrated oral care apparatus further includes a medium delivery member **60**, which is configured to bridge between the vector generation unit **40** and the medium supply unit **30**, that is, the medium delivery member **60** is connected between the vector generation unit **40** and the medium supply unit **30**. The medium delivery member **60** may be understood as a connecting component that is connected between the vector generation unit **40** and the medium supply unit **30**, that is, the vector transmission rod **50** is connected with the medium supply unit **30** through the medium delivery member **60**.

[0097] The medium delivery member **60** has a communication channel **61** for the fluid medium to flow, and the communication channel **61** is hermetically coupled to a second end of the medium conveying channel **51** and is in sealed communication with the medium supply unit **30**.

[0098] In this way, on the one hand, the communication channel **61** communicates with the second end of the medium conveying channel **51** and the medium supply unit **30**, and the fluid medium provided by the medium supply unit **30** may be delivered to a position of the composite member **20** through the communication channel **61** and the medium conveying channel **51** in sequence, so as to assist the user in accelerating the removal of foreign substances in the oral cavity.

[0099] Furthermore, the second end of the medium conveying channel **51** and the medium supply unit **30** are sealed by the medium delivery member **60**. That is, a sealing between the medium supply unit **30** and the vector transmission rod **50** is divided into two sealing steps, namely, a sealing between the medium delivery member **60** and the medium supply unit **30** and a sealing between the medium delivery member **60** and the vector transmission rod **50**. At this time, a vibration amplitude of the vector transmission rod **50** relative to the medium delivery member **60** and a vibration amplitude of the medium supply unit **30** relative to the medium delivery member **60** are both smaller, and the damage to the sealing structure between the vector transmission rod **50** and the medium supply unit **30** is smaller. Compared with a single-point sealing in the related art, the present embodiment realizes a sealing in a preset length range by setting the medium delivery member **60** and the sealing structures at its both ends, so as to disperse the influence of the pressure from the fluid medium; and there is better sealing effect between the vector transmission rod **50** and the medium supply unit **30**.

[0100] Furthermore, by providing the medium conveying channel **51** in the vector transmission rod **50** and the communication channel **61** in the medium delivery member **60**, the fluid medium may be conveyed to the composite member **20**. Compared with the technical solution in the related art, where the accommodating cavity of the toothbrush handle is provided with a conveying pipe communicated with the channel of the toothbrush head and the conveying pipe is located at one side of the accommodating cavity, in the present embodiment, the medium supply unit **30** supplies the fluid medium required for removing foreign substances to the composite member **20** through the vector transmission rod **50**, and there is no need to additionally arrange a conveying pipe in the uneven housing **10**, so that an uneven contour size between the composite member **20** and the vector generation unit **40** may be reduced, thereby making the overall contour of the uneven housing **10** smaller, so as to improve the user's gripping comfort.

[0101] In some embodiments, referring to FIGS. **1** to **6**, the integrated oral care apparatus further includes a first sealing member **70** configured to be elastic, that is, the first sealing member **70** is an elastic member, for example, the first sealing member **70** is a rubber member or a silicone member.

[0102] The first sealing members **70** are at least partially filled in an assembly gap between the medium delivery member **60** and the vector transmission rod **50** and an assembly gap between the medium delivery member **60** and an outlet end of the medium supply unit **30**, respectively.

[0103] That is, along the flow direction of the fluid medium, at least part of the assembly gaps is provided with the first sealing member **70** to seal the assembly gap. In some embodiments, the first

sealing members **70** may be arranged in a part of the assembly gaps between the medium delivery member **60** and the vector transmission rod **50** and a part of the assembly gaps between the medium delivery member **60** and the outlet end of the medium supply unit **30**, which has lower sealing cost and is easy to assemble.

[0104] By arranging the first sealing member **70** in the assembly gap, the first sealing members **70** may have elastic extrusion deformation, and seal the assembly gap between the medium delivery member **60** and the vector transmission rod **50** and the assembly gap between the medium delivery member **60** and the outlet end of the medium supply unit **30**, so as to prevent the fluid medium from leaking between the medium supply unit **30** and the medium delivery member **60** and between the medium delivery member **60** and the vector transmission rod **50**.

[0105] Meanwhile, because the first sealing member **70** is the elastic member, it may cushion the vibration of the vector transmission rod **50** and the medium supply unit **30**, that is, a vibration amplitude of the end of the vector transmission rod **50** relative to the medium delivery member **60** and a vibration amplitude of the medium supply unit **30** relative to the medium delivery member **60** are both smaller, the extrusion deformation of the first sealing member **70** caused by vibration is relatively small, a fatigue life of the first sealing member **70** is relatively long, and the sealing effect between the vector transmission rod **50** and the medium supply unit **30** is better.

[0106] The first sealing member **70** may be a solid structure, such as a rubber ring or a silicone ring, and its structure is relatively simple.

[0107] In some embodiments, the first sealing member **70** may also have an expansion cavity **71**, that is, the first sealing member **70** has a cavity structure inside, and the expansion cavity **71** penetrates through an outer wall surface of the first sealing member **70**. The fluid medium is configured to be filled in the expansion cavity **71** through the assembly gap, that is, the fluid medium may be transported into the expansion cavity **71** through the assembly gap.

[0108] In this way, during the process of the fluid medium being delivered to the composite member **20**, the first sealing member **70** may be filled with the fluid medium, and under the extrusion of the fluid medium, a volume of the expansion cavity **71** may be enlarged, and a side wall of the expansion cavity **71** will have an expansion deformation. Correspondingly, the first sealing member **70** will expand and deform, and the first sealing member **70** will be squeezed into the assembly gap.

[0109] That is, by providing the expansion cavity **71** in the first sealing member **70**, an extrusion deformation degree of the first sealing member **70** in the assembly gap may be increased by a pressure of the fluid medium, thereby improving the sealing effect.

[0110] In some embodiments, the greater the pressure of the fluid medium is, the greater the deformation degree of the side wall of the expansion cavity **71** is, and the better the sealing effect of the first sealing member **70** is.

[0111] The first sealing member **70** may be provided with a plurality of expansion cavities **71**, which are arranged at intervals along a circumferential direction of the communication channel **61** and do not communicate with each other. In this way, when the first sealing member **70** is clamped in the assembly gap, a sealing degree of the first sealing member **70** at different positions in its circumferential direction may be set differently.

[0112] In some embodiments, the expansion cavity **71** can also extend along the circumferential direction of the communication channel **61**, and an extension length of the expansion cavity **71** can be set according to requirements. For example, the expansion cavity **71** is annular and is arranged around the communication channel **61**. In this way, the sealing effect at different positions in the circumferential direction of the communication channel **61** is approximately the same, and the sealing effect is better.

[0113] In some embodiments, the first sealing member **70** includes a fixing portion **72** and expansion portions **73**, and the expansion portions **73** are multiple, such as two, three or more. The present embodiment is explained by taking the first sealing member **70** having two expansion

portions as an example. A cross-sectional shape of the first sealing member **70** is approximately Y-shaped, and the structure of the first sealing member **70** is relatively simple.

[0114] A plurality of expansion portions **73** are connected to the same end of the fixing portion **72** along the flow direction of the fluid medium, that is, one end of each expansion portion **73** is connected to the fixing portion **72**, and the other end is a free end, and the expansion portion **73** can bend and deform with its end connected to the fixing portion **72** as a support.

[0115] The plurality of expansion portions **73** are arranged at intervals along a radial direction of the communication channel **61**, and two adjacent expansion portions **73** enclose to form the expansion cavity **71**.

[0116] It can be understood that when the first sealing member **70** is clamped in the assembly gap, the fixing portion **72** is in a state of extrusion deformation to seal the assembly gap. At this time, the two expansion portions can be deformed toward one side that is close to each other in the assembly gap.

[0117] When the fluid medium is used in the integrated oral care apparatus, the fluid medium enters the expansion cavity **71**. And under the extrusion of the fluid medium, the two adjacent expansion portions **73** can move away from each other along the radial direction of the communication channel **61** and be extruded on the side wall of the assembly gap. For example, when the number of the expansion portions **73** is two and the two expansion portions **73** are arranged in the assembly gap between the medium delivery member **60** and the vector transmission rod **50**, one expansion portion **73** abuts against the medium delivery member **60** and the other expansion portion **73** abuts against the vector transmission rod **50**.

[0118] In some embodiments, when the expansion cavity **71** is annular and encloses the outer side of the communication channel **61**, accordingly, the expansion portion **73** is also annular. At this time, the free ends of two adjacent expansion portions **73** form an annular opening of the expansion cavity **71**, and the opening size of the expansion cavity **71** is relatively large, so that the fluid medium can easily flow into the expansion cavity **71**.

[0119] As for the communication channel **61** of the medium delivery member **60**, it may extend in a straight line direction. For example, a center line of the communication channel **61** is arranged along the main extension line **103**, and at this time, the center line of the outlet end of the medium supply unit **30** is also arranged along the main extension line **103**. The communication channel **61** can also be configured to be bent, that is, the ports at both ends of the communication channel **61** are staggered, so that the vector transmission rod **50** and the outlet end of the medium supply unit **30** can be staggered, and the assembly difficulty of the integrated oral care apparatus is relatively low.

[0120] In some embodiments, when the communication channel **61** is bent, the medium delivery member **60** includes an lead-in section **62** and an lead-out section **63** which are mutually communicated, and the inner cavities of the lead-in section **62** and the lead-out section **63** are mutually communicated, where the lead-out section **63** is connected with the vector transmission rod **50** in an insertion matching manner, and the lead-in section **62** is connected with the outlet end of the medium supply unit **30** in an insertion matching manner. In this way, the fluid medium conveyed by the outlet end of the medium supply unit **30** can be conveyed into the vector transmission rod **50** through the lead-in section **62** and the lead-out section **63** in sequence.

[0121] Where, a center line of the lead-in section **62** and a center line of the lead-out section **63** may have an included angle, for example, the lead-in section **62** is inclined relative to the main extension line **103**, so as to be suitable for the assembly requirements of the medium supply unit **30**.

[0122] In some embodiments, a center line of an inner cavity of the lead-in section **62** and a center line of an inner cavity of the lead-out section **63** can be spaced apart, that is, the center line of the inner cavity of the lead-in section **62** is parallel to the main extension line **103**. Correspondingly, there is a connection section **64** between the lead-in section **62** and the lead-out section **63**, and

both ends of the connection section **64** communicate with the lead-in section **62** and the lead-out section **63** respectively.

[0123] Since the center line of the inner cavity of the lead-in section **62** is arranged in parallel with the main extension line **103**, a strict centering between the outlet end of the medium supply unit **30** and the vector transmission rod **50** can be avoided, and the assembly difficulty of the medium supply unit **30** and the vector generation unit **40** is relatively low. And since the center line of the inner cavity of the lead-in section **62** extends along the direction of the main extension line **103**, the medium supply unit **30** correspondingly extends along the direction of the main extension line **103**, and does not occupy too much circumferential space of the integrated oral care apparatus. That is, the integrated oral care apparatus has smaller radial size and is easy for users to grip.

[0124] The medium delivery member **60** and the vector transmission rod **50**, as well as the medium delivery member **60** and the outlet end of the medium supply unit **30** may have different assembling ways, and the present embodiment is not further limited. Exemplarily, the vector transmission rod **50** is sleeved on the outside of the medium delivery member **60**, and the outlet end of the medium supply unit **30** is connected to the lead-in section **62** in an insertion manner.

[0125] In some embodiments, the present embodiment is explained by taking the vector transmission rod **50** inserted into and connected to the lead-out section **63** and the outlet end of the medium supply unit **30** inserted into and connected to the lead-in section **62** as examples. At this time, the structures of the vector transmission rod **50** and the outlet end of the medium supply unit **30** do not need to be greatly changed, and thus the manufacturing cost is lower.

[0126] In this way, the first sealing members **70** are sandwiched between the inner wall surface of the lead-in section **62** and the outer wall surface of the outlet end of the medium supply unit **30**, and between the inner wall surface of the lead-out section **63** and the outer wall surface of the vector transmission rod **50**, respectively.

[0127] In some embodiments, the inner wall surfaces of both ends of the communication channel **61** may also be provided with mounting grooves **65** respectively, and the first sealing member **70** is mounted in the mounting groove **65**, and correspondingly, the openings of the expansion cavities **71** of the first sealing members **70** at both ends of the communication channel **61** are oppositely arranged.

[0128] The depression depth of the mounting groove **65** in the radial direction of the communication channel **61** is smaller than the dimension of the first sealing member **70** in the radial direction of the communication channel **61**, so that part of the first sealing member **70** can extend into the communication channel **61** in the radial direction of the communication channel **61** and abut against the vector transmission rod **50** or the outlet end of the medium supply unit **30**.

[0129] Meanwhile, by providing the mounting groove **65**, an assembly gap between the vector transmission rod **50** and the medium delivery member **60** and an assembly gap between the medium supply unit **30** and the medium delivery member **60** are smaller, so that the medium delivery member **60** can have a larger wall thickness and a higher strength. In addition, by setting a smaller fit clearance, an insertion-connecting between the vector transmission rod **50** and the medium delivery member **60** and an insertion-connecting between the medium supply unit **30** and the medium delivery member **60** can be limited in position, and an excessive skew between the vector transmission rod **50** and the medium delivery member **60** and between the medium supply unit **30** and the medium delivery member **60** can be avoided.

[0130] In some embodiments, the mounting grooves **65** can also penetrate through an end face of the medium delivery member **60** in the direction of the main extension line **103** (as shown in FIG. **5**), so that the mounting grooves **65** are exposed at both ends of the medium delivery member **60**, and the first sealing member **70** is easy for assembling.

[0131] In some embodiments, considering that the assembly gap is usually smaller, and the opening end of the expansion cavity **71** is usually abutted against the inner wall surface of the mounting groove **65**, the inner wall surface of the communication channel **61** may also be provided with a

guiding inclined plane **66**, which is arranged at an opening end of the expansion cavity **71** of the first sealing member **70**, and forms an angle with the flow direction of the fluid medium and extends to the mounting groove **65**, so that a situation that the inner wall surface of the mounting groove **65** blocks the opening of the expansion cavity **71** may be prevented, and the fluid medium may enter into the expansion cavity **71** via the guiding inclined plane **66**.

[0132] An inclination angle of the guiding inclined plane **66** can be set as required, as long as the guiding inclined plane **66** points to the opening of the expansion cavity **71**. The extension length of the guiding inclined plane **66** along the main extension line **103** may be smaller than an insertion lengths between the medium delivery member **60** and the vector transmission rod **50** and between the medium delivery member **60** and the medium supply unit **30**, so as to avoid affecting an insertion matching between the medium delivery member **60** and the vector transmission rod **50** and between the medium delivery member **60** and the medium supply unit **30**.

[0133] In some embodiments, the medium supply unit **30** includes a medium conveying mechanism **31** and a medium container **32** arranged in the uneven housing **10**, so as to protect the medium conveying mechanism **31** and the medium container **32** through the uneven housing **10** and simplify the appearance of the integrated oral care apparatus.

[0134] The medium container **32** is a cavity that is arranged in the uneven housing **10** for storing the fluid medium to be used, that is, in the present embodiment, the medium container **32** is arranged in the uneven housing **10**, which is convenient for the user to carry.

[0135] The medium conveying mechanism **31** can be a pumping assembly arranged in the uneven housing **10**, which is configured for providing power to the fluid medium and driving the fluid medium to flow.

[0136] In some embodiments, the pumping assembly may include a gear pump, a diaphragm pump or a piston pump, etc. The pumping mechanism communicates with the bottom of the medium container **32** through a conveying pipe **33**, which can be arranged along the extension direction of the main extension line **103** and located between the medium conveying mechanism **31** and the medium container **32**. When the pumping assembly is activated, the fluid medium in the medium container **32** is led out by negative pressure suction.

[0137] The medium conveying mechanism **31** has a medium outflow end **312** and a medium inflow end **311**. The medium outflow end **312** communicates with the communication channel **61**, that is, the medium outflow end **312** constitutes the outlet end of the medium supply unit **30**, and the medium inflow end **311** communicates with the medium container **32** through a pipeline. Specifically, one end of the conveying pipe **33** is communicated with the medium inflow end **311** of the medium conveying mechanism **31**, and the other end of the conveying pipe **33** is communicated with the bottom of the medium container **32**. When it is necessary to convey the fluid medium to the composite member **20**, the medium conveying mechanism **31** starts to work, and the fluid medium in the medium container **32** can be sucked into the medium conveying channel **51** under the suction effect of the medium conveying mechanism **31**, and then conveyed to the composite member **20** through the medium conveying channel **51**.

[0138] The medium container **32** is arranged on a side deviated from the main extension line **103**, that is, the vector generation unit **40** and the medium conveying mechanism **31** are arranged on the main extension line **103**, and the medium container **32** is arranged on a side direction of the medium conveying mechanism **31**. In this way, the medium container **32** can have a larger volume in the direction of the main extension line **103** on the basis of reducing the length of the integrated oral care apparatus.

[0139] In some embodiments, along the extension direction of the main extension line **103**, the medium conveying mechanism **31** is spaced apart from the vector generation unit **40** by a preset distance, so that the medium delivery member **60** is arranged between the medium conveying mechanism **31** and the vector generation unit **40**. The medium conveying mechanism **31** is located on a side of the vector generation unit **40** away from the composite member **20**, that is, the

composite member **20** and the medium conveying mechanism **31** are respectively arranged at opposite ends of the vector generation unit **40** along the main extension line **103**, so as to convey the fluid medium through the medium conveying channel **51** located in the vector transmission rod **50**.

[0140] In some embodiments, the medium container **32** includes an outer wall and an inner wall **106**, where the outer wall is a peripheral side wall of the uneven housing **10**; and the outer wall is integrated with the bionic gripping surface, that is, the bionic gripping surface is an outer wall surface of the outer wall.

[0141] The inner wall **106** is an inner wall plate provided in the uneven housing **10**. The inner wall **106** is connected with the outer wall and extends along the main extension line **103**. One end of the inner wall **106** extends to the second end **102** of the uneven housing **10** and is hermetically connected with the inner side wall of the second end **102** of the uneven housing **10**. The other end of the inner wall **106** extends to the first end **101** of the uneven housing **10** and is hermetically connected with the inner side wall of the first end **101** of the uneven housing **10**, so that the inner wall **106** and the outer wall form a closed special-shaped cavity extending along the main extension line **103**, and the closed special-shaped cavity stores the fluid medium.

[0142] That is, the inner wall **106** divides the inner cavity of the uneven housing **10** into two mutually independent parts, where, one part constitutes the medium container **32** for storing the fluid medium, and the other part is configured for mounting the medium supply unit **30**, the vector generation unit **40**, and the like.

[0143] In some embodiments, a distance of the first profiling gripping surface **104** relative to the main extension line **103** varies from being equal to being gradually decreased, from the first end **101** of the uneven housing **10** to the second end **102** of the uneven housing **10**, along the extension direction of the main extension line **103**.

[0144] In the present embodiment, the distance between the first profiling gripping surface **104** and the main extension line **103** changes obviously, so the first profiling gripping surface **104** can be taken as an example for explanation.

[0145] A distance between a portion of the first profiling gripping surface **104** that is located at the first end **101** of and the middle part of the uneven housing **10** and the main extension line **103** is equal, and a distance between a portion of the first profiling gripping surface **104** that is located at the second end **102** of the uneven housing **10** and the main extension line **103** gradually decreases, that is, an outer diameter of the contour of the second end **102** of the uneven housing **10** gradually decreases.

[0146] In some embodiments, when the composite member **20** is installed on the uneven housing **10**, the outer wall surface of the composite member **20** and the bionic gripping surface can form a smooth transition, and the integrated oral care apparatus has a simple appearance and is easy for users to grip.

[0147] In some embodiments, referring to FIGS. **8** to **12**, the composite member **20** includes a support head **21** which is connected with an end of the vector transmission rod **50** far away from the vector generation unit **40** in a latching manner, that is, the support head **21** is detachably installed at the end of the vector transmission rod **50** far away from the vector generation unit **40**. With this arrangement, when the composite member **20** needs to be replaced after long-term use, it is convenient to disassemble the composite member **20** from the vector transmission rod **50**.

[0148] The composite member **20** may be a toothbrush head or a nozzle. When a user needs to brush his teeth, the toothbrush head is installed on the vector transmission rod **50**; and when the user needs to rinse his teeth, the nozzle may be installed on the vector transmission rod **50**. With this arrangement, a combined tooth brushing/tooth rinsing system can be realized through an uneven housing **10** with a profiling gripping surface, a set of vector generation units **40** and medium supply units **30**, thereby realizing the functions of teeth brushing and teeth rinsing.

[0149] In some embodiments, the support head **21** is internally provided with a medium guide

channel **22** communicating with the medium conveying channel **51**, and a center line of the medium guide channel **22** is arranged on the main extension line **103**, so that the composite member **20** mounted on the vector transmission rod **50** can be located on the same line with the vector transmission rod **50**, which can improve the vector transmission efficiency of the vector transmission rod **50** to the composite member **20** and avoid vector loss.

[0150] The support head **21** has a bristle planting surface provided with a plurality of planting holes, and bundles of bristles **23** are planted on the bristle planting surface at intervals, that is, the bristles **23** are embedded in the planting holes to form a toothbrush head structure.

[0151] In this way, the user can perform teeth brushing, teeth rinsing, or both teeth brushing and teeth rinsing simultaneously through the same composite member **20** to simplify the structure of the integrated oral care apparatus.

[0152] In some embodiments, the depth of bundles of bristles **23** planted on the bristle planting surface is not more than the distance from the bristle planting surface to the main extension line **103**, that is, the bristles **23** are embedded in the bottom of the planting holes, and the planting holes do not extend to the main extension line **103**, so as to prevent the bristles **23** from extending into the medium guide channel **22** and affecting the flow path of the fluid medium in the medium guide channel **22**.

[0153] The bristle planting surface is provided with a splash hole **24** communicating with the medium guide channel **22**. There may be one or more splash holes **24**, which are located on the bristle planting surface. And the splash hole **24** can be arranged perpendicular to the bristle planting surface, or the splash hole **24** can be obliquely arranged relative to the bristle planting surface. Exemplarily, the bristle planting surface is provided with a guide protrusion **211**, and the splash hole **24** penetrates through both ends of the guide protrusion **211**. The present embodiment is not limited to this.

[0154] In some embodiments, the splash hole **24** may be located in a gap between adjacent bristles **23** and extend in the direction perpendicular to the bristle planting surface. One end of the splash hole **24** can extend into the medium guide channel **22** and communicate with the medium guide channel **22**, so that the fluid medium located in the medium guide channel **22** can flow to a target area through the splash hole **24**.

[0155] In some embodiments, a nozzle member **29** may also be arranged at the splash hole **24**, and be opposite to the splash hole **24**. For example, the nozzle member **29** is socketed to the guide protrusion **211**, so that the fluid medium can be guided out through the nozzle member **29** with a better guiding effect, and a fluid column sprayed through the nozzle member **29** is not easy to disperse, thereby rinsing a part to be cleaned (such as a tooth gap) of the user's oral cavity.

[0156] The nozzle member **29** may be a plastic part with lower hardness. A height of the nozzle member **29** is smaller than that of the bristles **23**, so as to prevent the nozzle member **29** from hurting the mouth of the user, and the user has a good use feeling. In addition, since the nozzle member **29** has a smaller hardness, an oscillation amplitude of the fluid column can be relatively small during the oscillation of the composite member **20**, which is easy for the user to clean the oral cavity.

[0157] In some embodiments, for the convenience of assembly, as shown in FIG. **9**, the support head **21** may include a support head body and a bristle planting member, on which the splash hole **24** and the bristles **23** are arranged; the medium guide channel **22** is arranged on the support head body; and the bristle planting member can be fixedly connected by ultrasonic pressing, so that the fixing stability is higher. Where, the nozzle member **29** is press-fitted between the bristle planting member and the support head body, forming a sealing effect to prevent the fluid medium from leaking at the splash hole **24**.

[0158] In some embodiments, an inner pore size of the medium guide channel **22** is matched with an outer diameter of the vector transmission rod **50**, so that the vector transmission rod **50** can be inserted into the medium guide channel **22**.

[0159] The medium guide channel **22** has a bonding surface **271** parallel to the main extension line **103**, and correspondingly, a part of the vector transmission rod **50** that is located in the medium guide channel **22** has a milling plane **52** which is matched with the bonding surface **271**. When the vector transmission rod **50** is inserted into the medium guide channel **22**, the milling plane **52** of the vector transmission rod **50** and the bonding surface **271** are in contact with each other.
[0160] In this way, when the composite member **20** is installed, the milling plane **52** can be used as an indicator to hint the installation angle of the composite member. For example, the bristles **23** and the milling plane **52** can both be located on the same side of the integrated oral care apparatus. When the user installs the composite member **20**, the bristles **23** of the composite member **20** can be rotated to approximately the same position as the milling plane **52**, and then the composite member **20** can be inserted into the housing, which is easy for centering alignment.
[0161] In addition, the milling plane **52** is matched with the bonding surface **271**, and the vector transmission rod **50** can synchronously transmit its own swing to the composite member **20**, which has higher transmission efficiency.
[0162] It should be noted that the above-mentioned bonding surface **271** has a certain distance from a port of the medium guide channel **22**, so as to ensure that the vector transmission rod **50** has a certain insertion depth in the medium guide channel **22**. That is, the end of the vector transmission rod **50** far away from the vector generation unit **40** is inserted into the medium guide channel **22** by a certain distance, which can improve a connection reliability and a sealing reliability therebetween.
[0163] In some embodiments, in order to realize a detachable connection of the composite member **20**, the composite member **20** further includes a first spatial position holding member **25**, a second sealing member **26** and a second spatial position holding member **27**, which are arranged in the support head **21** along the flow direction of the fluid medium. The first spatial position holding member **25**, the second sealing member **26** and the second spatial position holding member **27** are all ring-shaped members; and the first spatial position holding member **25**, the second sealing member **26** and the second spatial position holding member **27** all have internal cavities which are communicated with each other and constitute part of the medium guide channel **22**. In this way, when the vector transmission rod **50** is inserted into the composite member **20**, the first spatial position holding member **25**, the second sealing member **26** and the second spatial position holding member **27** are respectively matched with the vector transmission rod **50** at different positions in an insertion manner.
[0164] That is, the “spatial position holding” means that when the composite member **20** is connected with the vector transmission rod **50**, the position of the composite member **20** relative to the vector transmission rod **50** is limited, so as to prevent the composite member **20** from rotating relative to the vector transmission rod **50** or separating from the vector transmission rod **50**.
[0165] In some embodiments, the first spatial position holding member **25** is connected with the support head **21** in a clamping manner, so that the second sealing member **26** and the second spatial position holding member **27** can be fixed in the medium guide channel **22**.
[0166] One of the first spatial position holding member **25** and the support head **21** may be provided with a clamping protrusion **251**, and the other may be provided with a clamping groove. Exemplarily, the clamping protrusion **251** is provided on the first spatial position holding member **25**, and the clamping groove is provided on the inner wall of the support head **21**. When the clamping protrusion **251** extends into the clamping groove, the first spatial position holding member **25** can be fixed on the support head **21**, which is easy for disassembling.
[0167] The bonding surface **271** may be provided on an inner wall of the support head **21**, or the bonding surface **271** may be provided on an inner wall of the second spatial position holding member **27**, which has a smaller size and is easy to process and mold.
[0168] In some embodiments, the second sealing member **26** is configured to fill at least part of a space between the vector transmission rod **50** and the support head **21**, so that after the composite

member **20** is connected with the vector transmission rod **50**, the sealing may be performed by the second sealing member **26**, thereby preventing the fluid medium from leaking at an insertion connecting position of the composite member **20** and the vector transmission rod **50**.

[0169] In some embodiments, a cavity structure may also be arranged in the second sealing member **26** to optimize a sealing effect of the second sealing member **26**. The sealing principle of the second sealing member **26** is the same as that of the first sealing member **70**, which is not repeated in the present embodiment.

[0170] In some embodiments, the vector transmission rod **50** is in snap-fit connection with the first spatial position holding member **25**, that is, through the snap-fit connection between the vector transmission rod **50** and the first spatial position holding member **25**, a detachable connection between the vector transmission rod **50** and the composite member **20** can be realized.

[0171] In this way, by arranging the first spatial position holding member **25**, the second sealing member **26** and the second spatial position holding member **27** on the support head **21**, it is possible to avoid directly arranging a structure connected with the vector transmission rod **50** on the inner wall surface of the support head **21**, and thus the manufacturing difficulty is relatively low.

[0172] In some embodiments, the first spatial position holding member **25** may be provided with a positioning groove **252**, and the support head **21** can be correspondingly provided with a positioning protrusion. When the first spatial position holding member **25** is installed, the positioning protrusion can be aligned with the positioning groove **252** until the first spatial position holding member **25** extends into the support head **21** and the positioning protrusion extends into the positioning groove **252**, which is easy for the first spatial position holding member **25** to install and convenient for operation.

[0173] In some embodiments, the second spatial position holding member **27** is provided with a connecting through hole **273**, which communicates with inner and outer sides of the second spatial position holding member **27**. The connecting through hole **273** is opposite to the bonding surface **271**, that is, the connecting through hole **273** and the bonding surface **271** are arranged on opposite sides of the second spatial position holding member **27**. The second spatial position holding member **27** is provided with an elastic arm **272**, which is arranged in the connecting through hole **273**. One end of the elastic arm **272** is connected to an inner wall surface of the connecting through hole **273**, and the other end is a free end. The free end of the elastic arm **272** points to the inner side of the second spatial position holding member **27**, so that when the vector transmission rod **50** is connected with the composite member **20** in an insertion manner, the elastic arm **272** is configured to be pressed against the vector transmission rod **50** by its own elastic structure. In this way, the end of the vector transmission rod **50** can be stably inserted into and matched with the second spatial position holding member **27**, thereby preventing the composite member **20** from shaking relative to the vector transmission rod **50**.

[0174] When the vector transmission rod **50** moves to the position of the elastic arm **272** in the process of installing the composite member **20**, the user can know that the vector transmission rod **50** is about to be inserted into place through an elastic abutting between the vector transmission rod **50** and the elastic arm **272**, that is, setting the elastic arm **272** may also be used to indicate that the composite member **20** is about to be installed in place.

[0175] In addition, when the integrated oral care apparatus is in operation, part of its vibration can be damped by the elastic arm **272**, and the user has a better hand feeling when gripping the integrated oral care apparatus.

[0176] In some embodiments, the elastic arm **272** extends along the direction of the main extension line **103**, and an abutting position between the elastic arm **272** and the vector transmission rod **50** may be an arc section, so that the elastic arm **272** and the vector transmission rod **50** will not be interfered with each other when the composite member **20** is disassembled and assembled, thus preventing the composite member **20** from being stuck on the vector transmission rod **50**.

[0177] In some embodiments, the composite member **20** further includes an elastic clamping member **28**, which can be a metal part or a plastic part. The elastic clamping member **28** is connected to the first spatial position holding member **25**, and a clamping portion **281** of the elastic clamping member **28** extends into the inner cavity of the first spatial position holding member **25**, that is, the clamping portion **281** of the elastic clamping member **28** is exposed in the inner cavity of the first spatial position holding member **25**.
[0178] Correspondingly, the outer wall surface of the vector transmission rod **50** is provided with a clamping groove **53**, which may be an annular groove and arranged on the circumferential outer wall surface of the vector transmission rod **50**, and the clamping portion **281** of the elastic clamping member **28** may be clamped in the clamping groove **53** in an openable and closable manner. In this way, when the vector transmission rod **50** is inserted into the composite member **20**, the elastic clamping member **28** can be closed and extended into the clamping groove **53**, so that the composite member **20** and the vector transmission rod **50** can be clamped and fixed. Furthermore, it can resist the impact force of the fluid medium in the rinsing mode or the mixing mode, and prevent the composite member **20** from separating from the vector transmission rod **50**.
[0179] When the composite member **20** is disassembled, the clamping portion **281** of the elastic clamping member **28** may be opened under the pressure of the vector transmission rod **50** and separated from the clamping groove **53**, so that the composite member **20** is convenient for disassembling and assembling.
[0180] In some embodiments, the elastic clamping member **28** may be approximately U-shaped, including two clamping portions **281** and a bending portion **282** connecting the two clamping portions **281**, and the two clamping portions **281** may move toward one side thereof that is close to each other under an elastic force of the bending portion **282**. The opening and closing of the elastic clamping member **28** means that the two clamping portions **281** are away from each other or close to each other.
[0181] The side wall of the first spatial position holding member **25** is correspondingly provided with a mounting hole **253** through which the clamping portion **281** passes, so that the elastic clamping member **28** can be fixed on the first spatial position holding member **25**, and the clamping portions **281** are exposed in the inner cavity of the first spatial position holding member **25**.
[0182] The integrated oral care apparatus further includes a power supply module **81**, a charging module **82** and a control panel **83**, where along the direction of the main extension line **103**, the power supply module **81** and the charging module **82** are sequentially arranged at the end of the medium conveying mechanism **31** away from the composite member **20** at intervals, that is, the power supply module **81** and the charging module **82** are sequentially arranged below the medium conveying mechanism **31**. In some embodiments, the power supply module **81** and the charging module **82** are arranged along the extension direction of the main extension line **103**.
[0183] The control panel **83** has a plurality of control buttons, which respectively control different working states of the integrated nursing apparatus. For example, among the control buttons, there is a switch button for controlling the on-off of power supply, and a button for selecting different modes.
[0184] The control panel **83** is arranged close to the second profiling gripping surface **105** of the uneven housing **10**, and the second profiling gripping surface **105** is provided with through holes for exposing the above-mentioned control buttons, so that when the control panel **83** is installed in the uneven housing **10**, the control buttons can protrude from the through holes, which is convenient for the user to operate the buttons.
[0185] In some embodiments, a soft rubber pad integrally formed with the uneven housing **10** may be provided at the through holes, and the soft rubber pad covers the through holes to prevent outside foreign substances from entering the uneven housing **10** through the through holes.
[0186] To facilitate the installation of the power supply module **81**, the charging module **82**, the

vector generation unit **40** and the medium conveying mechanism **31** into the uneven housing **10**, the integrated oral care apparatus provided by embodiments of the present application further includes a combination bracket **84** and a tail cover **89** arranged at the bottom end of the combination bracket **84**. The combination bracket **84** has a plurality of mounting points, and the vector generation unit **40**, the medium conveying mechanism **31** and the power supply module **81** can be sequentially pre-mounted on the combination bracket **84** along the extension direction of the main extension line **103**, and the charging module **82** is mounted on the tail cover **89**, which can be detachably mounted at the bottom of the combination bracket **84**. Therefore, the integration level of the oral care apparatus can be improved, and the assembly efficiency can be improved.

[0187] In some embodiments, the first end **101** of the uneven housing **10** provided by the embodiment of the present application is provided with a closure cover **107**, which is configured to seal the first end **101** of the uneven housing **10**. A first cavity is formed between the closure cover **107** and the tail cover **89**, and communicated with the medium container **32** that is located at one side of the uneven housing **10**.

[0188] As shown in FIG. **4**, the tail cover **89** is provided with a tail channel **891** communicating with the first cavity, and the tail channel **891** communicates with the medium inflow end **311** of the medium conveying mechanism **31** through the conveying pipe **33**. Further, the first profiling gripping surface **104** forming the medium container **32** is provided with a supplementary medium port communicating with the medium container **32**, and the fluid medium is supplemented into the medium container **32** through the supplementary medium port.

[0189] Further referring to FIG. **4**, a waterproof member **85**, a support member **86**, a first shock absorbing pad **87** and a second shock absorbing pad **88** are provided in the combination bracket **84**. The waterproof member **85** and the support member **86** are sequentially sleeved on the vector transmission rod **50** along the extension direction of the main extension line **103**, and the waterproof member **85** seals the space between the outlet of the second end **102** of the uneven housing **10** and the vector transmission rod **50** to prevent liquid from entering the interior of the uneven housing **10**.

[0190] The first shock absorbing pad **87** and the second shock absorbing pad **88** are sequentially sleeved on the vector generation unit **40**, and the support member **86** is placed between the first shock absorbing pad **87** and the waterproof member **85** to support the waterproof member **85**. The first shock absorbing pad **87** and the second shock absorbing pad **88** contact and abut against an inner wall of the combination bracket **84** respectively, to prevent the vibration vector from the vector generation unit **40** from being transmitted to the uneven housing **10**, so as to improve the user's grip comfort.

[0191] In the present specification, the embodiments or implementations are described in a progressive way, and the differences between each embodiment and other embodiments are highlighted, so the same and similar parts of the embodiments can be referred to each other.

[0192] In the description of the present specification, description with reference to the terms “one embodiment”, “some embodiments”, “schematic embodiments”, “example”, “specific example” or “some examples” or the like means that the specific features, structures, materials or characteristics described in connection with the embodiments or examples are included in at least one embodiment or example of the present application. In the present specification, the schematic expressions of the above terms do not necessarily refer to the same embodiment or example. Furthermore, the specific features, structures, materials or characteristics described may be combined in any one or more embodiments or examples in a suitable manner.

[0193] Finally, it should be explained that the above embodiments are only used to illustrate the technical solution of the present application, but not to limit it. Although the application has been explained in detail with reference to the above embodiments, those ordinary skilled in the art should understand that they can still modify the technical solutions described in the above embodiments, or equivalently replace some or all of the technical features therein, and these

modifications or substitutions do not make the essence of the corresponding technical solution deviate from the scope of the technical solutions of the embodiments of the present application.

Claims

1. An integrated oral care apparatus, comprising: an uneven housing, configured to have a bionic gripping surface suitable for gripping, wherein the uneven housing has a main extension line, and a first end and a second end which are oppositely arranged, and the main extension line extends from the first end of the uneven housing to the second end of the uneven housing; a composite member, configured to remove foreign substances in a target area, wherein the composite member is close to the second end of the uneven housing and is far away from the first end of the uneven housing; a medium supply unit, configured to provide the composite member with a fluid medium for accelerating a removal of the foreign substances; a vector generation unit at least partially added to the uneven housing, wherein the vector generation unit connects with the composite member through a vector transmission rod having a medium conveying channel with a first end that is communicated with the composite member; a medium delivery member, configured to be bridged between the vector generation unit and the medium supply unit, the medium delivery member having a communication channel that is hermetically coupled between a second end of the medium conveying channel and the medium supply unit.
2. The integrated oral care apparatus according to claim 1, wherein the integrated oral care apparatus further comprises: first sealing members, configured to be elastic, the first sealing members being at least partially filled in an assembly gap between the medium delivery member and the vector transmission rod, and an assembly gap between the medium delivery member and an outlet end of the medium supply unit, respectively.
3. The integrated oral care apparatus according to claim 2, wherein the first sealing member is internally provided with an expansion cavity that penetrates through an outer wall surface of the first sealing member, and the fluid medium is configured to be filled in the expansion cavity through the assembly gap.
4. The integrated oral care apparatus according to claim 3, wherein the expansion cavity extends along a circumferential direction of the communication channel.
5. The integrated oral care apparatus according to claim 3, wherein the first sealing member comprises a fixing portion and an expansion portion, the expansion portions are multiple, and multiple expansion portions are connected to a same end of the fixing portion along a flow direction of the fluid medium, and the multiple expansion portions are arranged at intervals along a radial direction of the communication channel, and two adjacent expansion portions enclose to form the expansion cavity.
6. The integrated oral care apparatus according to claim 3, wherein the medium delivery member comprises a lead-in section and a lead-out section which are communicated with each other, the lead-out section is connected with the vector delivery rod in an insertion manner, and the lead-in section is connected with the outlet end of the medium supply unit in an insertion manner.
7. The integrated oral care apparatus according to claim 6, wherein a center line of an inner cavity of the lead-in section is spaced from a center line of an inner cavity of the lead-out section.
8. The integrated oral care apparatus according to claim 6, wherein the vector transmission rod is inserted into the lead-out section, and the outlet end of the medium supply unit is inserted into the lead-in section; inner wall surfaces of both ends of the communication channel are respectively provided with mounting grooves, the first sealing members are mounted in the mounting grooves, and openings of the expansion cavities of the first sealing members at both ends of the communication channel are oppositely arranged.
9. The integrated oral care apparatus according to claim 8, wherein the inner wall surface of the communication channel is provided with a guiding inclined plane, which is arranged at an open end

of the expansion cavity of the first sealing member and has an included angle relative to the flow direction of the fluid medium and extends to the mounting groove.

10. The integrated oral care apparatus according to claim 1, wherein an end of the vector transmission rod far away from the composite member penetrates into the vector generation unit from an end of the vector generation unit close to the composite member, and passes through the vector generation unit from an end of the vector generation unit far away from the composite member.

11. The integrated oral care apparatus according to claim 10, wherein the vector transmission rod extends along the main extension line, and along an extension direction of the main extension line, the medium conveying channel penetrates through an end of the vector transmission rod far away from the composite member and an end of the vector transmission rod close to the composite member.

12. The integrated oral care apparatus according to claim 1, wherein the medium supply unit comprises a medium conveying mechanism and a medium container that are arranged in the uneven housing; the medium container is arranged at one side deviated from the main extension line; along the extension direction of the main extension line, the medium conveying mechanism is separated from the vector generation unit by a preset distance, and the medium conveying mechanism is located on a side of the vector generation unit far away from the composite member; the medium conveying mechanism has a medium outflow end and a medium inflow end, wherein the medium outflow end is communicated with the communication channel, and the medium inflow end is communicated with the medium container through a pipeline.

13. The integrated oral care apparatus according to claim 12, wherein the medium container comprises an outer wall which is integrated with the bionic gripping surface, and an inner wall which is connected with the outer wall and extends along the main extension line, and the inner wall and the outer wall enclose to form a closed special-shaped cavity extending along the main extension line, and the closed special-shaped cavity is configured to store the fluid medium.

14. The integrated oral care apparatus according to claim 1, wherein the bionic gripping surface comprises a first profiling gripping surface and a second profiling gripping surface which are asymmetrically distributed relative to the main extension line, and the first profiling gripping surface and the second profiling gripping surface are spliced to form a closed annular surface.

15. The integrated oral care apparatus according to claim 14, wherein a distance of the first profiling gripping surface relative to the main extension line varies from being equal to being gradually decreased, from the first end of the uneven housing to the second end of the uneven housing, along the extension direction of the main extension line.

16. The integrated oral care apparatus according to claim 1, wherein the composite member comprises a support head which is latchably connected with an end of the vector transmission rod far away from the vector generation unit, the support head is internally provided with a medium guide channel which is communicated with the medium conveying channel, and a center line of the medium guide channel is arranged on the main extension line; the supporting head is provided with a bristle planting surface, and a plurality of bundles of bristles are planted on the bristle planting surface at intervals, and a depth of the plurality of bundles of bristles planted on the bristle planting surface is not more than a distance from the bristle planting surface to the main extension line; and the bristle planting surface is provided with a splash hole that is communicated with the medium guide channel.

17. The integrated oral care apparatus according to claim 16, wherein an inner pore size of the medium guide channel is matched with an outer diameter of the vector transmission rod; the medium guide channel has a bonding surface parallel to the main extension line, wherein an end of the vector transmission rod far away from the vector generation unit is inserted into the medium guide channel by a certain distance, and a part of the vector transmission rod located in the medium guide channel has a milling plane matched with the bonding surface.

18. The integrated oral care apparatus according to claim 17, wherein the composite member further comprises a first spatial position holding member, a second sealing member and a second spatial position holding member, wherein the first spatial position holding member, the second sealing member and the second spatial position holding member are arranged in the support head along the flow direction of the fluid medium; the first spatial position holding member, the second sealing member and the second spatial position holding member all have internal cavities which are communicated with each other and constitute part of the medium guide channel; the first spatial position holding member is connected with the support head in a clamping manner, so as to fix the second sealing member and the second spatial position holding member in the medium guide channel; wherein, the bonding surface is arranged on an inner wall surface of the second spatial position holding member, and the second sealing member is configured to fill at least part of a space between the vector transmission rod and the support head, and the vector transmission rod is connected with the first spatial position holding member in a clamping manner.

19. The integrated oral care apparatus according to claim 18, wherein the second spatial position holding member is provided with a connecting through hole which is opposite to the bonding surface, and the second spatial position holding member is provided with an elastic arm arranged in the connecting through hole, and the elastic arm is configured to press against the vector transmission rod through its own elastic structure.

20. The integrated oral care apparatus according to claim 18, wherein the composite member further comprises an elastic clamping member that is connected with the first spatial position holding member, and a clamping portion of the elastic clamping member extends into the internal cavity of the first spatial position holding member; an outer wall surface of the vector transmission rod is provided with a clamping groove, and the clamping portion of the elastic clamping member is clamped in the clamping groove pin an openable and closable manner.