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Head assembly for dental contra-angle hand-piece and dental contra-angle hand-piece

Abstract

A head assembly for a dental contra-angle hand-piece and a dental contra-angle hand-piece are provided. The head assembly includes a hand-piece main body, a reversing valve movably connected to the hand-piece main body, and an inner water tube connected to the hand-piece main body, wherein the hand-piece main body is provided with a first flow channel and a second flow channel independent from each other, the first flow channel is configured to be in communication with a liquid outlet of a motor, and the second flow channel is configured to be in communication with an external pipeline; the reversing valve is provided with a confluence channel, the reversing valve is configured to enable, when moving relative to the hand-piece main body, the first flow channel and the second flow channel to alternatively be in communication with the inner water pipe through the confluence channel.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATION (1) The present disclosure is a continuation-in-part application of the international patent application PCT/CN2021/081589 which claims priority to the Chinese patent application with the filing No. 202110017563.1 filed with the Chinese Patent Office on Jan. 7, 2021, and entitled “Head Assembly for Dental Contra-angle Hand-piece and Dental Contra-angle Hand-piece”, the contents of each of which are incorporated herein by reference in entirety. (2) The present disclosure also claims priority to the Chinese patent application with the filing No. 202210349369.8 filed with the Chinese Patent Office on Apr. 1, 2022, and entitled “Head Module for Dental Contra-angle Hand-piece and Dental Contra-angle Hand-piece”, the contents of which are incorporated herein by reference in entirety Technical Field (3) The present disclosure relates to the field of medical equipment, in particular to a head assembly for a dental contra-angle hand-piece and a dental contra-angle hand-piece.

BACKGROUND

(1) The existing dental contra-angle hand-pieces mainly include two types, i.e. inner-water-channel dental contra-angle hand-pieces and outer-water-channel dental contra-angle hand-pieces. The inner-water-channel dental contra-angle hand-pieces are frequently used, that is, a water path and a gas path are provided inside the dental contra-angle hand-piece, water and gas are transmitted by a motor to the water path and the gas path in the dental contra-angle hand-piece, and the water and the gas are sprayed out from a front end of a head to form atomized water. The water sprayed out by the dental contra-angle hand-piece needs to be delivered via the water path of the motor, and the water path of the motor cannot be disinfected or sterilized, so when the clinical treatment of diseases such as oral diseases requires sterile operation with physiological saline or other sterile solutions, the existing inner-water-channel dental contra-angle hand-pieces cannot realize the same, and a dedicated outer-water-channel dental contra-angle hand-piece is needed, resulting in inconvenient use. In addition, the existing outer-water-channel dental contra-angle hand-pieces are not provided with a built-in water path, and cooling water cannot be directly provided by a dental

chair when a sterile environment is not needed, resulting in inconvenient use.

(2) It has been found from researches that the existing dental contra-angle hand-pieces have the following defects: a single function and inconvenient use.

SUMMARY

(3) Embodiments of the present application provide a head assembly for a dental contra-angle hand-piece, including: a hand-piece main body, wherein the hand-piece main body is provided with a first flow channel and a second flow channel independent from each other, the first flow channel is configured to be in communication with a liquid outlet of a motor, and the second flow channel is configured to be in communication with an external pipeline; an inner water pipe, wherein the inner water pipe is connected to the hand-piece main body; and a reversing valve, wherein the reversing valve is provided with a confluence channel; the reversing valve is movably connected to the hand-piece main body, the reversing valve is configured to enable the first flow channel and the second flow channel to alternatively be in communication with the inner water pipe through the confluence channel, when moving relative to the hand-piece main body.

(4) Optionally, in one or more embodiments, the head assembly includes; a hand-piece main body, wherein the hand-piece main body is provided with a first flow channel and a second flow channel independent from each other, the first flow channel is configured to be in communication with a liquid outlet of a motor, and the second flow channel is configured to be in communication with an external pipeline; a reversing valve, wherein the reversing valve is provided with a confluence channel, and a first port and a second port both in communication with the confluence channel; the reversing valve is movably connected with the hand-piece main body so as to be switched between a first operation position and a second operation position; when the reversing valve is located in the first operation position, the first port is in communication with the first flow channel and the second port is disconnected from the second flow channel; and when the reversing valve is located in the second operation position, the first port is disconnected from the first flow channel and the second port is in communication with the second flow channel; and an inner water pipe, wherein the inner water pipe is in communication with the confluence channel, and is configured to deliver a fluid to a head portion of the hand-piece main body.

(5) Optionally, in one or more embodiments, the hand-piece main body is provided with a fitting hole, the first flow channel and the second flow channel are both in communication with the fitting hole; the reversing valve is provided in the fitting hole, and the reversing valve is configured to slidably cooperate with the hand-piece main body in an extending direction of the hand-piece main body, so as to enable the reversing valve to be switched between the first operation position and the second operation position.

(6) Optionally, in one or more embodiments, the hand-piece main body has a front end configured to extend into an oral cavity and a rear end configured to be close to an operator, the fitting hole is provided on an end surface where the rear end is located, and the second flow channel is provided closer to the rear end than the first flow channel.

(7) Optionally, in one or more embodiments, the dental contra-angle hand-piece further includes a toggle member, the toggle member is connected to the reversing valve, the toggle member protrudes from an outer circumferential wall of the hand-piece main body, and the toggle member slidably cooperates with the hand-piece main body in the extending direction of the hand-piece main body, so as to drive the reversing valve to be switched between the first operation position and the second operation position.

(8) Optionally, in one or more embodiments, the hand-piece main body is provided with a first limiting portion and a second limiting portion arranged at an interval in the extending direction of the hand-piece main body, the toggle member is located between the first limiting portion and the second limiting portion, and the first limiting portion and the second limiting portion are configured to alternatively abut against the toggle member, so as to limit a sliding range of the toggle member.

(9) Optionally, in one or more embodiments, when the reversing valve is located in the first operation position, the toggle member abuts against the first limiting portion; and when the reversing valve is located in the second operation position, the toggle member abuts against the second limiting portion.

(10) Optionally, in one or more embodiments, when the reversing valve is switched between the first operation position and the second operation position, a flow rate is adjusted by adjusting an overlapped area of the first port and the first flow channel during the communication between the first port and the first flow channel; and the flow rate is adjusted by adjusting an overlapped area of the second port and the second flow channel during the communication between the second port and the second flow channel.

(11) Optionally, in one or more embodiments, the hand-piece main body is further provided with an operation hole in communication with the fitting hole, the operation hole is located on an outer circumferential wall of the hand-piece main body, the operation hole is a strip-shaped hole and extends along the extending direction of the hand-piece main body, the first limiting portion and the second limiting portion are provided on a hole wall of the operation hole, and the toggle member passes through the operation hole and protrudes from the outer circumferential wall of the hand-piece main body.

(12) Optionally, in one or more embodiments, the hand-piece main body is provided with a pressure relief hole in communication with the fitting hole.

(13) Optionally, in one or more embodiments, the inner water pipe is inserted into the confluence channel, and the inner water pipe is configured to slidably cooperate with the reversing valve in the extending direction of the hand-piece main body.

(14) Optionally, in one or more embodiments, an inner circumferential wall of the hand-piece main body is further provided with an annular gas passage, and the annular gas passage is configured to be in communication with a gas outlet of the motor.

(15) Optionally, in one or more embodiments, the head assembly further includes at least one sealing member, and the at least one sealing member is provided between the reversing valve and the hand-piece main body, and is configured to seal a gap between the hand-piece main body and the reversing valve.

(16) Optionally, in one or more embodiments, an outer circumferential wall of the reversing valve is provided with at least one annular positioning groove, and the at least one sealing member is provided in the at least one annular positioning groove.

(17) Optionally, in one or more embodiments, the at least one sealing member is a sealing ring, and the sealing ring is an O-ring, a V-ring, or a rectangular ring.

(18) Optionally, in one or more embodiments, the hand-piece main body is provided with a transfer cavity in communication with the inner water pipe and a first mounting hole in communication with the transfer cavity, the reversing valve is rotatably connected to the first mounting hole and then rotatably connected to the hand-piece main body, and a first sealing ring is provided between the reversing valve and a hole wall of the first mounting hole.

(19) Optionally, in one or more embodiments, the hand-piece main body is provided with a locking ring, and the locking ring abuts against a side of the reversing valve away from the hand-piece main body, so as to prevent the reversing valve from disengaging from the hand-piece main body via an orifice of a second mounting hole.

(20) Optionally, in one or more embodiments, the reversing valve has an outer circumferential surface provided around an axis of rotation of the reversing valve and an inner end surface intersecting the axis of rotation; the confluence channel includes a first hole segment and a second hole segment, one end of the first hole segment is located on the outer circumferential surface, and the other end of the first hole segment is in communication with one end of the second hole segment, the other end of the second hole segment is located on the inner end surface, the end of the second hole segment located on the inner end surface is eccentrically arranged with respect to

the axis of rotation; and the reversing valve has a first operation position and a second operation position which are switchable with each other when the reversing valve rotates relative to the hand-piece main body, wherein when the reversing valve is located in the first operation position, the first flow channel, the second hole segment, the first hole segment, and the transfer cavity are in communication in sequence, and the reversing valve blocks the second flow channel; and when the reversing valve is located in the second operation position, the second flow channel, the first hole segment, the second hole segment, and the transfer cavity are in communication in sequence, and the reversing valve blocks the first flow channel.

(21) Optionally, in one or more embodiments, a second sealing ring is provided between the reversing valve and the hand-piece main body, and the reversing valve is configured to be rotatable relative to the second sealing ring, wherein when the reversing valve is located in the first operation position, an end of the second hole segment away from the first hole segment is located in a region surrounded by the second sealing ring, and the second hole segment is in communication with the first flow channel through the second sealing ring; and when the reversing valve is located in the second operation position, the reversing valve blocks the first flow channel through the second sealing ring.

(22) Optionally, in one or more embodiments, the first flow channel includes an annular groove segment and a radial hole segment in communication with each other, the annular groove segment is provided around the axis of the hand-piece main body, the radial hole segment extends along a direction having an angle with the axis of the hand-piece main body, and the radial hole segment is configured to be in communication with the second hole segment through the second sealing ring when the reversing valve is located in the first operation position.

(23) Optionally, in one or more embodiments, a third sealing ring is provided between the reversing valve and the hand-piece main body, and the reversing valve is configured to be rotatable relative to the third sealing ring, wherein when the reversing valve is located in the first operation position, the reversing valve blocks the second flow channel through the third sealing ring; and when the reversing valve is located in the second operation position, an end of the first hole segment away from the second hole segment is located in a region surrounded by the third sealing ring, and the first hole segment is in communication with the second flow channel through the third sealing ring.

(24) Optionally, in one or more embodiments, a torque transmission portion is provided on the reversing valve, and the torque transmission portion is configured to be engaged with a force applying tool, so as to make the reversing valve rotate relative to the hand-piece main body under the driving of the force applying tool.

(25) Optionally, in one or more embodiments, the torque transmission portion is provided as a protrusion or a groove.

(26) Optionally, in one or more embodiments, at least one first limiting part is provided on the hand-piece main body, at least one second limiting part is provided on the reversing valve, and the at least one first limiting part and the at least one second limiting part are configured to abut against each other during rotation of the reversing valve relative to the hand-piece main body, so as to restrict a rotation range of the reversing valve.

(27) Embodiments of the present disclosure further provide a dental contra-angle hand-piece, including the head assembly according to any one of the preceding embodiments.

(28) Optionally, in one or more embodiments, the dental contra-angle hand-piece further includes a motor and an external pipeline, the motor is inserted into and matched with the hand-piece main body, and a liquid outlet of the motor is in communication with the first flow channel; and the external pipeline is inserted into the hand-piece main body and is in communication with the second flow channel.

(29) Optionally, in one or more embodiments, an end surface where the rear end of the hand-piece main body close to an operator is located is provided with an insertion hole, and the motor is inserted into the insertion hole of the hand-piece main body.

(30) Optionally, in one or more embodiments, the dental contra-angle hand-piece further includes a motor and an external pipeline, wherein both the motor and the external pipeline are connected to the hand-piece main body; the reversing valve of the head assembly is configured to make the liquid outlet of the motor and the external pipeline alternatively be in communication with the inner water pipe.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

- (1) In order to more clearly illustrate technical solutions of embodiments of the present disclosure, accompanying drawings which need to be used in the embodiments will be introduced briefly below, and it should be understood that the accompanying drawings below merely show embodiments of the present disclosure, therefore, they should not be considered as limitation on the scope, and those ordinarily skilled in the art still could obtain other relevant accompanying drawings according to these accompanying drawings, without using any creative efforts.
- (2) FIG. 1 is a structural schematic view of a head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (3) FIG. 2 is an exploded structural schematic view of the head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (4) FIG. 3 is a sectional structural schematic view of the head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (5) FIG. 4 is a local enlarged structural schematic view of portion IV in FIG. 3;
- (6) FIG. 5 is a partial sectional structural schematic view of a hand-piece main body in an embodiment of the present disclosure;
- (7) FIG. 6 is a sectional structural schematic view of a reversing valve and a toggle member in an embodiment of the present disclosure;
- (8) FIG. 7 is a partial structural schematic view of the head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (9) FIG. 8 is an exploded structural schematic view of the dental contra-angle hand-piece in an embodiment of the present disclosure;
- (10) FIG. 9 is a structural schematic view of another head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (11) FIG. 10 is a segmental structural schematic view of the another head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (12) FIG. 11 is an exploded structural schematic view of the another head assembly for a dental contra-angle hand-piece in an embodiment of the present disclosure;
- (13) FIG. 12 is a structural schematic view of a reversing valve in an embodiment of the present disclosure;
- (14) FIG. 13 is a segmental structural schematic view of the reversing valve in an embodiment of the present disclosure;
- (15) FIG. 14 is a structural schematic view of the head assembly when the reversing valve is located in a first operation position in an embodiment of the present disclosure;
- (16) FIG. 15 is a structural schematic view of the head assembly when the reversing valve is located in a second operation position in an embodiment of the present disclosure; and
- (17) FIG. 16 is a structural schematic view of the dental contra-angle hand-piece in an embodiment of the present disclosure.

REFERENCE SIGNS

- (18) **0001**—head assembly; **100**—hand-piece main body; **101**—front end; **102**—rear end; **103**—insertion hole; **110**—first flow channel; **120**—second flow channel; **130**—fitting hole; **131**—

insertion end; **140**—pressure relief hole; **150**—abutment surface; **160**—operation hole; **161**—first limiting portion; **162**—second limiting portion; **170**—annular gas passage; **200**—reversing valve; **201**—first end; **202**—second end; **210**—confluence channel; **220**—first port; **230**—second port; **240**—annular positioning groove; **300**—inner water pipe; **400**—toggle member; **500**—abutment ring; **600**—fastener; **700**—first sealing member; **800**—second sealing member; **900**—external pipeline; **001**—housing; **1001**—notch; **002**—motor; **2001**—liquid outlet; **2020**—gas outlet; **1100**—shell; **111**—second mounting hole; **112**—avoidance groove; **1200**—fixing seat; **1221**—annular groove segment; **1222**—radial hole segment; **124**—transfer cavity; **125**—first mounting hole; **126**—first limiting groove; **127**—second limiting groove; **128**—gas delivery channel; **1300**—press ring; **310**—sealing body; **311**—outer circumferential surface; **312**—inner end surface; **313**—confluence channel; **3131**—first hole segment; **3132**—second hole segment; **320**—force transmission body; **321**—torque transmission portion; **322**—second limiting part; **330**—annular limiting groove; **410**—first sealing ring; **510**—second sealing ring; **610**—third sealing ring; **700**—sealing structure; **800**—locking ring.

DETAILED DESCRIPTION OF EMBODIMENTS

(19) In order to make objectives, technical solutions, and advantages of the embodiments of the present disclosure clearer, the technical solutions in the embodiments of the present disclosure will be described clearly and completely below in conjunction with accompanying drawings in the embodiments of the present disclosure, and apparently, the embodiments described are some but not all embodiments of the present disclosure. Generally, components in the embodiments of the present disclosure, as described and shown in the accompanying drawings herein, may be arranged and designed in various different configurations.

(20) Therefore, the detailed description below of the embodiments of the present disclosure provided in the accompanying drawings is not intended to limit the claimed scope of the present disclosure, but merely illustrates chosen embodiments of the present disclosure. All of other embodiments obtained by those ordinarily skilled in the art based on the embodiments in the present disclosure without using any creative efforts shall fall within the scope of protection of the present disclosure.

(21) It should be noted that similar reference signs and letters represent similar items in the following accompanying drawings, therefore, once a certain item is defined in one accompanying drawing, it is not needed to be further defined or explained in subsequent accompanying drawings.

(22) In the description of the present disclosure, it should be indicated that orientation or positional relationships indicated by terms such as “center”, “upper”, “lower”, “left”, “right”, “vertical”, “horizontal”, “inner”, and “outer” are based on orientation or positional relationships as shown in the accompanying drawings, or orientation or positional relationships of a product of the present disclosure conventionally placed when in use, merely for facilitating describing the present disclosure and simplifying the description, rather than indicating or implying that related devices or elements have to be in the specific orientation, or configured or operated in a specific orientation, therefore, they should not be construed as limiting the present disclosure. Besides, terms such as “first”, “second”, and “third” are merely for distinctive description, but should not be construed as indicating or implying importance in the relativity.

(23) Moreover, the terms “horizontal”, “vertical” and the like do not mean that the parts are required to be absolutely horizontal or overhanging, but may be slightly inclined. For example, for “horizontal”, it merely means that a structure is more horizontal in comparison with “vertical”, rather than being completely horizontal, while the structure can be slightly inclined.

(24) In the description of the present disclosure, it should be further illustrated that, unless otherwise specifically specified and defined, the terms “set”, “install”, “link”, and “connect” should be understood in a broad sense, for example, a connection may be a fixed connection, a detachable connection, or an integrated connection; it may be a mechanical connection or an electrical connection; it may be direct joining or indirect joining through an intermediate medium, and it also

may be inner communication between two elements. For those ordinarily skilled in the art, specific meanings of the above-mentioned terms in the present disclosure could be understood according to specific circumstances.

(25) At present, the dental contra-angle hand-pieces mainly include two types of inner-water-channel contra-angle hand-pieces and outer-water-channel contra-angle hand-pieces. Water of the inner-water-channel contra-angle hand-piece is delivered by a motor to an inner water pipe; and water of the outer-water-channel contra-angle hand-pieces is delivered to an inner water pipe through an external pipeline. As the motor part of the inner water pipe is not easy to disinfect or clean, the inner-water-channel contra-angle hand-pieces are not suitable for delivering a sterile solution, at this time, the outer-water-channel contra-angle hand-piece needs to be used for processing, so the operation is complex, the labor intensity is high, and the efficiency is low. Meanwhile, when the outer-water-channel contra-angle hand-piece is used to deliver a liquid, the external pipeline of the outer-water-channel contra-angle hand-piece is close to a head of the hand-piece. In this way, a volume of a front end of the head assembly is increased, making the front end of the head assembly occupy a large space, while the oral cavity has a limited operation space, thus the operation is inconvenient. In other words, the existing dental contra-angle hand-pieces have a single function and are inconvenient to use.

(26) It should be understood that the front end of the head assembly is the end located at the oral cavity, and atomized water formed by mixing the liquid and the gas can be sprayed out from the front end of the head.

(27) Referring to FIG. 1 to FIG. 16, in view of this, the present embodiment provides a head assembly (also called head module) **0001** for a dental contra-angle hand-piece, wherein the head assembly has both functions of inner-water-channel water delivery and outer-water-channel water delivery. In this way, when in use, the inner-water-channel water delivery and the outer-water-channel water delivery can be flexibly selected, enabling diversified functions, convenient switching, flexible and convenient operation, low labor intensity, high operation efficiency, wide application range and a low cost.

(28) Referring to FIG. 1 to FIG. 4, in the present embodiment, the head assembly **0001** for a dental contra-angle hand-piece includes: a hand-piece main body (also called head main body) **100**, wherein the hand-piece main body **100** is provided with a first flow channel (also called first channel) **110** and a second flow channel (also called second channel) **120** independent from each other, the first flow channel **110** is configured to be in communication with a liquid outlet **2001** of a motor **002**, and the second flow channel **120** is configured to be in communication with an external pipeline (e.g., external water pipe) **900**; a reversing valve (also called adjusting valve) **200**, wherein the reversing valve **200** is provided with a confluence channel (also called reversing channel) **210**, and a first port **220** and a second port **230** which are both in communication with the confluence channel **210**; the reversing valve **200** is movably connected with the hand-piece main body **100** so as to be switched between a first operation position and a second operation position; when the reversing valve is located in the first operation position, the first port **220** is in communication with the first flow channel **110** and the second port **230** is disconnected from the second flow channel **120**; and when the reversing valve is located in the second operation position, the first port **220** is disconnected from the first flow channel **110** and the second port **230** is in communication with the second flow channel **120**; and an inner water pipe **300**, wherein the inner water pipe **300** is in communication with the confluence channel **210**, and is configured to deliver a fluid to a head portion of the hand-piece main body **100**.

(29) For the dental contra-angle hand-piece head assembly provided by the present embodiment, a state of the head assembly can be adjusted as required according to a field situation when the clinical treatment is carried out, to correspondingly adjust it to achieve inner-water-channel or outer-water-channel water delivery, then the operation is convenient and reliable. Specifically, when the inner-water-channel water delivery is required, that is, when the water is delivered from

the motor **002** to the inner water pipe **300**, the reversing valve **200** is adjusted so that the reversing valve **200** moves to the first operation position, and at this time, the first port **220** is in communication with the first flow channel **110**, the liquid outlet **2001** of the motor **002** is in communication with the first port **220** through the first flow channel **110**, and the first port **220** is in communication with the inner water pipe **300** through the confluence channel **210**, so that the water delivered by the motor **002** flows through the first flow channel **110**, the first port **220**, and the confluence channel **210** in sequence to the inner water pipe **300**, and flows out from the inner water pipe **300**, to be mixed with the gas to form a water mist. When the outer-water-channel water delivery is needed, that is, when the water is not delivered from the motor **002** to the inner water pipe **300**, but is delivered from the external pipeline **900** to the inner water pipe **300**, the reversing valve **200** is adjusted so that the reversing valve **200** moves to the second operation position, and the second port **230** is in communication with the second flow channel **120**, at this time, the external pipeline **900**, the second flow channel **120**, the second port **230**, the confluence channel **210**, and the inner water pipe **300** are in communication in sequence, so that the water delivered through the external pipeline **900** can smoothly flow into the inner water pipe **300**, and flow out from the inner water pipe **300**, to be mixed with the gas to form a water mist. Thus, the head assembly provided by the present embodiment can be switched between the state of inner-water-channel water delivery and the state of outer-water-channel water delivery, thus satisfying the use requirements of different scenarios, having diversified functions, being flexible and convenient to use, improving the operation efficiency and achieving safe and reliable operation.

(30) Meanwhile, when the reversing valve **200** is switched between the first operation position and the second operation position, during the communication between the first port **220** and the first flow channel **110**, the overlapped portion of the first port **220** and the first flow channel **110** gradually increases, the flow rate can be adjusted by adjusting an overlapped area of the first port **220** and the first flow channel **110**, realizing the function of adjusting flow rate. Similarly, during the communication between the second port **230** and the second flow channel **120**, the flow rate can also be adjusted by adjusting the overlapped area of the second port **230** and the second flow channel **120**.

(31) Referring to FIG. 5, in the present embodiment, optionally, the hand-piece main body **100** has a front end **101** which is close to a patient in an operation state and a rear end **102** used for being held by an operator, wherein the front end **101** may also be called as a head end, and the rear end **102** may also be called as a tail end. An end surface where the rear end **102** of the hand-piece main body **100** is located is provided with an insertion hole **103** for allowing the motor **002** to be inserted thereinto, an inner circumferential wall of the hand-piece main body **100** is provided with the first flow channel **110** in an annular shape, the first flow channel **110** is provided around an axis of the insertion hole **103**, an outer circumferential wall of the hand-piece main body **100** is provided with the second flow channel **120**, and the first flow channel **110** is located on a side of the second flow channel **120** close to the front end **101** of the hand-piece main body **100**. That is, the second flow channel **120** is provided close to the rear end **102** of the hand-piece main body **100**, in other words, the distance between the second flow channel **120** and the rear end **102** is smaller than the distance between the second flow channel **120** and the front end **101**, in this way, the external pipeline **900** in communication with the second flow channel **120** will not increase the volume of the head end, and when the head end extends into a patient's oral cavity, the external pipeline **900** will not enter the oral cavity. The head end has a small volume, and is easy to operate.

(32) Optionally, the hand-piece main body **100** is further provided with a fitting hole **130** and a pressure relief hole **140** in communication with the fitting hole **130**, both the fitting hole **130** and the pressure relief hole **140** extend along a length direction of the hand-piece main body **100**, an end of the fitting hole **130** close to the front end **101** of the hand-piece main body **100** is an insertion end **131**, the pressure relief hole **140** is in communication with an end of the fitting hole **130** close to the rear end **102** of the hand-piece main body **100**, that is, the pressure relief hole **140**

is located at a side of the fitting hole **130** close to the rear end **102** of the hand-piece main body **100**, and meanwhile, an end of the pressure relief hole **140** away from the fitting hole **130** extends to an end surface of the rear end **102** of the hand-piece main body **100**.

(33) Optionally, the fitting hole **130** and the pressure relief hole **140** are both cylindrical holes, the fitting hole **130** is coaxial with the pressure relief hole **140**, and the diameter of the fitting hole **130** is greater than the diameter of the pressure relief hole **140**, so as to form an abutment surface **150** in an annular shape at a position where the fitting hole **130** is in communication with the pressure relief hole **140**.

(34) It should be noted that the first flow channel **110** is in communication with the fitting hole **130** through a connecting hole, and the second flow channel **120** is in communication with the fitting hole **130**.

(35) Optionally, the hand-piece main body **100** is further provided with an operation hole **160** in communication with the fitting hole **130**, the operation hole **160** is located on the outer circumferential wall of the hand-piece main body **100**, a hole wall of the operation hole **160** is provided with a first limiting portion **161** and a second limiting portion **162** arranged at an interval in an axial direction of the hand-piece main body **100**, and the first limiting portion **161** and the second limiting portion **162** are configured to limit a sliding range of the reversing valve **200** in an extending direction of the hand-piece main body **100**.

(36) Optionally, the operation hole **160** may be a strip-shaped hole, and the operation hole **160** extends along the axial direction of the hand-piece main body **100**. With such configuration, the operation hole **160** has a small volume, occupies a small occupation space, and is easy to process, and the strength of the hand-piece main body **100** is not easily weakened.

(37) Referring to FIG. 6, in the present embodiment, optionally, the reversing valve **200** is of a cylindrical structure, the reversing valve **200** is provided with the confluence channel **210** at a first end **201** in its axial direction, and the confluence channel **210** is spaced apart from a second end **202** of the reversing valve **200** in its axial direction. The first port **220** and the second port **230** are both provided on the circumferential wall of the reversing valve **200**, and are spaced apart from each other in a circumferential direction of the reversing valve **200**, for example, the first port **220** and the second port **230** are uniformly arranged at an interval in the circumferential direction of the reversing valve **200**, that is, angles of the first port **220** and the second port **230** in the circumferential direction of the reversing valve **200** are 180°. The first port **220** is located on a side of the second port **230** close to the first end **201**, that is, the second port is closer to the second end **202** than the first port **220**.

(38) It should be noted that the reversing valve **200** may not be of a cylindrical structure, for example, may also be of a structure having an elliptical cross section or a square cross section, which may be set as needed. By providing the reversing valve **200** as a cylindrical structure, it is convenient to seal a gap between the reversing valve **200** and the hole wall of the fitting hole **130**.

(39) When the reversing valve **200** is fitted with the hand-piece main body **100**, the second end **202** of the reversing valve **200** is inserted from the insertion end **131** of the fitting hole **130**, the first end **201** of the reversing valve **200** is corresponding to the insertion end **131**, and the inner water pipe **300** is inserted into the first end **201** of the reversing valve **200** from the insertion end **131**. With such design, the reversing valve **200** slidably cooperates with the fitting hole **130** in the axial direction of the fitting hole **130**, and when the reversing valve **200** slides to a first operation position, the first port **220** is in communication with the first flow channel **110** through the connecting hole, and the outer circumferential wall of the reversing valve **200** blocks the second flow channel **120**, at this time, the inner-water-channel water delivery can be carried out. When the reversing valve **200** slides to a second operation position, the outer circumferential wall of the reversing valve **200** blocks the connecting hole, and the second port **230** is in communication with the second flow channel **120**, and at this time, the outer-water-channel water delivery can be carried out. Meanwhile, when the second port **230** is close to the rear end **102** of the hand-piece main body

100, and the second port **230** is connected to the external pipeline **900** through the second flow channel **120**, the external pipeline **900** is located at the rear end **102** of the hand-piece main body **100**, the external pipeline **900** is not located at the front end **101** of the hand-piece main body **100**, the front end **101** of the hand-piece main body **100** has a small volume, requires a small space when operating, and is convenient and flexible to operate in the oral cavity with limited space.

(40) Referring to FIG. 6 and FIG. 7, in the present embodiment, optionally, the head assembly for a dental contra-angle hand-piece further includes a toggle member **400**, an end of the toggle member **400** is in communication with the reversing valve **200**, and the toggle member **400** passes through the operation hole **160** and protrudes out from the outer circumferential wall of the hand-piece main body **100**. The toggle member **400** is located between the first limiting portion **161** and the second limiting portion **162**, and an outer wall of the toggle member **400** is in contact with the hole wall of the operation hole **160** in the circumferential direction of the hand-piece main body **100**, thereby preventing the reversing valve **200** from rotating in the fitting hole **130**, so that relative positions of the first port **220**, the second port **230**, the first flow channel **110**, and the second flow channel **120** are accurate and reliable. When the position of the reversing valve **200** needs to be switched, the toggle member **400** is operated so that the toggle member slides between the first limiting portion **161** and the second limiting portion **162**. Specifically, when the toggle member **400** moves to abut against the first limiting portion **161**, the reversing valve **200** is located in the first operation position, at this time, the first port **220** is in communication with the first flow channel **110**, and the second port **230** is not in communication with the second flow channel **120**; when the toggle member **400** moves to abut against the second limiting portion **162**, the reversing valve **200** is located in the second operation position, at this time, the second port **230** is in communication with the second flow channel **120**, and the first port **220** is not in communication with the first flow channel **110**. Such configuration facilitates adjusting the position of the reversing valve **200** through the toggle member **400**, and meanwhile facilitates judging the operation state of the reversing valve **200** according to the position of the toggle member **400**, then the operation is convenient and reliable.

(41) In addition, as there is the abutment surface **150** at a joint of the fitting hole **130** and the pressure relief hole **140**, when the reversing valve **200** slides from the first operation position to the second operation position, the abutment surface **150** has a function of restricting the sliding of the reversing valve **200**, thus preventing the reversing valve **200** from sliding out from the pressure relief hole **140**. When the reversing valve **200** slides, the gas can be discharged from the pressure relief hole **140**. The reversing valve **200** flexibly slides, and is not easily stuck in the fitting hole **130**. Obviously, when the reversing valve **200** is located in the second operation position, the second end **202** of the reversing valve **200** does not necessarily abut against the abutment surface **150**, and it is also feasible to achieve limiting by only relying on the second limiting portion **162** abutting against the toggle member **400**.

(42) It should be understood that in other embodiments, a driving mechanism can be provided to drive the toggle member **400** to move, so that the toggle member adjusts the position of the reversing valve **200**, then the reversing valve **200** can be switched between the first operation position and the second operation position. For example, the driving mechanism may be a motor screw transmission mechanism, a cylinder mechanism, a hydraulic cylinder mechanism, an electric push rod, or the like.

(43) In addition, the operation positions of the reversing valve **200** also can be switched not by sliding linearly with respect to the hand-piece main body **100**, for example, in other embodiments, the operation positions of the reversing valve **200** can be switched by rotating with respect to the hand-piece main body **100**, or the operation positions of the reversing valve **200** is switched by sliding and simultaneously rotating with respect to the hand-piece main body **100**.

(44) Referring to FIG. 7, in the present embodiment, optionally, the inner water pipe **300** is inserted into the confluence channel **210** from the first end **201** of the reversing valve **200** after passing

through the insertion end **131**, and the inner water pipe **300** slidably cooperates with the confluence channel **210**, that is, when the reversing valve **200** slides relative to the fitting hole **130**, it meanwhile slides relative to the inner water pipe **300**, at the same time, the reversing valve **200** will not disengage from the inner water pipe **300** during the sliding, and the connection stability between the two is high.

(45) Optionally, the fitting hole **130** is provided therein with an abutment ring **500**, and the fitting hole **130** is provided with an inner thread on a hole wall thereof located at a side of the abutment ring **500** close to the insertion end **131**. The inner water pipe **300** is sheathed with a fastener **600** and a first sealing member **700**, the inner water pipe **300** penetrates through the abutment ring **500** and is inserted into the confluence channel **210**, the fastener **600** is screwed into the fitting hole **130**, and the first sealing member **700** is clamped between the fastener **600** and the abutment ring **500**, enabling good sealing performance and allowing it to be not easy to leak.

(46) In the present embodiment, optionally, the head assembly for a dental contra-angle hand-piece further includes a plurality of second sealing members **800**, the plurality of second sealing members **800** are provided in the fitting hole **130**, located between the hole wall of the fitting hole **130** and the reversing valve **200**, and are configured to seal the hole wall of the fitting hole **130** and the outer circumferential wall of the reversing valve **200**.

(47) It should be noted that the second sealing members **800** can be embedded in the fitting hole **130**, and after the reversing valve **200** is inserted into the fitting hole **130** from the insertion end **131** of the fitting hole **130**, the hole wall of the fitting hole **130** and the reversing valve **200** are sealed by the second sealing members **800**. Alternatively, the second sealing members **800** are sleeved over the reversing valve **200** and form with the reversing valve **200** a combined structure, and when the reversing valve **200** is inserted into the fitting hole **130**, the second sealing members **800** realize the sealing of the reversing valve **200** and the hole wall of the fitting hole **130**. In the present embodiment, illustration is made by taking the second sealing members **800** being sleeved over the reversing valve **200** as an example.

(48) The number of second sealing members **800** is five, and all of the five second sealing members **800** are sleeved over the reversing valve **200**. Optionally, the outer circumferential wall of the reversing valve **200** is provided with five annular positioning grooves **240**, and the five second sealing members **800** are respectively provided in the five annular positioning grooves **240**. The second sealing members **800** have accurate and reliable positions, and are not easily displaced, rendering good sealing effect.

(49) For convenience of description, it is assumed that in a direction from the first end **201** to the second end **202** of the reversing valve **200**, the five second sealing members **800** are sealing member a, sealing member b, sealing member c, sealing member d, and sealing member e, respectively, and when the five second sealing members **800** are fitted to the reversing valve **200**, the first port **220** on the reversing valve **200** is located between the sealing member c and the sealing member d, and the second port **230** on the reversing valve **200** is located between the sealing member d and the sealing member e. When the reversing valve **200** is located in the first operation position, the first flow channel **110** is in communication with the first port **220**, and both the first flow channel **110** and the first port **220** are located between the sealing member d and the sealing member e; when the reversing valve **200** is located in the second operation position, the second flow channel **120** is in communication with the second port **230**, the second flow channel **120** and the second port **230** are both located between the sealing member d and the sealing member e, and the first flow channel **110** is located between the sealing member b and the sealing member c.

(50) It should be noted that both the first sealing member **700** and the second sealing member **800** may be sealing rings, and the sealing rings may be O-rings, V-rings, rectangular rings or the like. Shapes of the first sealing member **700** and the second sealing member **800** may be different.

(51) In other embodiments, the head assembly for a dental contra-angle hand-piece further includes

an external pipeline **900**, and the external pipeline **900** is inserted into the second port **230**.

(52) It should be noted that, the inner circumferential wall of the hand-piece main body **100** is further provided with an annular gas passage **170** configured to be in communication with the gas outlet **2020** of the motor **002**, the annular gas passage **170** is in communication with a gas delivery pipe, the gas delivery pipe is configured to deliver the gas to the front end **101** of the hand-piece main body **100**, so that the gas and the water are mixed to form a water mist at the front end **101** of the hand-piece main body **100**.

(53) In other embodiments, the hand-piece main body **100** is sheathed with a housing **001**, the toggle member **400** extends out of the housing **001**, and correspondingly, the housing **001** is provided with a through hole corresponding to the operation hole **160**. Meanwhile, the housing **001** is provided with a notch **1001** capable of exposing the second port **230** outside the housing **001**.

(54) When the head assembly for a dental contra-angle hand-piece provided in the present embodiment is used, the position of the reversing valve **200** can be adjusted as needed, and when the reversing valve **200** is located in the first operation position, the first port **220** is in communication with the first flow channel **110**, and inner-water-channel water delivery can be realized. When the reversing valve **200** is located in the second operation position, the second port **230** is in communication with the second flow channel **120**, and outer-water-channel water delivery can be realized. The head assembly has diversified functions, is flexible to operate, and has high operation efficiency. Meanwhile, when the reversing valve **200** is in the first operation position, the reversing valve **200** can be properly adjusted, so that the overlapped area of the first port **220** and the first flow channel **110** is changed, thus adjusting the flow rate. Similarly, when the reversing valve **200** is in the second operation position, the overlapped area of the second port **230** and the second flow channel **120** can also be adjusted, thereby adjusting the flow rate.

(55) Referring to FIG. **8**, the present embodiment further provides a dental contra-angle hand-piece, including a motor **002** and the head assembly for a dental contra-angle hand-piece mentioned in the above embodiments, the motor **002** is inserted into the insertion hole **103** of the hand-piece main body **100**, and the liquid outlet **2001** of the motor **002** is in communication with the first flow channel **110**, the gas outlet **2020** of the motor **002** is in communication with the annular gas passage **170**, and the motor **002** is configured to supply water to the first flow channel **110** when the dental contra-angle hand-piece performs inner-water-channel water delivery, thus, the water flows from the first flow channel **110** and the first port **220** to the confluence channel **210**, and finally flows out from the inner water pipe **300**.

(56) The dental contra-angle hand-piece provided by the present embodiment is capable of performing the inner-water-channel water delivery or the outer-water-channel water delivery as needed, has diversified functions, is flexible and reliable to operate, and has high safety.

(57) Referring to FIG. **9** to FIG. **11**, in the present embodiment, a head assembly **0001** for a dental contra-angle hand-piece includes a hand-piece main body **100**, an inner water pipe **300**, and a reversing valve **200**. The hand-piece main body **100** is provided with a first flow channel **110** and a second flow channel **120** independent from each other, wherein the first flow channel **110** is configured to be in communication with a liquid outlet (or liquid delivery channel) of the motor **002**, and the second flow channel **120** is configured to be in communication with an external pipeline **900**. The inner water pipe **300** is connected to the hand-piece main body **100**. The reversing valve **200** is provided with a confluence channel **313**, the reversing valve **200** is rotatably connected to the hand-piece main body **100**, and the reversing valve **200** is configured to enable, when rotating relative to the hand-piece main body **100**, the first flow channel **110** and the second flow channel **120** to alternatively be in communication with the inner water pipe **300** through the confluence channel **313**.

(58) It should be understood that the first flow channel **110** and the second flow channel **120** being alternatively in communication with the inner water pipe **300** through the confluence channel **313** means that when the reversing valve **200** is rotated, the confluence channel **313** of the reversing

valve **200** can make the first flow channel **110** be in communication with the inner water pipe **300**, so as to realize the function of inner-water-channel water delivery, and at this time, the second flow channel **120** is not in communication with the inner water pipe **300**, and the liquid in the external pipeline **900** will not be delivered into the inner water pipe **300**; similarly, when the reversing valve **200** is rotated, the confluence channel **313** of the reversing valve **200** can also make the second flow channel **120** in communication with the inner water pipe **300**, so as to realize the function of outer-water-channel water delivery, at this time, the first flow channel **110** is not in communication with the inner water pipe **300**, so that the liquid will not be delivered from the motor **002** into the inner water pipe **300**.

(59) The operation principle of the head assembly **0001** for a dental contra-angle hand-piece provided in the present embodiment is as follows.

(60) When needing to perform inner-water-channel water delivery, that is, when water is delivered from the motor **002** to the inner water pipe **300**, the reversing valve **200** is operated, to make the reversing valve **200** rotate relative to the hand-piece main body **100**, and during the rotation, the reversing valve **200** can move to a position where the first flow channel **110**, the confluence channel **313**, and the inner water pipe **300** are in communication in sequence, so that the motor **002** delivers the liquid from the first flow channel **110** to the confluence channel **313**, and then the liquid enters the inner water pipe **300** from the confluence channel **313**, thus realizing that the liquid is delivered from the motor **002** to the inner water pipe **300**, the liquid is mixed with the gas delivered by the motor **002** to form a water mist, and the water mist is sprayed out from a front end of the hand-piece main body **100**.

(61) When needing to perform outer-water-channel water delivery, that is, when the water is not delivered from the motor **002** to the inner water pipe **300**, but is delivered from the external pipeline **900** to the inner water pipe **300**, the reversing valve **200** continues to rotate, to make the reversing valve **200** rotate to a position where the second flow channel **120**, the confluence channel **313**, and the inner water pipe **300** are in communication in sequence, so that the liquid delivered through the external pipeline **900** can smoothly flow to the inner water pipe **300** and flow out from the inner water pipe **300**, to be mixed with the gas to form a water mist. In this way, the operation state of the head assembly is adjusted as required according to the field situation when clinical treatment is carried out, so that it can be switched between two states of inner-water-channel water delivery and outer-water-channel water delivery, thus it is convenient and flexible to operate, and easy and convenient to use, and has a low cost.

(62) Meanwhile, when the reversing valve is rotated with respect to the hand-piece main body, during the communication between the confluence channel and the first flow channel, an overlapped part of the confluence channel and the first flow channel is gradually increased, and the flow rate can be adjusted by adjusting an overlapped area of the confluence channel and the first flow channel, thereby achieving the function of adjusting flow rate. Similarly, during the communication between the confluence channel and the second flow channel, the flow rate can also be adjusted by adjusting the overlapped area of the confluence channel and the second flow channel.

(63) With reference to FIG. **10**, in the present embodiment, it needs to be noted that the hand-piece main body **100** is in an elongated shape, and two ends of the hand-piece main body **100** in a length extending direction thereof are respectively a front end **101** and a rear end **102**, wherein the front end **101** may also be referred to as a head end, the rear end **102** may also be referred to as a tail end, the front end **101** is configured to extend into a patient's oral cavity, and the rear end **102** is configured to be held by an operator. Optionally, the hand-piece main body **100** includes a shell **1100**, a fixing seat **1200**, and a press ring **1300**, wherein an end of the shell **1100** is configured to be open (i.e. the end is an opening), the fixing seat **1200** can be inserted into the shell **110** or pulled out from the shell **110** through the opening, the press ring **1300** is connected to the shell **1100**, and limits the fixing seat **1200** in the shell **1100**, and the fixing seat **120** will not freely slide out from

the open end of the shell **1100**. The inner water pipe **300** is provided in the shell **1100**, and an end of the inner water pipe **300** is connected to the fixing seat **1200**. An end surface of the fixing seat **1200** close to the rear end **102** is provided with an insertion hole **103** configured to allow the motor **002** to insert thereto, an axis of the insertion hole **103** extends along the length direction of the hand-piece main body **100**, and the hole wall of the insertion hole **103** is provided with the first flow channel **110** and a gas delivery channel **128** arranged at an interval in the length extending direction of the hand-piece main body **100**, and the gas delivery channel **128** is closer to the front end of the hand-piece main body **100** than the first flow channel **101**. The first flow channel **101** includes an annular groove segment **1221** and a radial hole segment **1222** arranged around the axis of the insertion hole **103**, the radial hole segment **1222** is in communication with the annular groove segment **1221**, and the radial hole segment **1222** extends along a direction perpendicular to the axis of the insertion hole **103**. Obviously, in other embodiments, the radial hole segment **1222** further may form, with the axis of the insertion hole **103**, an angle other than 90° and zero. When the motor **002** is inserted into the insertion hole **103**, a part of the motor **002** is butt-jointed to the open end of the shell **1100**, the liquid outlet of the motor **002** is in communication with the annular groove segment **1221**, and a gas delivery hole on the motor **002** is in communication with the gas delivery channel **128**.

(64) It should be noted that the fixing seat **1200** can be fixedly connected to the shell **1100** by means of screws, snap structures or the like.

(65) With reference to FIG. **14**, meanwhile, the second flow channel **120** is provided on the fixing seat **1200**, and the second flow channel **120** is provided close to the rear end **102** of the hand-piece main body **100**, in other words, a distance between the second flow channel **120** and the rear end **102** is smaller than a distance between the second flow channel **120** and the front end **101**, in this way, the external pipeline **900** in communication with the second flow channel **120** is away from the front end, and will not increase the volume of the front end. When the front end is extended into the patient's oral cavity, the external pipeline **900** will not enter the oral cavity, in this way, the front end has a small volume, and is easy to operate. The fixing seat **1200** is further provided with a transfer cavity and a first mounting hole **125** in communication with the transfer cavity, and the transfer cavity is in communication with the inner water pipe **300**. The shell **1100** is provided with an avoidance groove **112** configured to avoid the external pipeline **900**, and the avoidance groove **112** is in communication with the second flow channel **120**. The shell **1100** is further provided with a second mounting hole **111** in communication with the first mounting hole **125**. The reversing valve **200** is rotatably connected to the first mounting hole **125** and the second mounting hole **111**, and a first sealing ring **410** is provided between the reversing valve **200** and a hole wall of the first mounting hole **125**, preventing the liquid in the transfer cavity from leaking from a gap between the first mounting hole **125** and the reversing valve **200**. In the above, an axis of the first mounting hole **125** is perpendicular to the extending direction of the hand-piece main body **100**. Obviously, in other embodiments, the axis of the first mounting hole **125** and the extending direction of the hand-piece main body **100** may also form an angle other than zero. A first limiting groove **126** and a second limiting groove **127** are further provided on a cavity wall of the transfer cavity, wherein the first limiting groove **126** and the second limiting groove **127** can both be provided as circular grooves, and an end of the radial hole segment **1222** away from the annular groove segment **1221** is located on a groove bottom wall of the first limiting groove **126**; and an end of the second flow channel **120** is located on a groove bottom wall of the second limiting groove **127**. The first limiting groove **126** and the second limiting groove **127** are respectively provided with a second sealing ring **510** and a third sealing ring **610**, wherein the second sealing ring **510** is in communication with the radial hole segment **1222**, and the third sealing ring **610** is in communication with the second flow channel **120**; further, an annular end surface of the third sealing ring **610** away from the groove bottom wall of the second limiting groove **127** is a sealing surface, and the sealing surface is a partial spherical surface or a partial cylindrical surface.

(66) Further, a sealing structure **700** is provided in the transfer cavity **124**, which can prevent the liquid in the transfer cavity **124** from leaking from a connection gap between the shell **1100** and the fixing seat **1200**.

(67) Referring to FIG. 12 to FIG. 13, in the present embodiment, optionally, the reversing valve **200** includes a sealing body **310** and a force transmission body **320** connected to each other, and the sealing body **310** and the force transmission body **320** may be configured as an integrated structure. The sealing body **310** has an outer circumferential surface **311** and an inner end surface **312** connected to the outer circumferential surface **311**, the outer circumferential surface **311** is a partial spherical surface or a cylindrical surface, the inner end surface **312** is a circular surface, and the force transmission body **320** is located at an end of the sealing body **310** in an axial direction thereof, that is, the inner end surface **312** of the sealing body **310** is located at an end of the sealing body **310** away from the force transmission body **320**. The axis of the sealing body **310** is an axis of rotation of the reversing valve **200**. The confluence channel **313** includes a first hole segment **3131** and a second hole segment **3132**, wherein one end of the first hole segment **3131** is located on the outer circumferential surface **311**, and the other end of the first hole segment **3131** is in communication with one end of the second hole segment **3132**, the other end of the second hole segment **3132** is located on the inner end surface **312**, the end of the second hole segment **3132** located on the inner end surface **312** is eccentrically arranged with respect to the axis of rotation, and further, a center of the inner end surface **312** is located outside a region surrounded by an outer contour of one end of the second hole segment **3132** located at the inner end surface **312**. An annular limiting groove **330** is formed at a position where the sealing body **310** is connected with the force transmission body **320**, and the first sealing ring **410** is embedded in the annular limiting groove **330**. During fitting, the reversing valve **200** passes through the second mounting hole **111** and is inserted into the first mounting hole **125**, the inner end surface **312** abuts against the second sealing ring **510**, and the outer circumferential face **311** abuts against the third sealing ring **610**. Moreover, a part of the force transmission body **320** away from the sealing body **310** may protrude out from a port of the second mounting hole **111** away from the first mounting hole **125**, facilitating in operating the force transmission body **320** to make the same drive the sealing body **310** to rotate.

(68) It should be understood that, the outer circumferential surface **311** cooperates with the third sealing ring **610**, here, when the reversing valve **200** is rotated relative to the hand-piece main body **100**, the sealing body **310** will be rotated relative to the third sealing ring **610** and the second sealing ring **510**, and the outer circumferential surface **311** will be rotated relative to the third sealing ring **610**, a sealing surface of the third sealing ring **610** fits with the outer circumferential surface **311** of the sealing body **310**, so that during the rotation, the sealing state is always maintained and dynamic sealing is realized. In this way, when the sealing surface of the third sealing ring **610** is a spherical surface, the outer circumferential surface **311** of the sealing body **310** is also correspondingly provided as a spherical surface. Similarly, when the sealing surface of the third sealing ring **610** is a cylindrical surface, the outer circumferential surface **311** of the sealing body **310** is also correspondingly provided as a cylindrical surface.

(69) Referring to FIG. 14 and FIG. 15, in the present embodiment, it may be noted that the reversing valve **200** has a first operation position and a second operation position which are switchable with each other when the reversing valve is rotated relative to the hand-piece main body **100**. When the reversing valve **200** is located in the first operation position, the first flow channel **110**, the second hole segment **3132**, the first hole segment **3131**, and the transfer cavity are in communication in sequence, an end of the second hole segment **3132** away from the first hole segment **3131** is located in a region surrounded by the second sealing ring **510**, the second hole segment **3132** is in communication with the radial hole segment **1222** of the first flow channel **110** through the second sealing ring **510**, and the outer circumferential surface **311** of the sealing body **310** blocks the second flow channel **120** through the third sealing ring **610**. When the reversing valve **200** is located in the second operation position, the second flow channel **120**, the first hole

segment **3131**, the second hole segment **3132**, and the transfer cavity are in communication in sequence, an end of the first hole segment **3131** away from the second hole segment **3132** is located in a region surrounded by the third sealing ring **610**, the first hole segment **3131** is in communication with the second flow channel **120** through the third sealing ring **610**, and the inner end surface **312** of the sealing body **310** blocks the first flow channel **110** through the second sealing ring **510**.

(70) It should be understood that, when the reversing valve is located in the first operation position, the head assembly **0001** for a dental contra-angle hand-piece can perform the inner-water-channel water delivery; and when the reversing valve is located in the second operation position, the head assembly **0001** can perform the outer-water-channel water delivery.

(71) Optionally, a torque transmission portion **321** is provided on an end surface of the force transmission body **320** away from the sealing body **310**, and the torque transmission portion **321** is configured to be engaged with a force applying tool, so as to make the reversing valve **200** rotate relative to the hand-piece main body **100** under the driving of the force applying tool. The force applying tool may be a wrench, a screw driver, or the like. The torque transmission portion **321** may be a protrusion or a groove, and both the protrusion and the groove may be in a strip-shaped structure.

(72) In other embodiments, optionally, at least one first limiting part may be provided on the shell **110**, and at least one second limiting part **322** may be provided on the force transmission body **320**. The first limiting part and the second limiting part **322** may both be protrusions. When the reversing valve **200** is rotated relative to the hand-piece main body **100**, the first limiting part can abut against the second limiting part **322**, thereby limiting a rotation angle of the reversing valve **200**. Specifically, there are two first limiting parts, and one second limiting part **322**. When the second limiting part **322** abuts against one of the first limiting parts, the reversing valve **200** is located in the first operation position, and when the second limiting part **322** abuts against the other one of the first limiting parts, the reversing valve **200** is located in the second operation position. Without doubt, in other embodiments, there may be one first limiting part and two second limiting parts **322**.

(73) Alternatively, in other embodiments, the first limiting part can be provided on the fixing seat **120**. Alternatively, one of the first limiting part and the second limiting part **322** is a protrusion, and the other is a groove.

(74) Referring to FIG. **14**, in other embodiments, optionally, a locking ring **800** is mounted on the shell **1100** in a position corresponding to the second mounting hole **111**, and the locking ring **800** may be detachably connected to the shell **1100** by a screw or a snap member. After the locking ring **800** is connected to the shell **1100**, the locking ring **800** abuts against a side of the force transmission body **320** away from the shell **1100**, so as to prevent the reversing valve **200** from disengaging from the hand-piece main body **100** via an orifice of the second mounting hole **111**.

(75) In other embodiments, optionally, two confluence channels **313** may be provided on the reversing valve **200**, and when the reversing valve **200** is located in the first operation position, a channel A makes the first flow channel **110** be in communication with the inner water pipe **300**, and the second flow channel **120** is discommunicated from the inner water pipe **300**. When the reversing valve **200** is located in the second operation position, a channel B makes the second flow channel **120** be in communication with the inner water pipe **300**, and the first flow channel **110** is discommunicated from the inner water pipe **300**.

(76) The head assembly **0001** for a dental contra-angle hand-piece provided in the present embodiment can be switched between the state of inner-water-channel delivery and the state of outer-water-channel delivery as required, is flexible and convenient to use, and has a wide application range, and a low cost.

(77) Referring to FIG. **9** and FIG. **16**, the present embodiment further provides a dental contra-angle hand-piece, including a motor **002**, an external pipeline **900**, and the head assembly **0001** for

a dental contra-angle hand-piece described in the above embodiments, wherein both the motor **002** and the external pipeline **900** are connected to the hand-piece main body **100**; the reversing valve **200** of the head assembly **0001** is configured to make the liquid outlet of the motor **002** and the external pipeline **900** alternatively be in communication with the inner water pipe **300**. When the dental contra-angle hand-piece is used, the state of the head assembly can be adjusted as required according to the field situation, so that it can be switched between two states of inner-water-channel water delivery and outer-water-channel water delivery, and is convenient and flexible to operate, and convenient to use.

(78) The above-mentioned are merely for preferred embodiments of the present disclosure and not used to limit the present disclosure. For one skilled in the art, various modifications and changes may be made to the present disclosure. Any modifications, equivalent substitutions, improvements and so on, made within the spirit and principle of the present disclosure, should be covered within the scope of protection of the present disclosure.

INDUSTRIAL APPLICABILITY

(79) The head assembly for a dental contra-angle hand-piece provided by the present disclosure includes a hand-piece main body, an inner water tube and a reversing valve, wherein the hand-piece main body is provided with a first flow channel and a second flow channel independent from each other, the first flow channel is configured to be in communication with a liquid outlet of a motor, and the second flow channel is configured to be in communication with an external pipeline; the inner water pipe is connected to the hand-piece main body; the reversing valve is provided with a confluence channel; the reversing valve is movably connected to the hand-piece main body, the reversing valve is configured to enable, when moving relative to the hand-piece main body, the first flow channel and the second flow channel to alternatively be in communication with the inner water pipe through the confluence channel. the dental contra-angle hand-piece provided by the present disclosure includes the head assembly mentioned above. The head assembly and the dental contra-angle hand-piece including the same can be switched between the state of inner-water-channel water delivery and the state of outer-water-channel water delivery, so as to satisfy the use requirements of different scenarios, has flexible and convenient use, and is safe and reliable; and the dental contra-angle hand-piece can perform the inner-water-channel water delivery or the outer-water-channel water delivery as needed, have diversified functions, flexible and reliable operation, and high safety.

Claims

1. A head assembly for a dental contra-angle hand-piece, comprising: a hand-piece main body, wherein the hand-piece main body is provided with a first flow channel and a second flow channel independent from each other, the first flow channel is configured to be in communication with a liquid outlet of a motor, and the second flow channel is configured to be in communication with an external pipeline; an inner water pipe, wherein the inner water pipe is connected to the hand-piece main body; and a reversing valve, wherein the reversing valve is provided with a confluence channel; the reversing valve is movably connected to the hand-piece main body, the reversing valve is configured to enable, when moving relative to the hand-piece main body, the first flow channel and the second flow channel to alternatively communicate with the inner water pipe through the confluence channel; wherein the reversing valve is further provided with a first port and a second port both in communication with the confluence channel; the reversing valve is configured to be switched between a first operation position and a second operation position, wherein when the reversing valve is located in the first operation position, the first port is in communication with the first flow channel and the second port is discommunicated from the second flow channel; and when the reversing valve is located in the second operation position, the first port is discommunicated from the first flow channel and the second port is in communication with the second flow channel;

and the inner water pipe is in communication with the confluence channel, and is configured to deliver a fluid to a head portion of the hand-piece main body.

2. The head assembly according to claim 1, wherein the hand-piece main body is provided with a fitting hole, the first flow channel and the second flow channel are both in communication with the fitting hole, the reversing valve is provided in the fitting hole, and the reversing valve is configured to slidably cooperate with the hand-piece main body in an extending direction of the hand-piece main body, so as to enable the reversing valve to be switched between the first operation position and the second operation position.

3. The head assembly according to claim 2, wherein the dental contra-angle hand-piece further comprises a toggle member, the toggle member is connected to the reversing valve, the toggle member protrudes out from an outer circumferential wall of the hand-piece main body, and the toggle member is configured to slidably cooperate with the hand-piece main body in the extending direction of the hand-piece main body, so as to drive the reversing valve to be switched between the first operation position and the second operation position.

4. The head assembly according to claim 3, wherein the hand-piece main body is provided with a first limiting portion and a second limiting portion arranged at an interval in the extending direction of the hand-piece main body, the toggle member is located between the first limiting portion and the second limiting portion, and the first limiting portion and the second limiting portion are configured to alternatively abut against the toggle member, so as to limit a sliding range of the toggle member.

5. The head assembly according to claim 4, wherein when the reversing valve is switched between the first operation position and the second operation position, a flow rate is adjusted by adjusting an overlapped area of the first port and the first flow channel during communication between the first port and the first flow channel; and the flow rate is adjusted by adjusting an overlapped area of the second port and the second flow channel during communication between the second port and the second flow channel.

6. The head assembly according to claim 4, wherein the hand-piece main body is further provided with an operation hole in communication with the fitting hole, the operation hole is located on the outer circumferential wall of the hand-piece main body, the operation hole is a strip-shaped hole and extends along the extending direction of the hand-piece main body, the first limiting portion and the second limiting portion are provided on a hole wall of the operation hole, and the toggle member passes through the operation hole and protrudes out from the outer circumferential wall of the hand-piece main body.

7. The head assembly according to claim 2, wherein the hand-piece main body is provided with a pressure relief hole in communication with the fitting hole.

8. The head assembly according to claim 2, wherein the inner water pipe is inserted into the confluence channel, and the inner water pipe is configured to slidably cooperate with the reversing valve in the extending direction of the hand-piece main body.

9. The head assembly according to claim 1, wherein an inner circumferential wall of the hand-piece main body is further provided with an annular gas passage, and the annular gas passage is configured to be in communication with a gas outlet of the motor.

10. The head assembly according to claim 1, wherein the head assembly further comprises at least one sealing member, and the at least one sealing member is provided between the reversing valve and the hand-piece main body, and is configured to seal a gap between the hand-piece main body and the reversing valve.

11. The head assembly according to claim 10, wherein an outer circumferential wall of the reversing valve is provided with at least one annular positioning groove, and the at least one sealing member is provided in the at least one annular positioning groove.

12. A dental contra-angle hand-piece, comprising the head assembly according to claim 1.
