(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 527 473 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
17.04.1996 Bulletin 1996/16

(51) Int. Cl.[6]: **A61C 1/05**, A61C 1/08

(21) Application number: **92113687.5**

(22) Date of filing: **11.08.1992**

(54) Cartridge type dental handpiece

Turbineneinsatz für zahnärztliches Handstück

Cartouche pour instrument dentaire à main

(84) Designated Contracting States:
AT CH DE FR GB IT LI

(30) Priority: **12.08.1991 JP 201864/91**

(43) Date of publication of application:
17.02.1993 Bulletin 1993/07

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EP 0 527 473 B1

Description

BACKGROUND OF THE INVENTION

This invention relates to a dental handpiece. More particularly, it relates to a cartridge type dental handpiece in which a cartridge for receiving and securing a dental burr is removably attached to a head housing provided at a distal end of the handpiece.

There have hitherto been employed a variety of so-called cartridge type dental handpieces in which a burr sleeve for securing a dental burr and bearings for rotatably holding the burr sleeve are housed within a cartridge which is removably attached to a head housing provided at the distal end of the handpiece. The dental handpiece is provided with a spray unit for spraying a cooling fluid, such as water or air to a site of treatment for cooling the site during tooth cutting. In conventional cartridge type dental handpieces, such spraying units as shown in Figs.3 an 4 are employed. In an example shown in Fig.3, air, water or a mixture thereof is sprayed to the site of treatment via an air supply port 52 and a water supply port 53 provided in the handpiece main body and communicating with an air-supply channel 50 and a water-supply channel 51, respectively. In an example shown in Fig.4, the lower end face of the head housing 55 is planar and a front cap 57 having a recess or groove is mounted in intimate contact with the planar lower end surface of the head housing 55 for establishing an annular fluid passage 56 to which air and water are supplied via an air-supply port 52 and a water-supply port 53 opened on the lower end surface of the head housing 55 so as to be sprayed via fluid ejecting ports 58, 59 provided at predetermined positions within the fluid passage 56.

However, the conventional spray unit shown in Fig.3, while having an advantage that the head is neat in appearance so that the site of treatment may be viewed more easily, is disadvantageous in that the opening positions of the air-supply port 52 and the water-supply port 53 are remote from a dental burr 60, while the fluid can be sprayed only in one direction proceeding from the handpiece main body to the site of treatment, so that the cooling effect is diminished, with the fluid being unable to reach the site of treatment particularly when cutting the lateral side of the tooth or cutting through the inside of the tooth.

While the conventional spray unit shown in Fig.4 has an advantage that the fluid may be sprayed from many directions by providing plural fluid ejecting ports 58, 59 along the fluid passage 56, and spraying may be made from positions close to the site of treatment with improved cooling effects, the spray unit raises a problem that the field of view is interrupted during treatment by an enlarged lower head end, while the operation of attaching the front cap 57 to the lower end face of the head housing 55 in intimate contact therewith cannot be achieved without considerable difficulties.

Document EP-A-0 109 507 which forms the preamble of Claim 1, discloses a cartridge type dental handpiece with a diffusion nose that has a number of orifices through which air or water can be sprayed. While air and water will be kept separately during transit through the orifices those will be mixed only at the time reaching the tip of driller.

A serious drawback with the device provided in this document is the fact that impurities such as debris of cut teeth cannot be prevented from entering the handpiece.

Furthermore document FR-A-2 482 448 is known that discloses a dental handpiece with a mechanism for preventing impurities to enter the handpiece. Notwithstanding the fact that it is advantageous to provide a mechanism for preventing impurities to enter the handpiece, the device revealed in document FR-A-2 482 448 is unable to solve the above-identified problems of the known prior art.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a cartridge type dental handpiece in which the fluid may be sprayed from many directions from a position close to the site of treatment, in which the field of view is interrupted only to a lesser extent during treatment and in which a spray unit may be constituted and dismounted easily by attachment or detachment of the cartridge with respect to the head housing and the handpiece main body. It is another object of the present invention to provide a cartridge type dental handpiece in which impurities such as debris of cut teeth may be prevented from being intruded into the cartridge.

According to the present invention, there is provided a cartridge type dental handpiece comprising a handpiece main body, a head housing provided at the distal end of the handpiece main body and a cartridge detachably adapted within the head housing, the cartridge having a cartridge casing and a rotatable sleeve rotatably mounted within the cartridge casing and adapted for detachably holding a dental burr, the dental handpiece further comprising a fluid passage defined between the inner surface of the head housing and the outer surface of the cartridge casing when the cartridge is mounted within the head housing, a fluid spraying port formed in the lower surface of the cartridge casing in communication with the fluid passage for spraying the fluid from the fluid passage onto a tooth being treated and a communication port for supplying the fluid from a fluid supply duct within the handpiece main body into the fluid supply passage.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is an exploded perspective view showing essential parts of a dental handpiece according to an embodiment of the present invention.

Fig.2 is a detailed cross-sectional view of the embodiment shown in Fig.1.

Fig.3 is a cross-sectional view showing an embodiment of a spray mechanism of a conventional dental handpiece.

Fig.4 is a cross-sectional view showing another embodiment of a spray mechanism of a conventional dental handpiece.

PREFERRED EMBODIMENT OF THE INVENTION

Referring to Fig.1, a dental handpiece 10 of the present embodiment includes a head housing 12 attached to the distal end of a handpiece main body 11, and a cartridge 13 attached to the head housing 12. When the dental handpiece 10 is used, the cartridge 13 is threadedly secured in position within the head housing 12 by a head cap 14, and a dental tool or burr 15 is inserted into and secured to the lower end of the cartridge 13.

The cartridge 13 is a cylinder having a frusto-conical lower inclined or tapered part 16. An annular water-supply groove 17 and an annular air-supply groove 18 are formed on an outer peripheral surface of the tapered part 16, and two O-rings 28 are mounted on the outer peripheral surface on both sides of the water-supply groove 17. Referring to Fig.2, the cartridge 13 is secured to the head housing 12 so that the tapered part 16 thereof is intimately contacted with the inner inclined surface of the head housing 12 under the thrusting force exerted by the head cap 14 with an end face 19 of the cartridge 13 being projected and exposed from the lower end of the head housing 12. As a result thereof, an annular water-supply channel 20 and an annular air-supply channel 21 are defined between the water-supply groove 17 and the air-supply groove 18 provided in the inclined part 16 on one hand and the inner peripheral surface of the head housing 12 on the other hand, respectively. The O-rings 28 are brought into tight contact with the inner peripheral surface of the head housing 12 to prevent water leakage from the water-supply channel 20. Three spray ports 22, 22, 22 communicating with the channels 20, 21 are formed so as to be opened on the lower end face 19 of the cartridge 13 at an angular interval of about 120° from one another along the periphery of the outer end face 19 of the cartridge 13.

The cartridge 13 of the present embodiment includes a pneumatic rotating mechanism, and is provided with a burr sleeve 23 for receiving and securing the dental tool or burr 15, upper and lower ball bearings 24, 24 for rotationally holding the burr sleeve 23, a rotor 25 secured to the outer periphery of the burr sleeve 23 between the upper and lower bearings 24, 24 and a cartridge casing 26 for accommodating these cartridge components. The burr sleeve 23 is rotationally driven under the force of air flowing via an aperture 27 (Fig.1) provided in the outer periphery of the cartridge casing 26.

On the other hand, the handpiece main body 11 is provided with a water-supply communication port 31 and an air-supply communication port 32 for supplying water and air from a water-supply duct 29 and an air-supply duct 30 within the handpiece main body 11, respectively, to the water-supply channel 20 and the air-supply channel 21, respectively. These communication ports 31, 32 are previously formed in the cartridge main body 11 to be opened in the inner peripheral surface of the head housing 12 at positions in register with the water-supply channel 20 and the air-supply channel 21, respectively, when the cartridge 13 is mounted in position relative to the handpiece main body 11 and the head housing 12.

In the above-described dental handpiece 10, water and air supplied from the water-supply duct 29 and the air-supply duct 30 during dental treatment are supplied via communication ports 31, 32 to the annular water-supply channel 20 and the annular air-supply channel 21, respectively. Water and air or a mixture thereof are sprayed onto a site of treatment from three directions via three spray ports 22 surrounding the burr sleeve 23 and from positions proximate to the dental tool 15 mounted on the burr sleeve 23.

The handpiece 10 of the present embodiment also includes a dust- and water-proofing mechanism for preventing impurities, such as debris of cut tooth or water droplets, from being intruded into the inside of the cartridge 13. That is, the lower end 33 of the burr sleeve 23 passes through the lower end face of the cartridge casing 26 and forms an opening 34 concentric with the burr sleeve 23 and spaced from the burr sleeve 23. At the base part of the opening 34, which is spaced apart from the outer periphery of the burr sleeve 23, there is provided a stationary partitioning member 36 having an L-shaped cross-section. The partitioning member 36 is extended radially inwardly from the inner peripheral surface of the opening 34 and then extended downwardly a predetermined distance as a lower extension 35 in a state free from contact with the burr sleeve 23. A dust-proofing disc 39 defining a rotatable partitioning member 38 having an L-shaped cross-section is secured to the outer peripheral surface of the lower end 33 of the burr sleeve 23. The disc 39 is extended radially outwardly from the lower end 33 and then extended upwardly in the form of an upper extension 37, a part of which is arranged between the lower extension 35 of the stationary partitioning member 36 and the inner peripheral surface of the opening 34 in a non-contact state. A disc cover 40 is mounted in contact with the inner peripheral surface of the opening 34 and extended a predetermined distance from the lower end of the opening 34 for covering the dust-proofing disc 39 in a non-contact state. Discharge holes 41 are formed in the extended part of the disc cover 40 at predetermined circumferential distances from one another. The result is that, at a lower region of the burr sleeve 23, the burr sleeve 23, the lower extension 35 of the stationary partitioning member 36, the upper extension 37 of the rotatable partitioning member 38 and the disc cover 40 are arranged concentrically such that first to third gaps 42, 43 and 44 are defined between the bur sleeve 23 and the lower extension 35, between the lower extension 35 and the upper extension 37 and between

the upper extension 37 and the disc cover 40, in communication with one another, respectively.

In the operation of the dental handpiece 10, since the radii of the burr sleeve 23, and the inner peripheral surface and the outer peripheral surface of the upper extension 37 of the rotatable partitioning member 38 are increased in this order with rotation of the burr sleeve 23, the flow velocities of air in the first gap 42, the second gap 43 and the third gap 44 are increased in this order, as a result of which the pneumatic pressure becomes lowest within the third gap 44 to cause impurities such as debris to be introduced into the third gap 44 as well as to prevent the impurities from being intruded into the second gap 43 and the first gap 42 where higher pneumatic pressures are maintained. The impurities introduced into the third gap 44 are discharged to outside via discharge holes 41 in the disc cover 40 under the centrifugal force.

Claims

1. A cartridge type dental handpiece (10) comprising a handpiece main body (11), a head housing (12) provided at a distal end of said handpiece main body (10), and a cartridge (13) detachably adapted within said head housing (12), said cartridge (13) having a cartridge casing (26) and a rotatable sleeve (23) rotatably mounted within said cartridge casing (26) and adapted for detachably holding an upper part of a dental burr (15) so that a lower part of the dental burr (15) extends beyond the lower face of said cartridge casing (26), the dental handpiece (10) further comprising a fluid passage (17, 18, 20, 21) defined between an inner surface of the head housing (12) and an outer surface of the cartridge casing (26) when the cartridge (13) is mounted within said head housing (12), a fluid spraying port (22) formed in a lower surface of said cartridge casing (26) in communication with said fluid passage (17, 18, 20, 21) for spraying the fluid from said fluid passage (17, 18, 20, 21) onto a tooth being treated, and a communication port (31, 32) for supplying the fluid from a fluid supply duct (29, 30) within said handpiece main body (11) into said fluid supply passage (17, 18, 20, 21),
characterized in that said dental handpiece comprises a rotatable partitioning member (38) provided in vicinity of a lower end of said rotatable sleeve (23), said rotatable partitioning member being extended radially outwardly from said rotatable sleeve (23) and then extended axially in the form of a rotatable extension (37), and a stationary partitioning member (40) provided in vicinity of a lower end of said cartridge casing (26), said stationary partitioning member (40) being spaced apart radially outwardly from said rotatable partitioning member (38), said stationary partitioning member (40) having a stationary extension (35) facing to and spaced apart radially inwardly from said rotatable extension (37), an outer surface of said rotatable sleeve (23) and said stationary extension (35) defining a first gap (42), said stationary extension (35) and said rotatable extension (37) defining a second gap (43) communicating with said first gap (42), said rotatable extension (37) and an inner surface of said stationary partitioning member (40) defining a third gap (44) communicating with said second gap (43), said stationary partitioning member (40) having a debris discharge hole (41) for establishing communication of said third gap (44) with outside air.

2. The dental handpiece (10) according to claim 1 wherein an outer surface of said cartridge casing (26) has a groove (17, 18) as said fluid passage.

3. The dental handpiece (10) according to claim 1 wherein said fluid passage (17, 18, 20, 21) comprises an air-supply passage (18) and a water-supply passage (17).

4. The dental handpiece (10) according to claim 1 wherein an outer surface of said cartridge casing (26) is formed with an air-supply groove (18) and a water-supply groove (17) as said fluid passage.

5. The dental handpiece (10) according to claim 1 wherein said rotatable extension (37) is extended axially along said upper part of said dental burr (15) and said stationary extension (35) is extended axially towards said lower part of said dental burr (15).

Patentansprüche

1. Zahnärztliches Handstück (10) mit Turbineneinsatz, umfassend ein Handstück-Hauptteil (11), ein Kopfgehäuse (12), welches am distalen Ende des Handstück-Hauptteiles (10) vorgesehen ist, und einen Turbineneinsatz (13), welcher lösbar in das Kopfgehäuse (12) eingefügt ist, wobei der Turbineneinsatz (13) ein Gehäuse (26) und eine drehbare Buchse (23), die drehbar innerhalb des Turbineneinsatzgehäuses (26) angeordnet und so gestaltet ist, daß darin ein oberer Teil eines Dentalfräsers (15) lösbar gehalten werden kann, so daß ein unterer Teil des Dentalfräsers (15) über die untere Stirnseite des Turbineneinsatzgehäuses (26) heraussteht, und das zahnärztliche Handstück (10) weiterhin umfaßt: einen Fluiddurchlaß (17, 18, 20, 21), der zwischen einer Innenfläche des Kopfgehäuses (12) und einer Außenfläche des Turbineneinsatzgehäuses (26) gebildet wird, wenn der Turbineneinsatz (13) innerhalb des Kopfgehäuses (12) befestigt ist, eine das Fluid verspritzende Öffnung (22), die in eine untere Fläche des Turbineneinsatzgehäuses (26) eingebracht ist und in Verbindung mit dem Fluiddurchlaß (17, 18, 20, 21) steht, um das Fluid aus dem Fluiddurchlaß (17, 18, 20, 21) auf einen zu behandelnden Zahn zu spritzen, sowie eine Verbindungsöffnung

(31, 32) zur Zuführung des Fluides von einer Fluidversorgungsleitung (29, 30) innerhalb des Handstück-Hauptteiles (11) zu dem Fluiddurchlaß (17, 18, 20, 21), **dadurch gekennzeichnet**, daß an dem zahnärzlichen Handstück ein rotierendes Spaltteil (38), anschließend an das untere Ende der drehbaren Buchse (23), vorgesehen ist, wobei das rotierende Spaltteil von der drehbaren Buchse (23) radial nach außen absteht und sich dann in Form eines rotierenden Fortsatzes (37) axial erstreckt, und daß ein feststehendes Spaltteil (40) in Fortsetzung des unteren Endes des Turbineneinsatzgehäuses (26) angeordnet ist, welches sich mit Abstand zum rotierenden Spaltteil (38) radial außen befindet, und das feststehende Spaltteil (40) einen feststehenden Fortsatz (35) aufweist, der zum rotierenden Fortsatz (37) gerichtet und von diesem radial nach innen beabstandet ist, und daß eine Außenfläche der drehbaren Buchse (23) und der feststehende Fortsatz (35) einen ersten Ringspalt (42) bilden, daß der feststehende Fortsatz (35) und der rotierende Fortsatz (37) einen zweiten Ringspalt (43) bilden, welcher mit dem ersten Ringspalt (42) in Verbindung steht, daß der rotierende Fortsatz (37) und die Innenfläche des feststehenden Spaltteiles (40) einen dritten Ringspalt (44) bilden, der mit dem zweiten Ringspalt (43) in Verbindung steht, und daß das feststehende Spaltteil (40) eine Auswurföffnung (41) für feste Teilchen zur Schaffung einer Verbindung des dritten Ringspaltes (44) mit der äußeren Atmosphäre aufweist.

2. Zahnärztliches Handstück (10) nach Anspruch 1, **dadurch gekennzeichnet**, daß eine Außenfläche des Turbineneinsatzgehäuses (26) eine Nut (17, 18) als Fluiddurchlaß (17, 18) aufweist.

3. Zahnärztliches Handstück (10) nach Anspruch 1, **dadurch gekennzeichnet**, daß der Fluiddurchlaß (17, 18, 20, 21) einen Luftzuführungsdurchlaß (18) und einen Wasserzuführungsdurchlaß (17) besitzt.

4. Zahnärztliches Handstück (10) nach Anspruch 1, **dadurch gekennzeichnet**, daß in eine Außenfläche des Turbineneinsatzgehäuses (26) eine Luftzuführungsnut (18) und eine Wasserzuführungsnut (17) als Fluiddurchlässe eingeformt sind.

5. Zahnärztliches Handstück (10) nach Anspruch 1, **dadurch gekennzeichnet**, daß der rotierende Fortsatz (37) axial entlang des oberen Teiles des Dentalfräsers (15) und der feststehende Fortsatz (35) axial in Richtung zum unteren Teil des Dentalfräsers (15) angeordnet sind.

Revendications

1. Pièce à main dentaire (10) du type à cartouche comprenant un corps principal (11) de pièce à main, un boîtier de tête (12) prévu à l'extrémité distale dudit corps principal (10) de la pièce à main et une cartouche (13) adaptée de façon démontable dans le boîtier de tête (12), ladite cartouche (13) ayant un étui de cartouche (26) et une pince rotative (23) montée rotative dans ledit étui de cartouche (26) et adaptée pour tenir une partie supérieure d'une fraise dentaire (15) d'une façon démontable, de sorte cu'une partie inférieure de la fraise dentaire (15) se prolonge au-delà de la face inférieure dudit étui de cartouche (26) la pièce à main (10) comprenant en outre un passage de fluide (17, 18, 20, 21) défini entre la surface intérieure du boîtier de tête (12) et la surface extérieure de l'étui de cartouche (26) lorsque la cartouche (13) est montée dans le boîtier de tête (12), un orifice de pulvérisation de fluide (22) formé dans la surface inférieure de l'étui de cartouche (26) en communication avec ledit passage de fluide (17, 18, 20, 21) pour pulvériser le fluide provenant dudit passage de fluide (17, 18, 20, 21) sur une dent en cours de traitement, et un orifice de communication (31, 32) servant à acheminer le fluide depuis un conduit d'arrivée de fluide (29, 30) prévu dans ledit corps principal (11) de la pièce à main dans ledit passage d'arrivée de fluide (17, 18, 20, 21),
caractérisée en ce que ladite pièce à main dentaire comprend un élément de cloisonnement rotatif (38) prévu dans le voisinage de l'extrémité inférieure de ladite pince rotative (23), ledit élément de cloisonnement rotatif se prolongeant radialement vers l'extérieur à partir de ladite pince rotative (23) puis se prolongeant axialement sous la forme d'un prolongement rotatif (37), et un élément de cloisonnement fixe (40) prévu dans le voisinage d'une extrémité inférieure dudit étui de cartouche (26), ledit élément de cloisonnement fixe (40) étant espacé radialement vers l'extérieur par rapport audit élément de cloisonnement rotatif (38), ledit élément de cloisonnement rotatif (40) ayant un prolongement fixe (35) qui fait face audit prolongement rotatif (37) et est espacé radialement vers l'intérieur par rapport à cet élément, une surface extérieure de ladite pince rotative (23) et ledit prolongement fixe (35) définissant une première fente (42), ledit prolongement fixe (35) et ledit prolongement rotatif (37) définissant une deuxième fente (43) qui communique avec ladite première fente (42), ledit prolongement rotatif (37) et une surface intérieure dudit élément de cloisonnement fixe (40) définissant une troisième fente (44) qui communique avec ladite deuxième fente (43), ledit élément de cloisonnement fixe (40) ayant un trou (41) d'éjection des débris servant à établir la communication entre ladite troisième fente (44) et l'air extérieur.

2. Pièce à main dentaire (10) selon la revendication 1, dans laquelle une surface extérieure dudit étui de

cartouche (26) présente une gorge (17, 18) qui constitue ledit passage de fluide.

3. Pièce à main dentaire (10) selon la revendication 1, dans laquelle ledit passage de fluide (17, 18, 20, 21) comprend un passage d'arrivée d'air (18) et un passage d'arrivée d'eau (17).

4. Pièce à main dentaire (10) selon la revendication 1, dans laquelle une surface extérieure dudit étui de cartouche (26) est munie d'une gorge d'arrivée d'air (18) et d'une gorge d'arrivée d'eau (17) pour constituer ledit passage de fluide.

5. Pièce à main dentaire (10) selon la revendication 1, dans laquelle ledit prolongement rotatif (37) est prolongé axialement le long de ladite partie supérieure de ladite fraise dentaire (15) et ledit prolongement fixe (35) est prolongé axialement vers ladite partie inférieure de ladite fraise dentaire (15).

FIG. 1

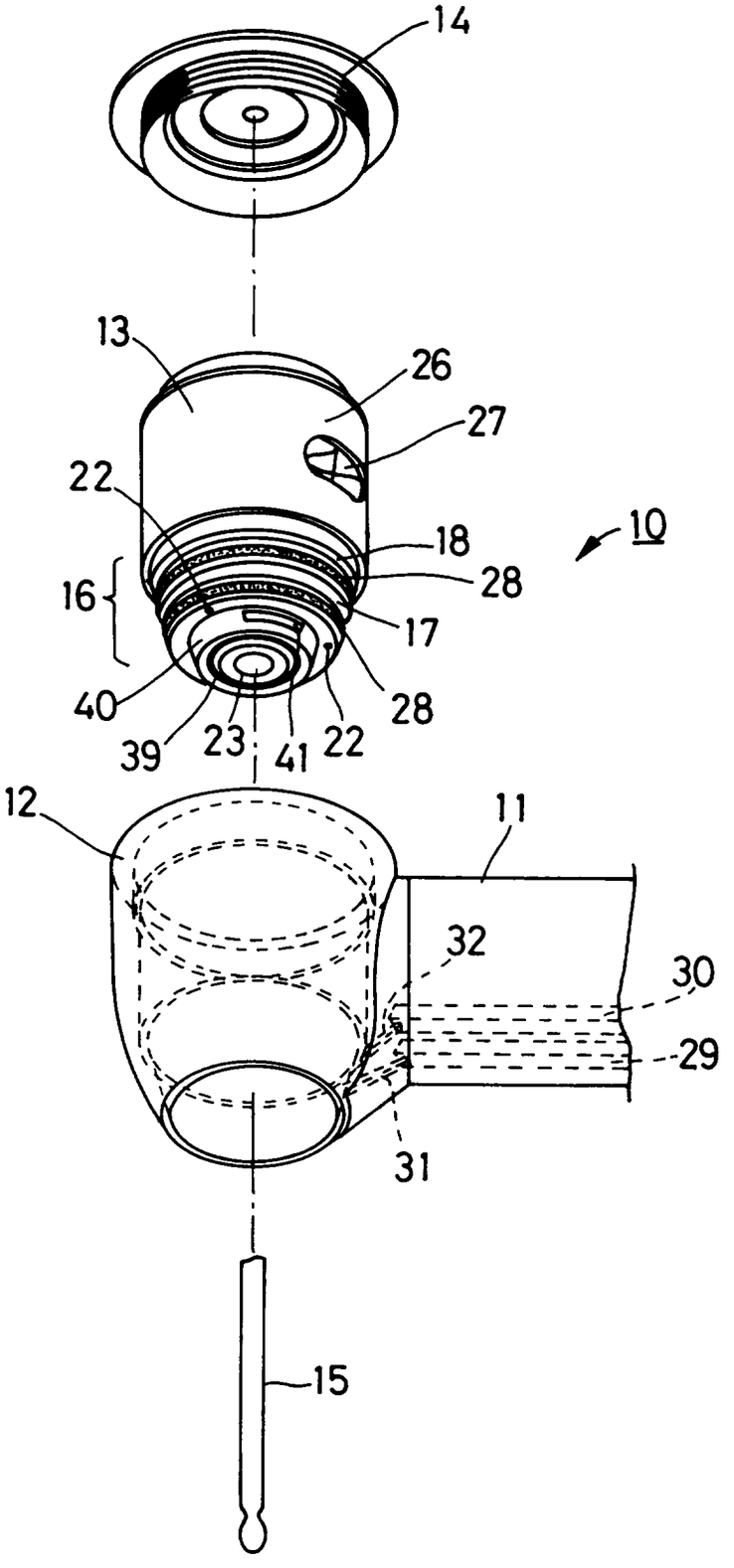

FIG. 2

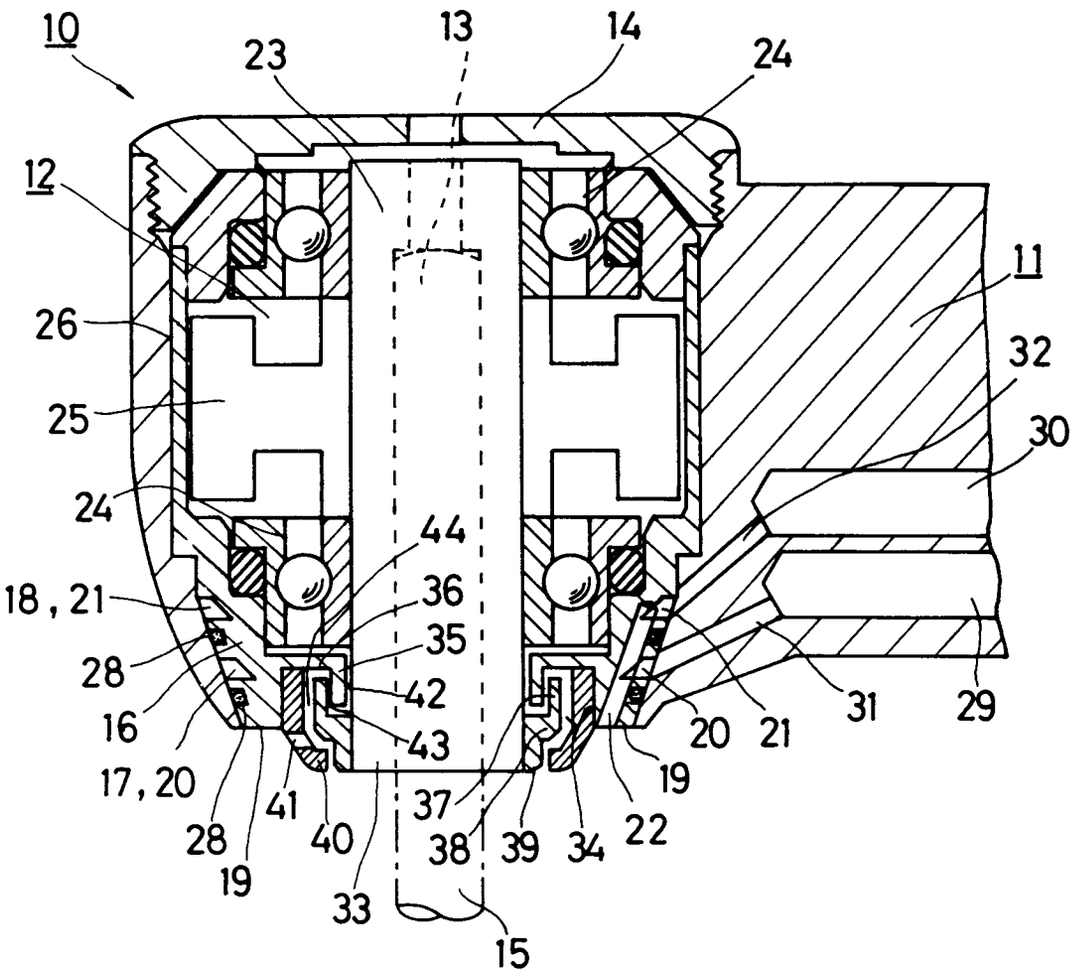
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FIG. 3

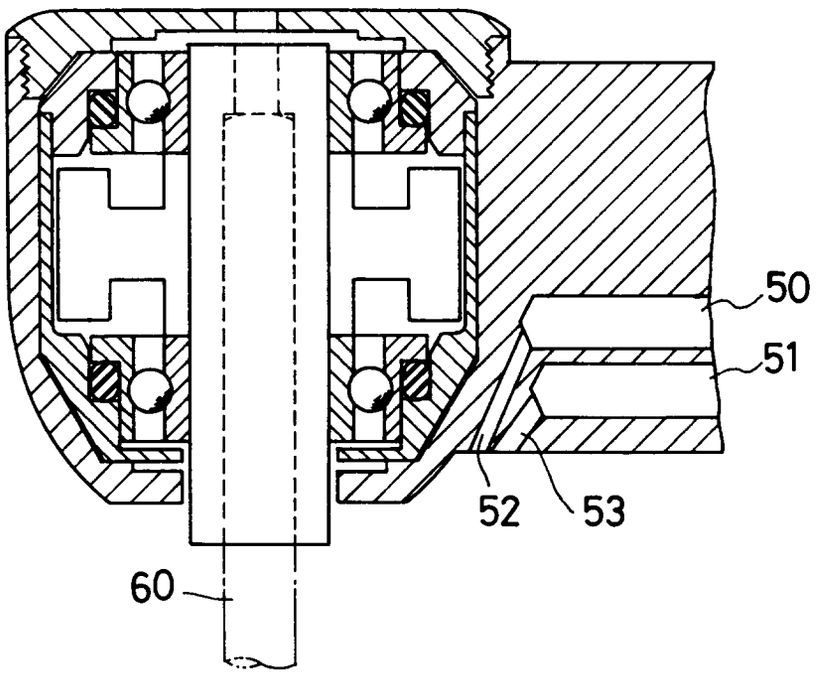

FIG. 4