

ILLUMINATED SYRINGE TIP AND HANDPIECE ASSEMBLY

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Background of the Invention

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This invention relates to an illuminated syringe tip and handpiece assembly, and more particularly to an illuminated syringe tip and handpiece assembly in which a disposable syringe tip is used to transmit light from a light source on the interior of the adaptor to the oral cavity of the patient to provide illumination for the dentist.

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U.S. Patent No. 5,049,071 (Davis et al.) discloses a disposable dental syringe tip made of plastic material. This patent also discloses various adaptors that can be used to attach the disposable syringe tip to the handpiece of a three way dental syringe assembly. The disclosure of this U.S. Patent No. 5,049,071 is incorporated herein by this reference. Additionally, U.S. Patent No. 5,192,206 (Davis et al.) contains additional disclosure relating to adaptors for use in three way dental syringe assemblies and the disclosure of this U.S. Patent No. 5,192,206 is also incorporated herein by this reference.

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The use of disposable plastic syringe tips has become quite widespread in light of the serious concern about the rising incidence of communicable diseases such as hepatitis and acquired immune deficiency syndrome. Dentists are taking extreme care to prevent the transmission of germs (viral or bacteria) from one patient to the next. The plastic syringe tip receives air and water under pressure.

1 By operation of the air button and the water button on the
2 handpiece, the dentist can direct water, air or a combined
3 air/water spray into the patient's mouth for whatever
4 dental procedures are required.

5 It is desirable to also supply light into the oral
6 cavity to assist the dentist in performing necessary dental
7 procedures. Most dental operatories have an overhead
8 lighting system with reflective surfaces that help concen-
9 trate the light on the patient's mouth. However, the
10 dentist will often stand in the path of the light which
11 minimizes the effectiveness of the overhead light.

12 Various dental tools have been provided with a light
13 source to assist the dentist during various dental activi-
14 ties. For example, a typical dental drill will include a
15 fiberoptic bundle that transmits light from a light source
16 to the end of the dental drill which allows the dentist to
17 provide light directly to the area in which the drilling is
18 occurring. Representative of this technology are the
19 disclosures shown in U.S. Patent No. 4,507,085 (Mosimann)
20 and U.S. Patent No. 5,088,924 (Woodward).

21 Dental syringe tip handpieces have also been provided
22 with a light source to illuminate the area into which the
23 air and/or water are to be sprayed. Representative of
24 these devices is the disclosure of U.S. Pat. No. 4,619,612
25 (Weber) which shows a fiberoptic bundle disposed down the
26 center of a metal syringe tip assembly. A light bulb acts

1 as the light source and is disposed in the interior of the
2 handpiece. The syringe tip used in the disclosure of the
3 Weber patent is a metal, non-disposable syringe tip which
4 must be autoclaved prior to use on the next patient.

5 Prior to the present invention, however, there have
6 not been any disposable syringe tips provided with a light
7 source to transmit light to the oral cavity. Dentists
8 using disposable syringe tips would have had to rely on the
9 ambient overhead lighting systems used in the dental
10 operatories in order to see in the oral cavity of the
11 patient during use of the air/water dental syringe tip
12 handpiece.

13 It is an object of the present invention to provide a
14 useful source of light that can be transmitted into the
15 oral cavity of the patient whenever the dentist is using an
16 air/water dental syringe tip handpiece.

17 It is a feature of the present invention to provide a
18 light source at the end of the syringe tip on the interior
19 of the adaptor that holds the syringe tip in the dental
20 syringe tip handpiece. Light from the light source is
21 directed into one end of the syringe tip and carried along
22 the length thereof. At the opposite end of the syringe
23 tip, the light radiates from the syringe tip and can be
24 used to illuminate the oral cavity of the patient.

25 It is an advantage of the present invention that a
26 dentist will be able to illuminate the oral cavity using

1 the same instrument that he is using to supply air, water
2 or combined air and water to the oral cavity of the pa-
3 tient. Any dental procedures that require use of the
4 air/water dental syringe tip handpiece will be more easily,
5 safely and effectively carried out because the dentist will
6 be able to see exactly where in the oral cavity he is
7 working.

8 Other objects, features and advantages of the present
9 invention will become apparent from a consideration of the
10 following detailed description.

11 Summary of the Invention

12 A dental syringe tip handpiece assembly includes a
13 clear, plastic syringe tip mounted in an adaptor for
14 connection to the handpiece. On the interior of the
15 adaptor at a location adjacent the end of the syringe tip,
16 a source of light, preferably a fiberoptic ringlight, is
17 provided. Light from the light source will be transmitted
18 down the length of the syringe tip and emitted from the end
19 thereof. By positioning the end of the syringe tip in the
20 patient's oral cavity, the dentist can provide illumination
21 in the oral cavity so that various dental functions can be
22 more easily and accurately performed.

23 A special handpiece body formed of a handpiece inner
24 unit and an outer cover is provided to receive the adaptor
25 and syringe tip assembly. The air, water and fiberoptic
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1 lines are positioned inside the handpiece body. The
2 handpiece body can be easily disassembled for cleaning.

3 The source of light may also be a light bulb posi-
4 tioned at the rear of the adaptor. The adaptor is made
5 from clear, or at least translucent, material so that light
6 from the light bulb will be transmitted through the adaptor
7 and then into the syringe tip.

8 In yet another embodiment of the present invention,
9 the source of the light may be one or more fiberoptic
10 bundles disposed through a valve head and a manifold
11 assembly. The ends of the fiberoptic bundles are posi-
12 tioned adjacent the end of a syringe tip so that the light
13 emitting from the ends of the fiberoptic bundles is trans-
14 mitted into the syringe tip which then carries the light
15 along the length thereof and the light is emitted from the
16 end of the syringe tip and can be used to illuminate the
17 oral cavity of a patient.

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19 Brief Description of the Drawings

20 Figure 1 shows a partially-exploded isometric view of
21 the illuminated syringe tip assembly and a handpiece body
22 of the present invention.

23 Figure 2 shows a cross sectional view at the location
24 in the assembly at which the adaptor, syringe tip and
25 locking cap are joined to the handpiece body, with all
26 parts in the closed position.

1 Figure 3 shows a cross sectional view at the location
2 in the assembly at which the adaptor, syringe tip and
3 locking cap are joined to the handpiece body, with all
4 parts in the open position.

5 Figure 4 shows an isometric view of the handpiece body
6 of the present invention with the outer cover removed.

7 Figure 5 shows a cross section of one end of the
8 handpiece body shown in Figure 4.

9 Figure 6 shows a cross sectional end view of a syringe
10 tip for use with the present invention. =

11 Figure 7 shows a cross sectional view of a modified
12 embodiment of the present invention at the location in the
13 assembly at which a light bulb is positioned at the rear of
14 the adaptor.

15 Figure 8 shows a partially-exploded isometric view of
16 another alternative embodiment of an illuminated dental
17 syringe tip assembly of the present invention.

18 Figure 9 shows a partially exploded isometric view of
19 the head and fiberoptic bundles used in this alternative
20 embodiment of the present invention.

21 Figure 10 shows a longitudinal cross sectional view in
22 the closed position of this alternative embodiment of the
23 present invention.

24 Figure 11 shows a lateral cross section view of the
25 manifold body used in this alternative embodiment and
26 showing the location of the water veins.

1 Figure 12 shows a partially exploded isometric view of
2 the manifold body, with the manifold sleeve partially
3 cutaway, used in this alternative embodiment.
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5 Detailed Description of the Preferred Embodiments

6 The illuminated dental syringe tip handpiece assembly
7 of the present invention is shown generally at 300 in
8 Figure 1. A handpiece body 312 comprises an outer cover
9 410 that slidably mounts over an inner unit 430. The inner
10 unit 430 is a generally U-shaped channel that has a hollow
11 interior to accommodate the water line, the air line and a
12 fiberoptic line. Each of these supply lines are connected
13 to the handpiece body 312 by means of an outer tubing 470
14 which extends to the sources (not shown) of the water
15 supply, the air supply and the light source for the fiber-
16 optic line.

17 At one end of the handpiece body 312, there is pro-
18 vided an adaptor 320 that mounts the syringe tip 314 into
19 the handpiece body 312. A locking cap assembly 330 holds
20 the syringe tip 314 securely in place.

21 As shown in Figures 2, 3 and 5, the handpiece body 312
22 has at one end a threaded opening 313 into which the
23 adaptor 320 can be screwed using the first adaptor threads
24 322. The middle of the adaptor 320 is provided with a
25 central hexagonal opening 316 into which a wrench can be
26 positioned to tighten the adaptor 320 into the threaded

1 opening 313 of the handpiece body 312.

2 In the embodiment shown in this application, the hand-
3 piece body can be a standard configuration known as the
4 "Continental Design," although the components of the
5 present invention can be modified to fit any handpiece body
6 configuration. Further details of the adaptor 320 are set
7 out in U.S. Patent No. 5,049,071, which is incorporated
8 herein by this reference.

9 A locking assembly securely holds the syringe tip 314
10 into the handpiece body 312 to prevent inadvertent loosening
11 of the syringe tip 314 so that the air and water supply
12 is at all times fed through the syringe tip 314 and to
13 prevent the syringe tip 314 from separating from the
14 adaptor 320. The locking assembly comprises generally the
15 adaptor 320, a collet gripping member 340 that fits over
16 the exterior end of the adaptor 320, an O-ring 342 and a
17 locking cap 330 that screws onto the adaptor 320 and
18 surrounds the collet gripping member 340. The interior of
19 the locking 330 contains a set of screw threads 332 that
20 cooperate with the second adaptor threads 326 on the
21 adaptor 320 to secure the locking cap 330 to the adaptor
22 320. Further details of the locking assembly are shown in
23 U.S. Patent No. 5,306,146 and U.S. Patent No. 5,489,205,
24 both of which are incorporated herein by this reference.
25 The release of the locking cap 330 from the adaptor 320
26 takes pressure off the collet gripping member 340 which

1 allows removal of a used syringe tip and replacement with
2 a new syringe tip.

3 The syringe tip 314 is an elongated cylindrical member
4 preferably made of a plastic material. The syringe tip 314
5 is press fit onto the tapered spindle 321 of the adaptor
6 320. Further details of the syringe tip are set out in
7 U.S. Patent No. 5,049,071. The syringe tip 314 must be
8 made of material that will transmit light from one end of
9 the syringe tip to the other end. In the preferred embodi-
10 ment of the present invention, the syringe tip 314 is made
11 of polypropanate, although other light transmitting,
12 plastic materials can be used such as acrylic plastics.

13 Also, the syringe tip 314 preferably should be clear
14 or transparent so that an inspection of the syringe tip
15 would reveal if it had previously been used. Once a
16 syringe tip has been used on a patient, the end of the
17 syringe tip will retain small amounts of saliva, blood or
18 other materials from the patient's mouth.

19 The syringe tip 314 is designed to be disposable after
20 a single use. The tip material is fabricated in a single-
21 step extrusion process, and is made preferably from any
22 rigid transparent plastic that can transmit light. A rigid
23 plastic is preferred to fulfill the need to use the tip for
24 continued retraction of the cheek and tongue by the dental
25 operator.

1 The syringe tip 314 is press fit onto the tapered
2 spindle 321 at the end of the spindle extension 325. The
3 tapered spindle 321 is integrally connected to an spindle
4 extension 325 that extends through the rear end of the
5 adaptor and into the handpiece body 312. The rear end of
6 the spindle extension 325 is threaded and received by the
7 threaded opening 316 on the interior of the handpiece body
8 312. The remote end of the spindle extension 325 is
9 connected to the water supply line 444 which allows water
10 to be feed to the syringe tip 314 in a conventional manner.

11 Similarly, the air supply is sent to the adaptor 320
12 through an air supply line 442 in the handpiece body 312
13 that aligns with the air channel 328 in the adaptor 320.

14 As shown in Figures 2 and 3, a light source in the
15 form of a fiberoptic ringlight 360 is disposed directly
16 adjacent to the end of the syringe tip 314 on the interior
17 of the adaptor 320 so that light is directed down the
18 length of the syringe tip. In the preferred embodiment of
19 the present invention, a fiberoptic ring light made by
20 Fiberoptics Technology Incorporated, 14 Fiber Road, Pom-
21 fret, CT 06258 can be used, although any suitable fiber-
22 optic ring arrangement would be acceptable. The fiberoptic
23 ringlight 360 is connected to a fiberoptic bundle 363 which
24 extends through a passageway 448 in the handpiece body 312
25 for connection to a remote light source (not shown).

1 On the interior of the adaptor 320, there is provided
2 an annular grommet 365 which receives a snap in flexible
3 ring 368. This flexible ring 368 surrounds the spindle
4 extension 325 and the fiberoptic bundle 363 and holds them
5 in place on the interior of the adaptor 320.

6 As shown in Figure 2, with the locking cap 330 pushed
7 onto the adaptor 320 in the closed position, the fiberoptic
8 ringlight 360 sits adjacent to the end of the syringe tip
9 314 in the interior of the adaptor 320. When the power
10 supply is activated by the dentist, the light bulb 360 will
11 illuminate and the light therefrom will be passed along the
12 length of the syringe tip 314 to its remote end where it is
13 emitted to illuminate the oral cavity of the patient.

14 Figure 4 shows the interior details of the inner unit
15 430 of the handpiece body 312. On the interior of the
16 inner unit 430 inside the U-shaped channel, there is
17 provided the water supply line 444 and the air supply line
18 442 which supply the air and water from the source to the
19 adaptor. The water valve 454 is positioned in the water
20 supply line 444 and is activated by the dentist by depress-
21 ing the water button 453 carried by the outer cover 410.
22 Similarly, air valve 452 is positioned in the air supply
23 line 442 and is activated by the dentist by depressing the
24 air button 451 carried by the outer cover 410.

25 The inner unit 430 is also provided with a conven-
26 tional pin fastener 462 which cooperates with an aperture

1 464 in the outer cover 410. The outer cover 410 slides
2 over the length of the inner unit 430 and the pin fastener
3 462 engages into the aperture 464 to hold the outer cover
4 410 in place when the assembly is being used. When it is
5 desired to clean the assembly, the pin fastener 462 is
6 depressed which allows the outer cover 410 to slide off of
7 the inner unit 430. The adaptor 320 unscrews from the
8 handpiece body 312 and the outer cover 410, the adaptor
9 320, the locking cap 330 and the collet gripping member 340
10 can then all be cleaned and autoclaved as needed. =

11 Figure 6 shows a modification to a syringe tip 514
12 which ensures that the syringe tip is accurately positioned
13 in the adaptor 320. The syringe tip 514 has a central
14 water passageway 522 and a plurality of air passageways 524
15 positioned around the water passageway 522. One end of the
16 syringe tip 514 is provided with a keyed channel 530 which
17 aligns with a complementary adaptor insert 540 (see Figure
18 2) on the interior of the adaptor 320. Thus, for the
19 syringe tip 514 to properly seat within the adaptor 320,
20 the keyed channel 530 on the syringe tip 514 must be
21 aligned with the adaptor insert 540. If the alignment is
22 not correct, the adaptor 514 will not properly press fit
23 onto the spindle 321 and water and air leakage problems
24 will occur.

25 Other variations of the present invention may be made.
26 Instead of the fiberoptic ringlight 360, other suitable

1 light sources can be used. For example, any suitably
2 shaped light bulb can be positioned on the interior of the
3 adaptor so that light can then be transmitted down the
4 syringe tip and into the oral cavity of the patient.

5 As shown in Figure 7, the handpiece body 612 has an
6 adaptor 620 that mounts the syringe tip 614 into the
7 handpiece body 612. In this embodiment, the adaptor 620 is
8 made of a relatively hard plastic such as polycarbonate or
9 hard acrylics. The adaptor 620 must also transmit light
10 from a light source 660 to the syringe tip 614, so the
11 material chosen for the adaptor 620 must be a light transmit-
12 ting material. It is preferred that this material be a
13 clear, transparent plastic, but a translucent material may
14 also be used.

15 The adaptor 620 rests in one end of the handpiece body
16 612 and a locking ring 650 having an external locking ring
17 thread 652 cooperates with a set of internal threads 622
18 holds the adaptor 620 in place. The locking ring 650 can
19 have a recessed groove (not shown) on its surface to receive
20 a screw driver for turning the locking ring 650 into the
21 internal threads 622.

22 The adaptor 620 includes a tapered spindle 621 upon
23 which the syringe tip 614 is mounted. A water channel 628
24 and an air channel 629 are provided in the adaptor 620 to
25 transmit water and air, respectively, from the handpiece
26 612 to the syringe tip 614. A locking assembly securely

1 holds the syringe tip 614 into the handpiece body 612 to
2 prevent inadvertent loosening of the syringe tip 614 so
3 that the air and water supply is at all times fed through
4 the syringe tip 614 and to prevent the syringe tip 614 from
5 separating from the adaptor 620. The locking assembly
6 comprises generally the adaptor 620, a collet gripping
7 member 640 that fits over the exterior end of the adaptor
8 620, an O-ring 642 and a locking cap 630 that screws onto
9 the adaptor 620 and surrounds the collet gripping member
10 640. The interior of the locking cap 630 contains a set of
11 screw threads that cooperate with the second adaptor
12 threads 626 on the adaptor 620 to secure the locking cap
13 630 to the adaptor 620.

14 The adaptor 620 contains a bulb recess 625 that
15 receives the light bulb 660. The light bulb 660 is mounted
16 on a light bulb base 662 positioned in the handpiece body
17 612. The light bulb base 662 is connected to a remote
18 power supply (not shown) by connecting wire 670.

19 When the light bulb 660 is activated by the power
20 supply, a lens 668 concentrates the light into the adaptor
21 620 whence the light is transmitted through the adaptor 620
22 and into the syringe tip 614 for transmission to the mouth
23 of the patient.

24 It is desirable to minimize heat being emitted from
25 the light source, so fiberoptic or fluorescent light
26 structures are preferred since the heat emissions of these

1 light sources is minimal. It is also contemplated that a
2 light source positioned adjacent a reflective surface can
3 be used to focus the light into the end of the syringe tip.
4 This would increase the light intensity without increasing
5 the size of the light source and would increase the light
6 intensity available for transmission down the length of the
7 syringe tip.

8 As shown in Figures 8-12, another embodiment of the
9 present invention utilizes one or more fiberoptic bundles
10 to deliver light from a light source through the handle of
11 the syringe tip assembly into the syringe tip where the
12 light is transmitted the length of the syringe tip and used
13 to illuminate the oral cavity of the patient.

14 The dental syringe assembly of this embodiment is
15 shown generally at 700. The handle 712 contains the
16 connecting lines for the fiberoptic bundles 760 and for the
17 sources of air and water which are water tubing 756 and air
18 tubing 758. The handle 712 threads (or otherwise suitably
19 connects) to a head 720 having a threaded extension 722.
20 The head 720 also contains the air valve 752 and the water
21 valve 754 for activation of the air and water, respec-
22 tively, in a conventional manner. As shown in Figure 9,
23 the threaded extension 722 includes one or more fiberoptic
24 bundle apertures 728 for receiving one or more of the
25 fiberoptic bundles 760 as well as a water barb fitting 724
26 for connecting the water tubing 756 and an air barb fitting

1 726 for connecting the air tubing 758.

2 The head 720 also threadably connects to a thumb nut
3 740, which in operable relationship with a locking collar
4 750, securely holds the syringe tip 714 in place in the
5 dental syringe assembly 700. The structure of the thumb
6 nut 740 and locking collar 750 are shown in United States
7 Patent No. 5,306,146 and U.S. Patent No. 5,489,205, the
8 disclosures of which are incorporated herein by reference.

9 Positioned on the interior of the head 720 is a
10 manifold body 770. The manifold body 770 is a generally
11 cylindrical body which includes a tapered spindle 780 (see
12 Figure 10) upon which is mounted the syringe tip 714 in the
13 manner shown in United States Patent No. 5,236,356. A
14 manifold top 772 is positioned next to the manifold body
15 770 and held in place thereat by a manifold sleeve 776.
16 The manifold body 770 contains the fiberoptic bundle
17 apertures 728 for receiving the fiberoptic bundles 760.
18 The air supply for the dental syringe assembly 700 is
19 connected to the air insert stem 778 which in turn is
20 mounted in the air vein 782 which is a longitudinal pas-
21 sageway through the manifold body 770. The water supply
22 for the dental syringe assembly 700 is connected to the
23 water insert stem 779 which in turn is mounted in the
24 offset longitudinal water vein 790 in the manifold body
25 770. The offset longitudinal water vein 790 intersects
26 with a perpendicular water vein 788 in the manifold body

1 770, which also intersects with an axial water vein 786 in
2 the manifold body 770 which finally intersects with a
3 central longitudinal water vein 784 in the manifold body
4 770 to deliver water into the spindle 780 and from there
5 into the syringe tip 714.

6 Figure 10 shows in longitudinal cross section the
7 dental syringe assembly 700 in assembled relationship. The
8 head 720 is threaded into the handle 712 and the combined
9 manifold body 770, manifold top 772 and manifold sleeve 776
10 are received in a recess in the head 720. The thumb nut
11 740 when threaded into the head 720 holds the manifold body
12 770, manifold top 772 and manifold sleeve 776 in place with
13 an O-ring 742 provided to seal this threaded connection.
14 The syringe tip 714 is pushed into the thumb nut 740 and
15 one end thereof presses onto the spindle 780. The syringe
16 tip 714 is securely held on the spindle 780 by the locking
17 collar 750 and the O-ring 751 when the thumb nut 740 is
18 threaded into the head 720.

19 The end of the syringe tip 714 is closely positioned
20 to the ends of the fiberoptic bundles 760 so that when the
21 light source (not shown) is activated, the light carried by
22 the fiberoptic bundles 760 is transmitted into the end of
23 the syringe tip 714 and is carried along the length of the
24 syringe tip 714 where it can be emitted into the oral
25 cavity of patient to provide needed illumination. Any
26 suitable means can be used to activate the light source.

1 At the same time the light is being activated, the
2 dentist can press the air valve 752 which causes air from
3 the air tubing 758 to pass through the air vein 782 and
4 into the air passageways in the syringe tip 714. Simi-
5 larly, activation of the water valve 754 causes water from
6 the water tubing 756 to pass into the offset longitudinal
7 water vein 790, from there into the perpendicular water
8 vein 788, from there into the axial water vein 786 and from
9 there into the central longitudinal water vein 784 which
10 connects to the central passageway in the spindle 780 which
11 feeds water to the central water passageway of the syringe
12 tip 714.

13 While the invention has been illustrated with respect
14 to several specific embodiments thereof, these embodiments
15 should be considered as illustrative rather than limiting.
16 Various modifications and additions may be made and will be
17 apparent to those skilled in the art. Accordingly, the
18 invention should not be limited by the foregoing descrip-
19 tion, but rather should be defined only by the following
20 claims.



WHAT IS CLAIMED IS:

Claim 1. A dental syringe tip handpiece assembly for providing light for emission from a remote end of a light transmitting syringe tip comprising:

a) a hollow adaptor for receiving a syringe tip mounted thereon;

b) a spindle extension mounted in the interior of the adaptor, the spindle extension having a tapered spindle at one end thereof; and

c) a light source mounted in the interior of the adaptor and adjacent the tapered spindle

whereby when the light source is illuminated, light will be directed into a proximate end of the syringe tip mounted on the tapered spindle so that light may be transmitted along the length of the syringe tip and emit from the remote end thereof whereby a dentist may illuminate a work area using the light emitting from the syringe tip.

Claim 2. The assembly of Claim 1 wherein the light source is a fiberoptic ringlight mounted so as to surround the spindle extension.

Claim 3. The assembly of Claim 1 further including a light-transmitting syringe tip mounted on the tapered spindle.



Claim 4. An illuminated syringe tip and dental handpiece assembly comprising:

- a) a handpiece body;
- b) an adaptor mounted in the handpiece body, the adaptor including a hollow body portion having external threads and a tapered spindle mounted on the interior of the hollow body portion;
- c) a syringe tip mounted on the adaptor;
- d) a locking assembly for securing the syringe tip in the adaptor; and
- e) a light source mounted on the interior of the hollow body portion of the adaptor adjacent an end of the syringe tip

whereby when the light source is illuminated, light will be directed into a proximate end of the syringe tip mounted on the tapered spindle so that light may be transmitted along the length of the syringe tip and emit from the remote end thereof whereby a dentist may illuminate a work area using the light emitting from the syringe tip.

Claim 5. The assembly of Claim 4 wherein the light source is a fiberoptic ringlight.

Claim 6. The assembly of Claim 4 handpiece body comprises:

- a) an inner unit having a generally U-shaped cross section with a hollow interior;



- b) a water supply line and an air supply positioned with the hollow interior and connected to the adaptor;
 - c) a fiberoptic bundle positioned on the interior of the hollow unit and connected to the light source;
 - d) a cover unit slidably mounted onto the inner unit;
- and
- e) means for disassembling the cover unit from the inner unit and means for disassembling the adaptor from the inner unit
- so that the assembly can be cleaned and autoclaved.

Claim 7. A syringe tip comprising:

- a) an elongated plastic cylindrical member having a first central passageway throughout the entire length of the cylindrical member;
- b) a plurality of second passageways disposed circumferentially about the first central passageway; and
- c) means for keying the syringe tip onto an adaptor so that the syringe tip is properly aligned on the adaptor.

Claim 8. The syringe tip of Claim 7 in which the means for keying the syringe tip onto an adaptor is a keyed channel on the syringe tip.



Claim 9. A dental syringe tip adaptor for transmitting light for emission from a remote end of a clear, light transmitting syringe tip into a patient's oral cavity comprising:

- a) a light transmitting body; and
- b) means for mounting a syringe tip to the light transmitting body

whereby when a light source is positioned adjacent to the adaptor and the light source is illuminated, light will be directed through the adaptor body into the syringe tip mounted thereon so that light may be transmitted along the length of the syringe tip and emit from a remote end thereof.

Claim 10. A dental syringe tip handpiece assembly for providing light for emission from a remote end of a clear, light transmitting syringe tip comprising:

- a) an adaptor for mounting a syringe tip in a handpiece, the adaptor comprising a light transmitting body;
 - b) means for mounting a syringe tip to the adaptor;
- and

- c) a light source mounted adjacent the adaptor

whereby when a light source is positioned adjacent to the adaptor and the light source is illuminated, light will be directed through the adaptor body into the syringe tip mounted thereon so that light may be transmitted along the



length of the syringe tip and emit from a remote end thereof.

Claim 11. The assembly of Claim 10 wherein the means for mounting the syringe tip is a tapered spindle integral with the adaptor.

Claim 12. The assembly of Claim 10 wherein the light source is a light bulb mounted in a bulb recess in the adaptor.

Claim 13. The assembly of Claim 10 further including a light-transmitting syringe tip mounted on the adaptor.

Claim 14. An illuminated syringe tip and dental handpiece assembly comprising:

- a) a handpiece body;
- b) an adaptor mounted in the handpiece body, the adaptor comprising a light transmitting body;
- c) the adaptor having a tapered spindle integral thereon;
- d) a syringe tip mounted on the tapered spindle;
- e) a locking assembly for securing the syringe tip in the adaptor; and
- f) a light source mounted adjacent to the light transmitting adaptor body whereby when the light source is



illuminated, light will be directed through the adaptor body into the syringe tip mounted thereon so that light may be transmitted along the length of the syringe tip and emit from a remote end thereof.

Claim 15. An adaptor for mounting a syringe tip into a handpiece body comprising:

a) a solid body including a slot therein sized to receive an end of a syringe tip, the solid body made of light transmitting material; and

b) a tapered spindle integrally joined to the solid body at an end of the slot

whereby when the syringe tip is inserted into the slot, the syringe tip will be mounted onto the tapered spindle.

Claim 16. The adaptor of Claim 15 wherein a second slot is provided in the solid body for receiving a light source.

Claim 17. The adaptor of Claim 15 further including a syringe tip mounted on the tapered spindle.

Claim 18. A dental syringe tip handpiece assembly for providing light for emission from a clear, light transmitting syringe tip comprising:

a) a generally hollow handle containing a light source, a water source and an air source;



b) a valve head attached to the handle, the valve head including a water valve and an air valve;

c) a manifold assembly positioned inside the valve head, the manifold assembly including a spindle adapted to receive a syringe tip to be mounted thereon;

d) the manifold assembly further including a water vein for transporting water from the water source to the spindle;

e) the manifold assembly further including an air vein for transporting air from the air source and adapted to provide air to a syringe tip; and

f) the manifold assembly further including means for transmitting light from the light source to a location adjacent the spindle

whereby when the light source is illuminated, light will be directed from the light source into a proximate end of a syringe tip to be mounted on the spindle so that light may be transmitted along the length of the syringe tip and emit from a remote end thereof whereby a dentist may illuminate a work area using the light emitting from the syringe tip.

Claim 19. The assembly of Claim 18 further including a light-transmitting syringe tip mounted on the tapered spindle.



Claim 20. A dental syringe tip handpiece assembly for providing light for emission from a remote end of a clear, light transmitting syringe tip comprising:

a) a generally hollow handle containing at least one fiberoptic bundle, a water source tubing and an air source tubing;

b) a generally hollow valve head attached to the handle, the valve head including a water valve and an air valve;

c) a manifold assembly positioned inside the valve head, the manifold assembly including a spindle for receiving a syringe tip to be mounted thereon;

d) the manifold assembly further including a water vein for transporting water from the water source through the spindle and into a water passageway in the syringe tip;

e) the manifold assembly further including an air vein for transporting air from the air source into an air passageway in the syringe tip;

f) a thumb nut and locking collar attached to the valve head for securing the syringe tip on the spindle and adjacent a first end of the manifold body; and

g) the manifold assembly further including at least one fiberoptic bundle aperture for receiving the fiberoptic bundle from the handle and positioning one end of the fiberoptic bundle adjacent the first end of the manifold body



whereby when the fiberoptic bundle is illuminated, light will be directed from the fiberoptic bundle into a proximate end of a syringe tip to be mounted on the spindle so that light may be transmitted along the length of the syringe tip and emit from a remote end thereof whereby a dentist may illuminate a work area using the light emitting from the syringe tip.

Claim 21. The assembly of Claim 20 further including a light-transmitting syringe tip mounted on the tapered spindle.

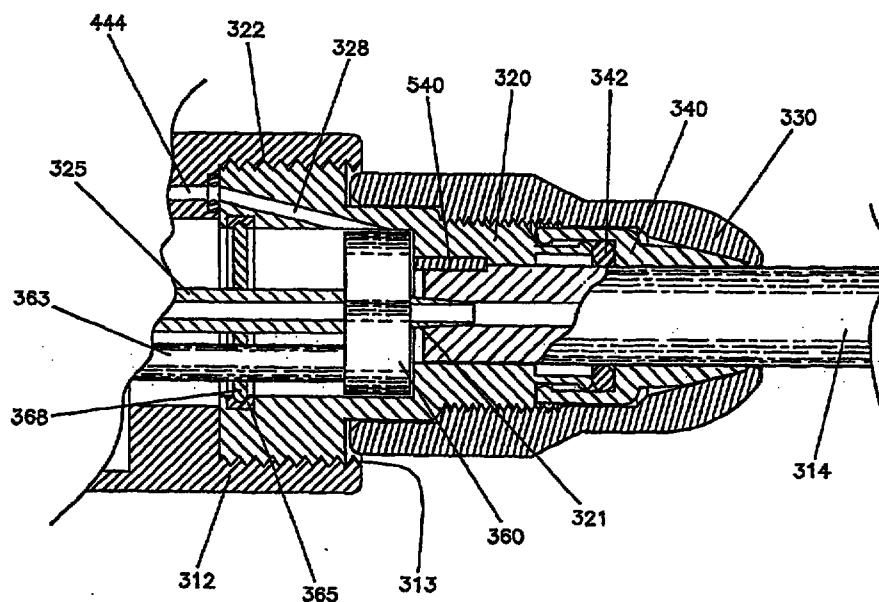
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61C 17/02, 1/08	A1	(11) International Publication Number: WO 99/47067 (43) International Publication Date: 23 September 1999 (23.09.99)
(21) International Application Number: PCT/US98/05509 (22) International Filing Date: 19 March 1998 (19.03.98) (71)(72) Applicants and Inventors: DAVIS, Warren [US/US]; 942 Eldorado Lane, Las Vegas, NV 89123 (US). WASSERMAN, David [US/US]; 2095 Mohigan Way, Las Vegas, NV 89109 (US). (74) Agent: ROETHEL, John, Edward; 3770 Howard Hughes Parkway #135, Las Vegas, NV 89109 (US).	(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report.	

(54) Title: ILLUMINATED SYRINGE TIP AND HANDPIECE ASSEMBLY



(57) Abstract

A dental syringe tip handpiece assembly includes a plastic syringe tip mounted in an adaptor for connection to the handpiece. On the interior of the adaptor at a location adjacent the end of the syringe tip, a source of light is provided. Light from the light source will be transmitted down the length of the syringe tip and emitted from the end thereof. By positioning the end of the syringe tip in the patient's oral cavity, the dentist can provide illumination in the oral cavity so that various dental functions can be more easily and accurately performed.

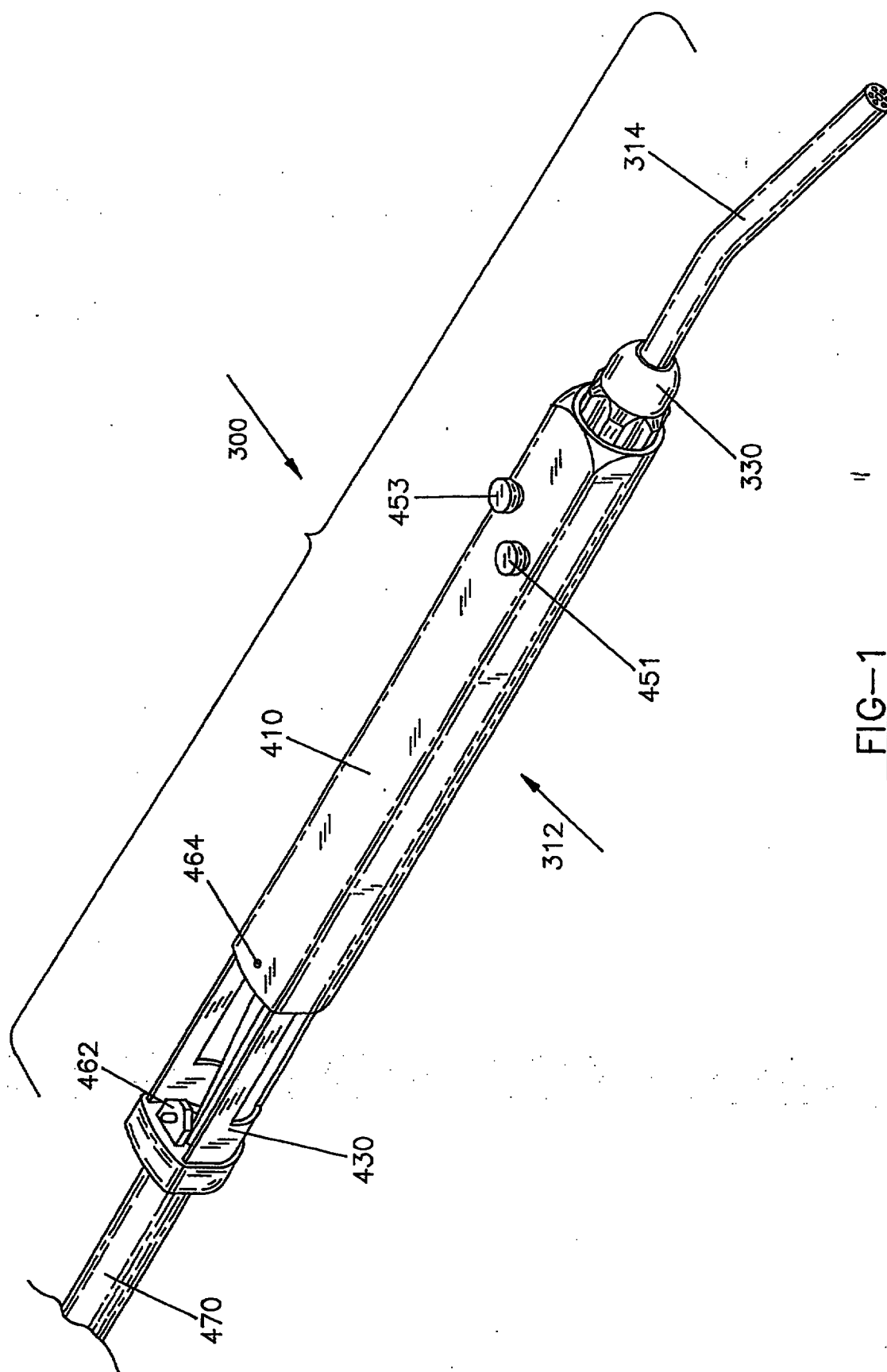
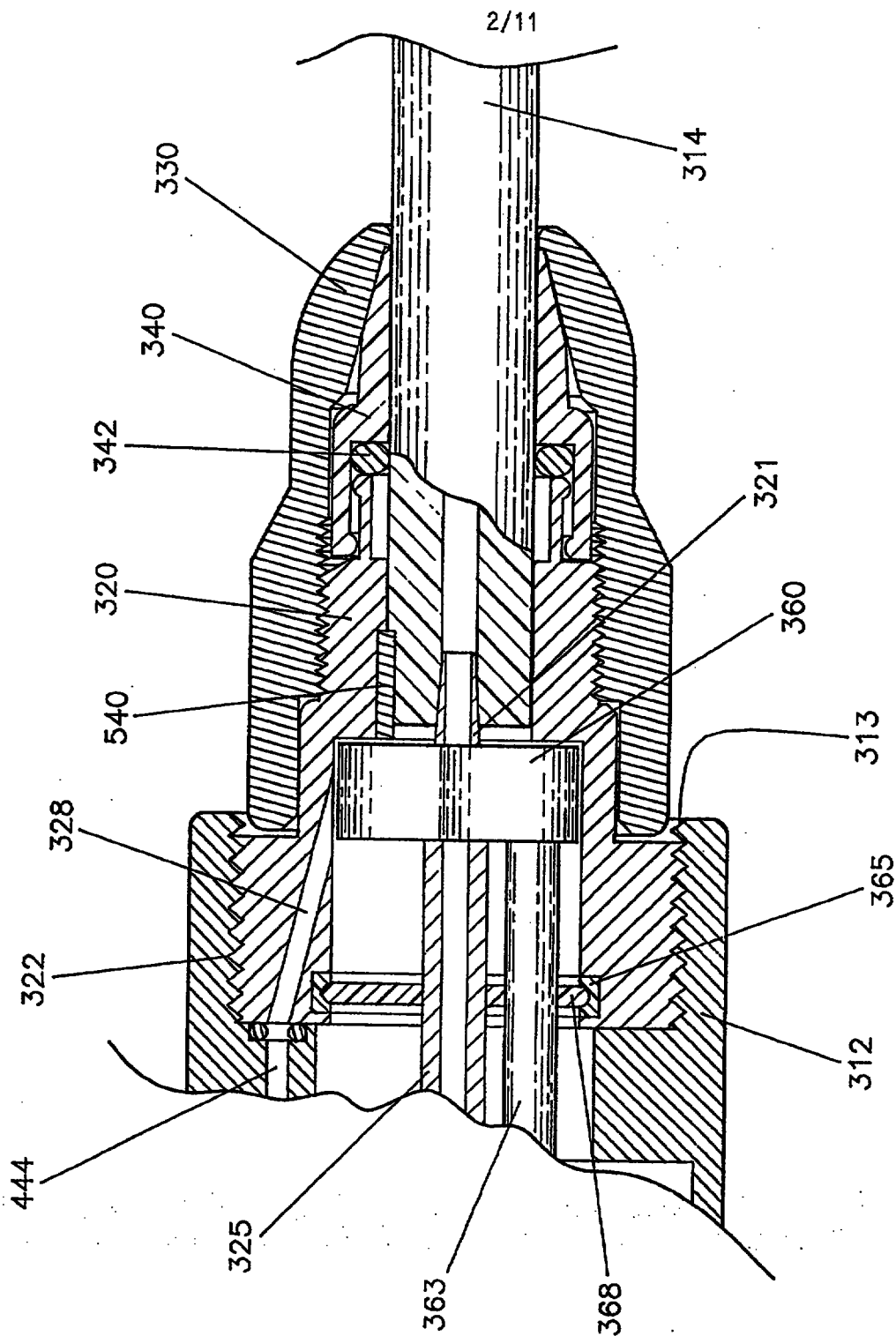
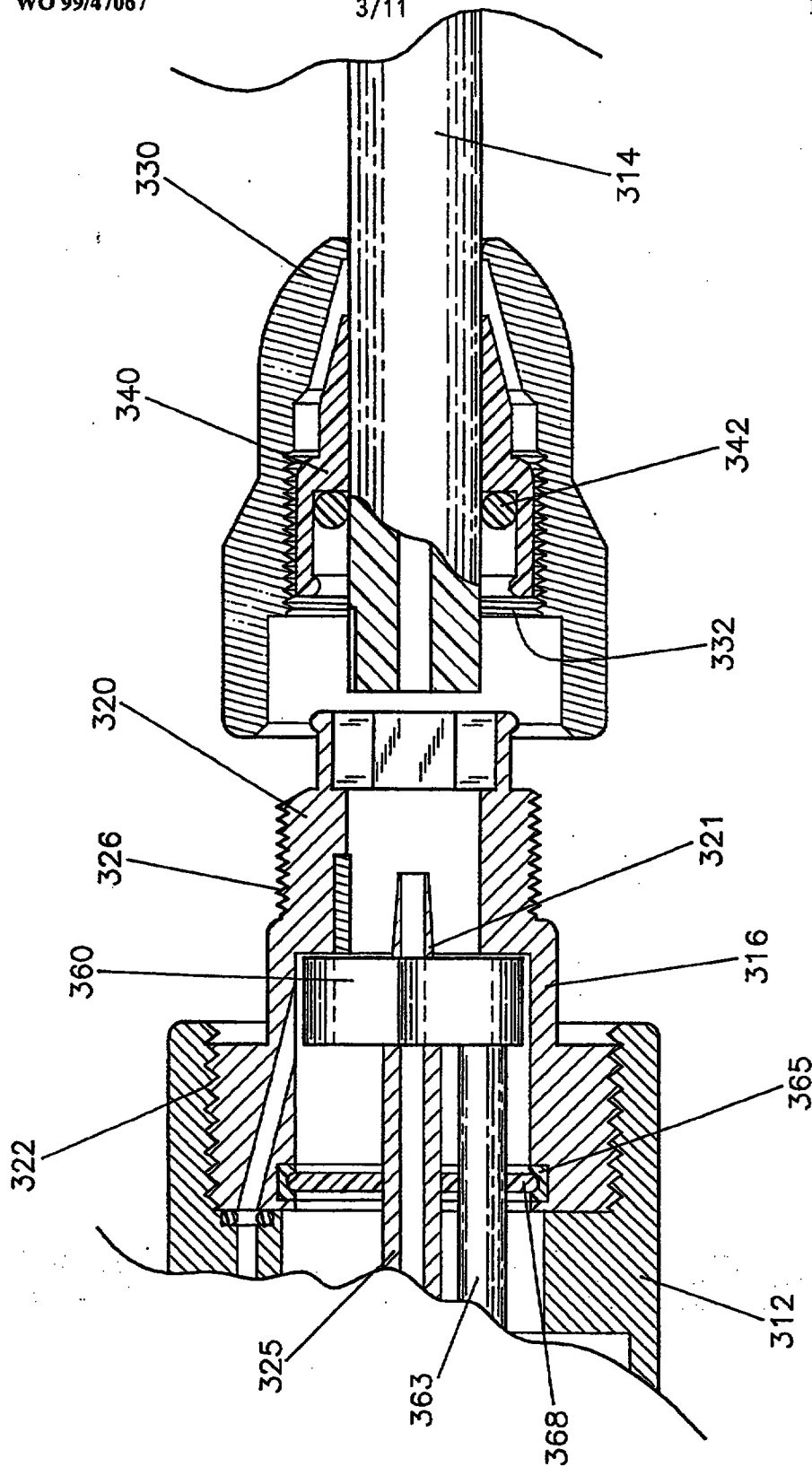


FIG-1





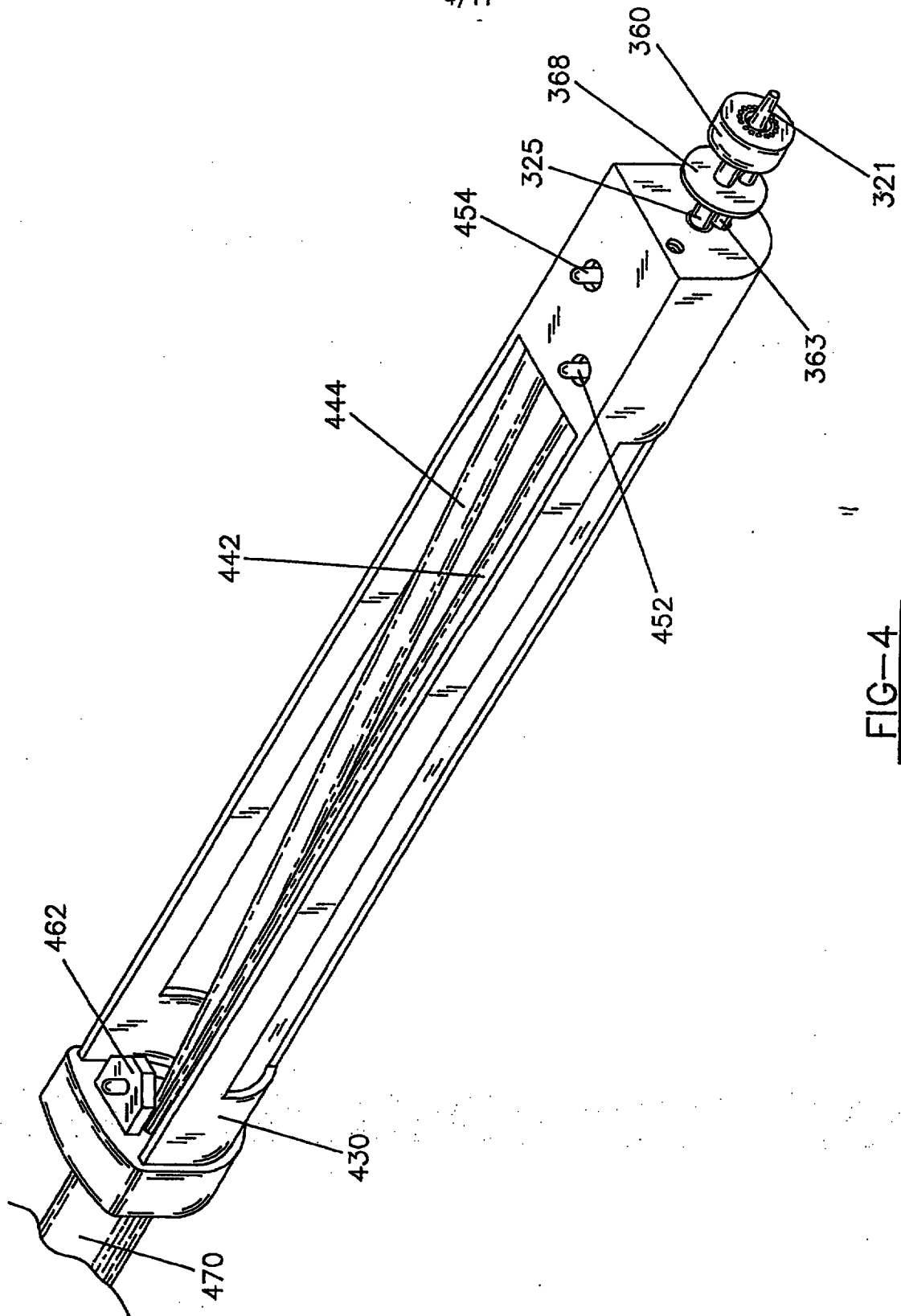


FIG-4

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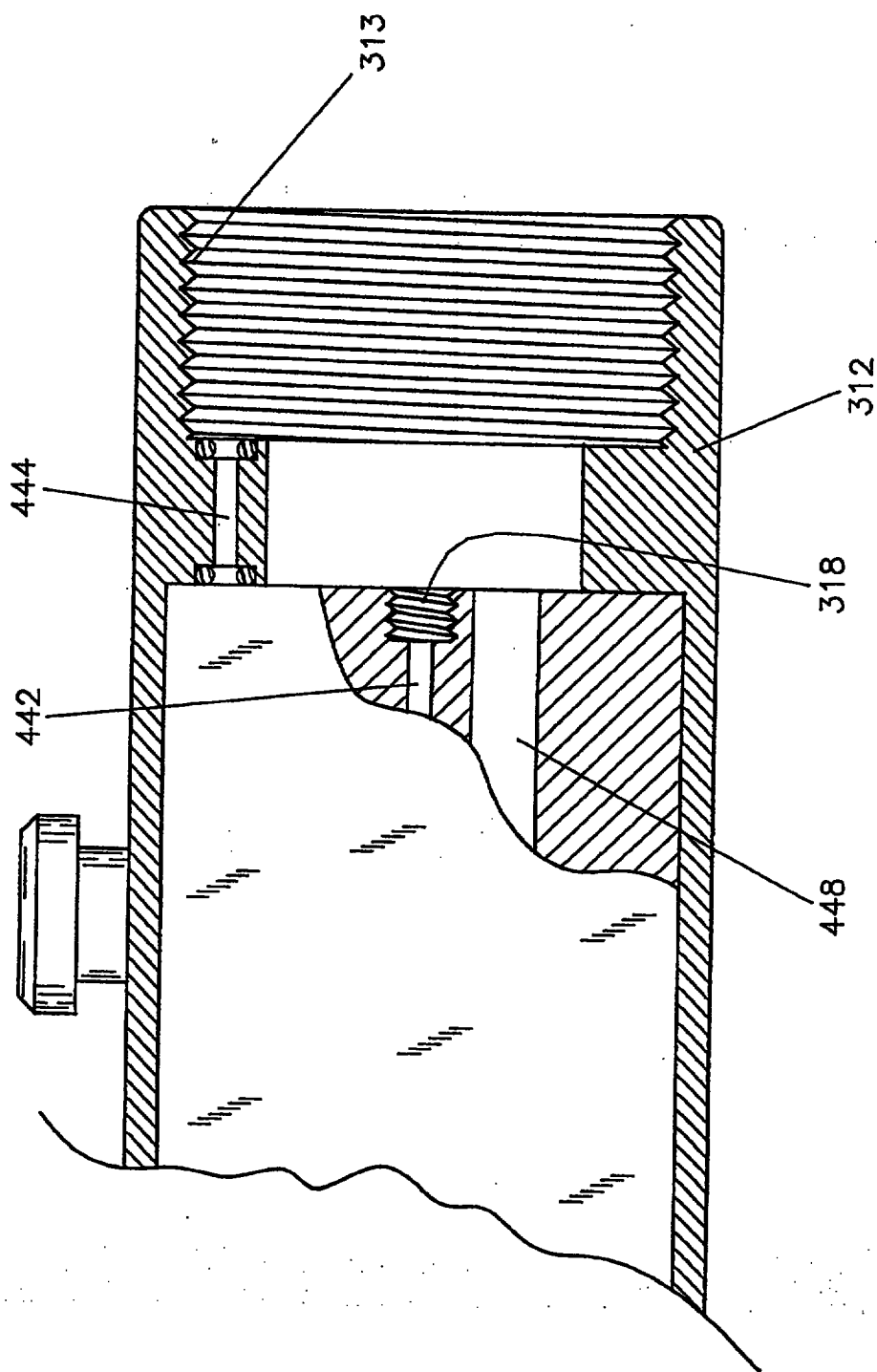


FIG-5

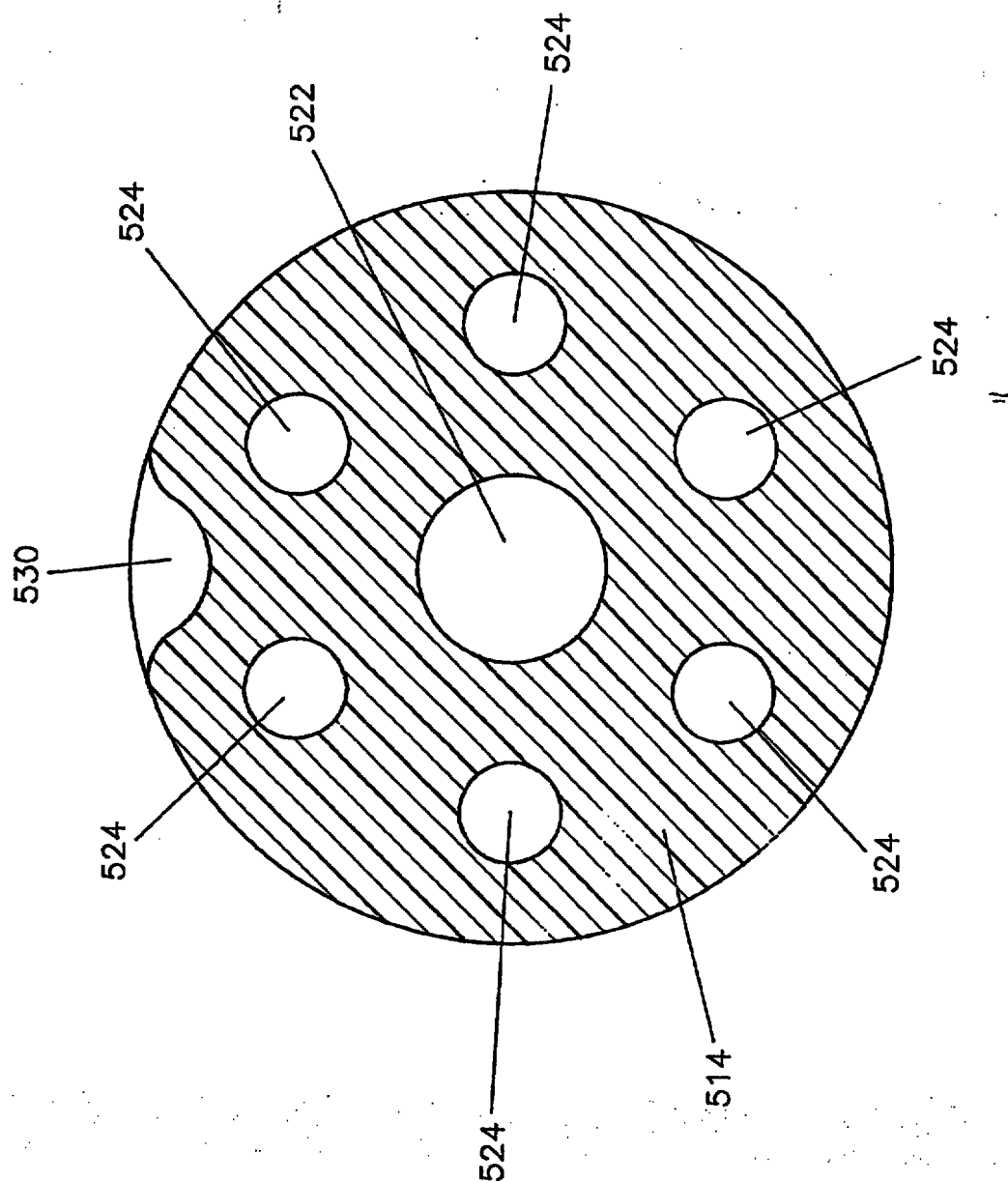
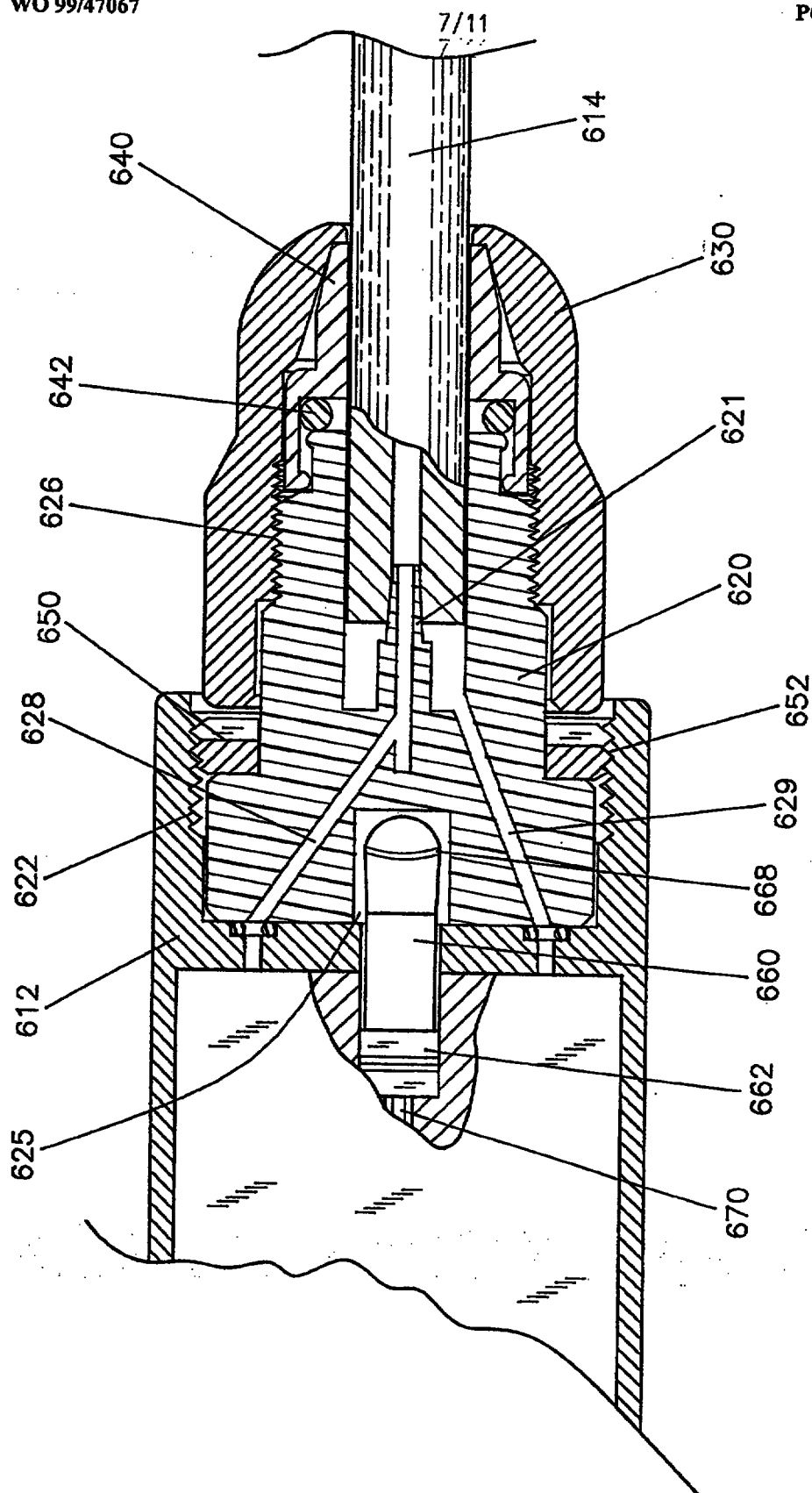
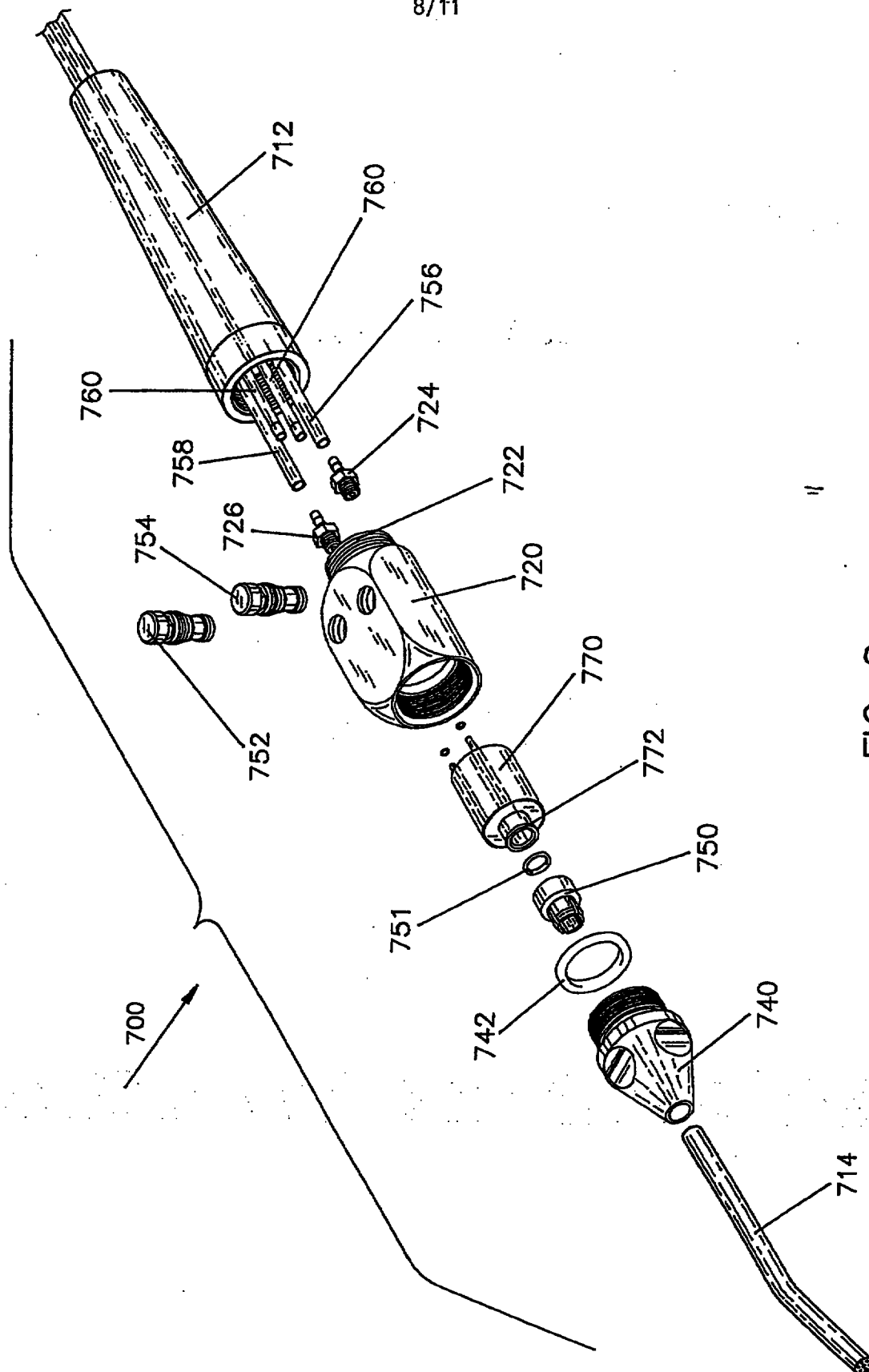


FIG-6





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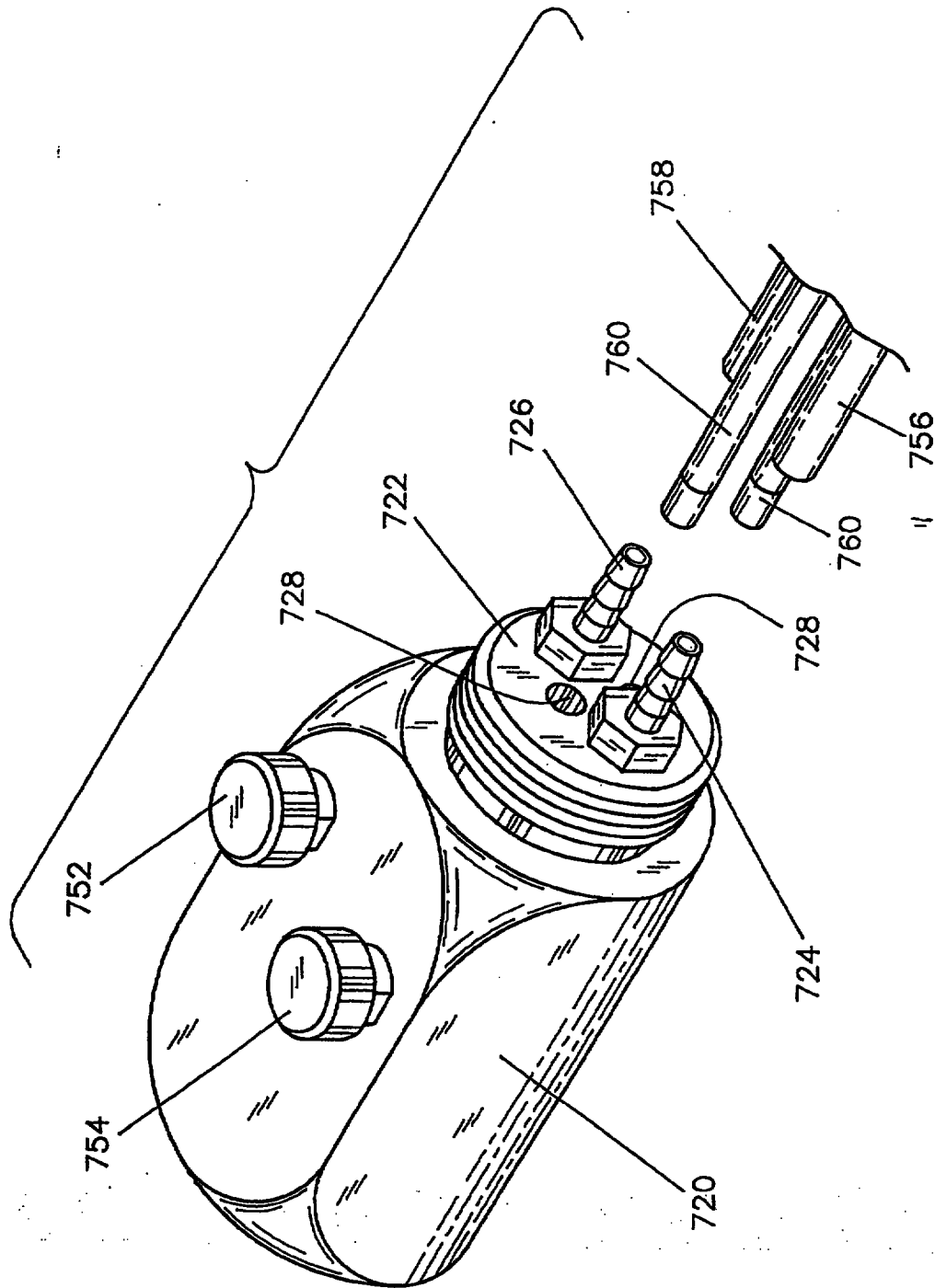


FIG-9

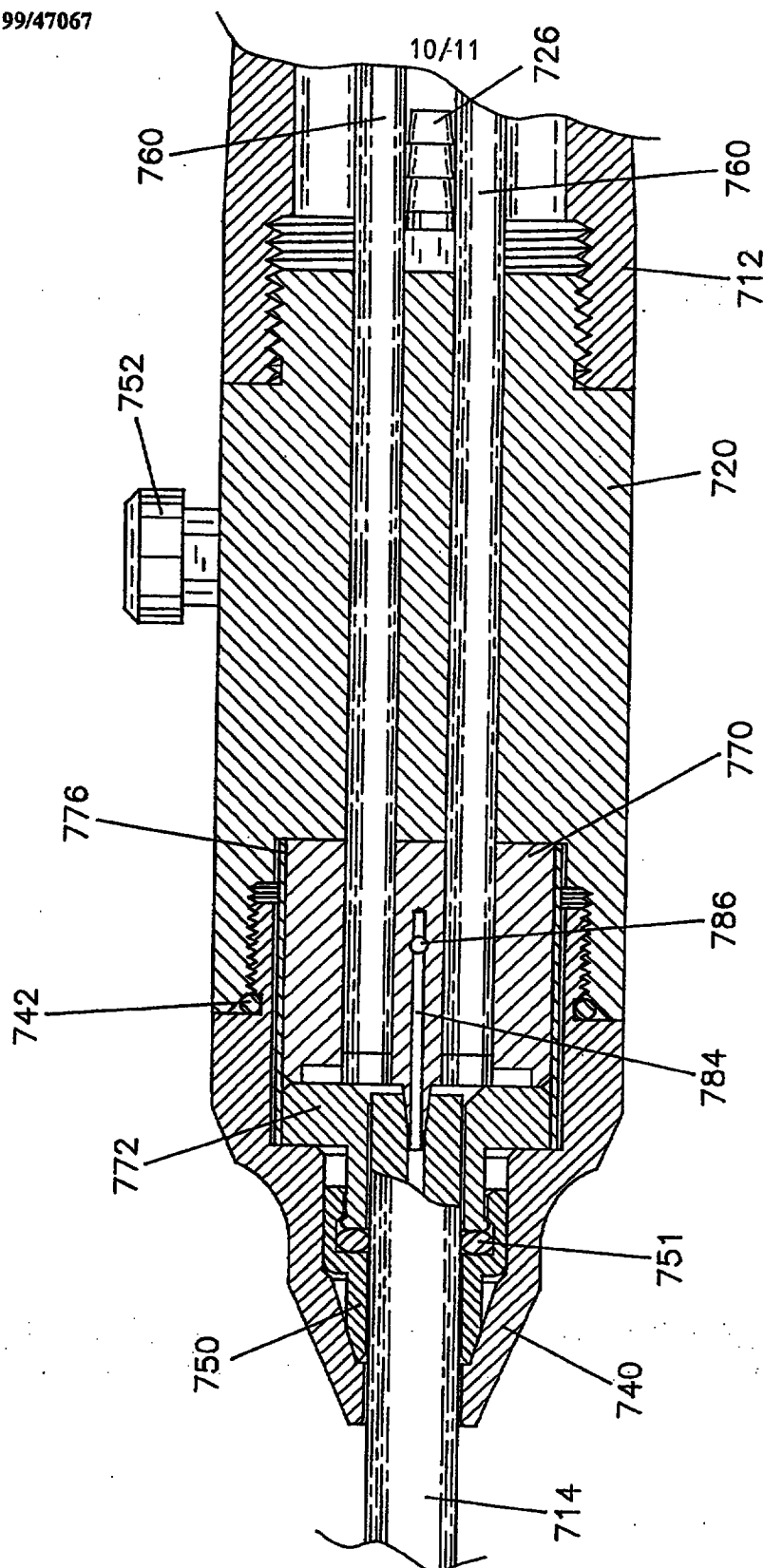


FIG-10

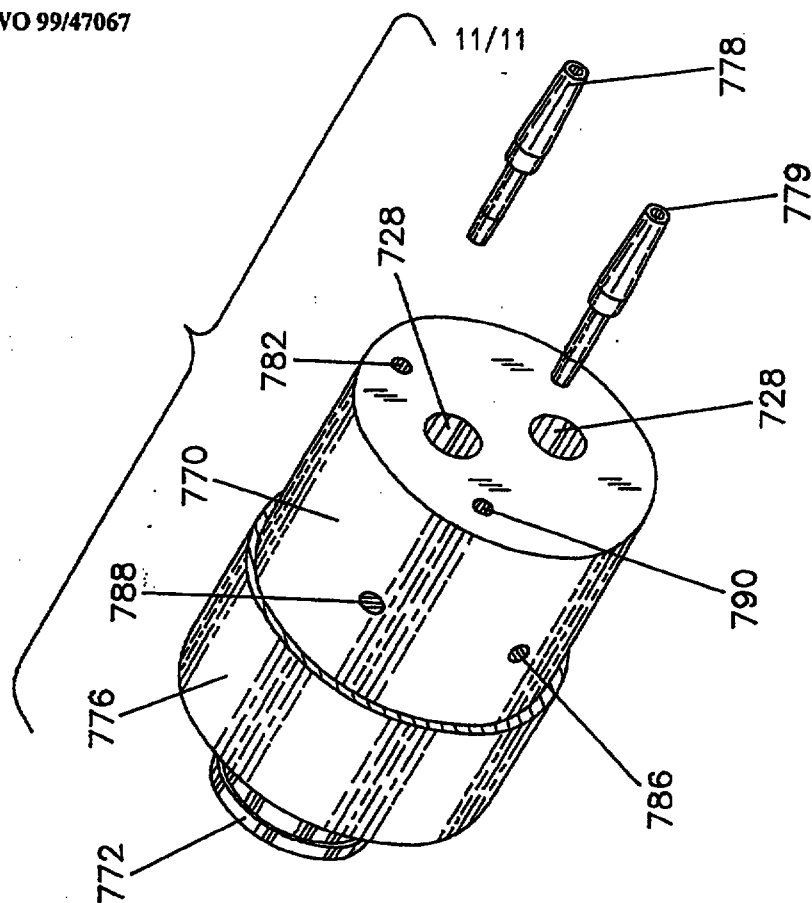


FIG-11

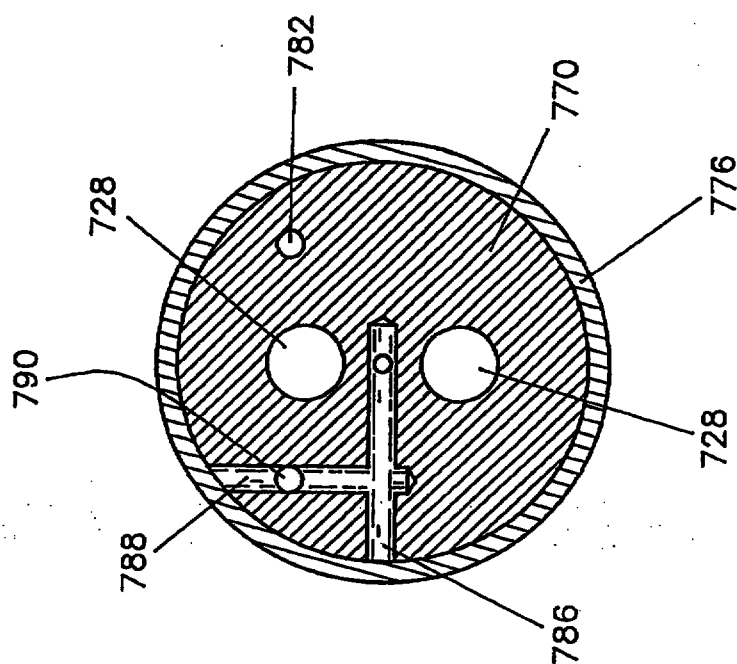


FIG-12