

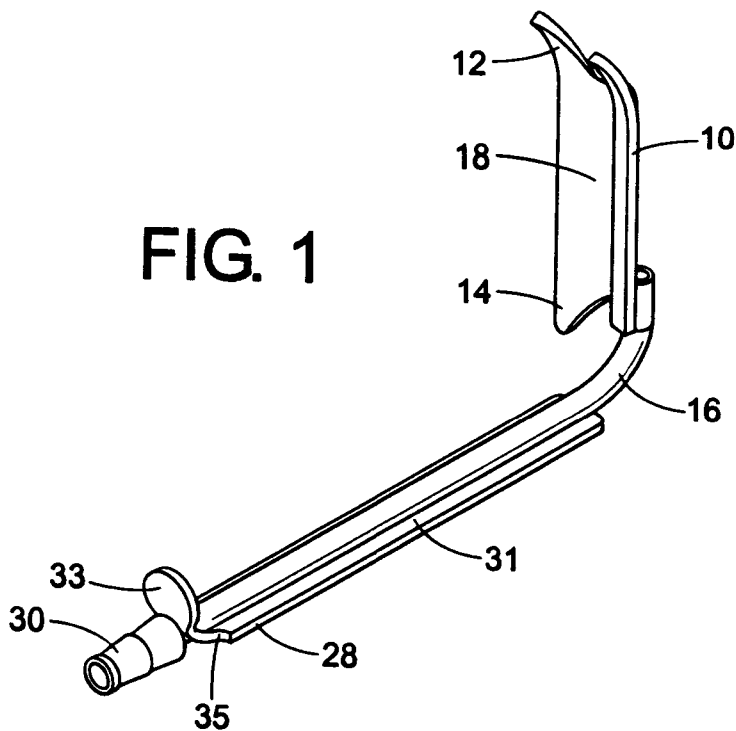


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(54) Title: SUCTION DEVICE FOR EVACUATING FUMES



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(57) Abstract: A suction device for evacuating fumes includes a tongue depressor having a pair of opposed walls; at least one suction tube connected to the tongue depressor; an elongated support member to which the suction tube is connected; and a connecting member attached to an end of the suction tube for connecting the suction tube to a suction generating device. A light such as a fiber optic light can be added to the suction device. The tongue depressor, suction tube and elongated support member can be made of one piece.

SUCTION DEVICE FOR EVACUATING FUMES

CLAIM OF PRIORITY

[0001] This application claims priority from Provisional Application Serial No. 61/364,499 filed on July 15, 2010, which is hereby entirely incorporated by reference.

BACKGROUND OF THE DISCLOSURE

[0002] The disclosure relates generally to the field of surgical instrumentation and more particularly, to a suction device to be used with a tongue blade device for evacuating cauterization tissue and fumes from a patient's mouth during oral laser surgery.

[0003] Electrocautery devices and surgical lasers are typically used for cutting or ablating tissues in various confined body cavities. For example, in the surgical treatment of snoring, the surgeon performs a vertical resection of the soft palate on both sides of the uvula, sparing the uvula itself, with further ablation with the laser of the lateral and inferior sides of the uvula to create a "new uvula" that is higher and smaller (uvulopalatoplasty). Electrocautery devices and surgical lasers are also used for reshaping or removing the tonsils (tonsillectomy), and for removing or reshaping posterior parts of the tongue (glossectomy).

[0004] During such applications of electrocautery devices and surgical lasers, it is desirable and necessary that the work area be maintained as free from smoke and vaporized tissue as possible. A tongue blade evacuation system can be provided as shown in U.S. Patent No. 5,460,626, which is hereby incorporated by reference. It is also necessary that the patient's tongue be kept away from the working area. These requirements are necessary to provide a clear view of the working area for the surgeon.

[0005] While existing pharyngeal handpieces remove some of the smoke and vaporized tissue during laser application, they do not remove it rapidly enough to keep the area fully visible for the doctor or to prevent contamination of the lens.

Additionally, while existing tongue depressors prevent the patient's tongue from interfering with the operation, they occupy one of the surgeon's hands while not effectively assisting with removal of fumes and tissue during surgery. Further, while the foregoing problems are particularly troublesome with respect to the above described applications for surgical lasers, they are also present to some degree in many other applications of surgical lasers.

[0006] In a preferred embodiment, the device is a tongue blade used with a McIvor mouthgag. The device is used intraoperatively to retract the tongue and mandible and open the mouth for surgeries involving the oral cavity/oropharynx. The device is preferably a one-piece surgical stainless steel unit with a built-in suction tube to evacuate any anesthetic gases or noxious/dangerous fumes or plumes generated by electrocautery, or other similar devices. This serves as a protective feature to help ensure the safety of the Operating Room Staff and the patient. It can also be used to oxygenate or jet ventilate a patient intraoperatively by passing oxygen through the suction passage down into the oral cavity/oropharynx. There can be two other variations of the device: a high impact plastic model that is disposable, and a stainless steel model with a removable, disposable suction tubing.

[0007] It is accordingly an object of the present disclosure to provide a tongue blade suction device for eliminating or reducing the foregoing problems during surgical applications while providing better overall results.

SUMMARY OF THE DISCLOSURE

[0008] The disclosure relates to an apparatus for removing noxious fumes. In particular, it relates to an apparatus for and a method of removing noxious fumes, plumes generated by electrocautery, smoke and vaporized tissue from a patient's mouth and controlling a patient's tongue through the use of a one-piece tongue blade coupled with a suction device to form a single unit which can be used in and during surgical applications. Specifically, the disclosure includes a tongue blade coupled with a suction device.

[0009] In accordance with one aspect of the disclosure, a suction device for evacuating fumes has a tongue depressor including a pair of opposed walls; a

suction tube connected to the tongue depressor; an elongated support member to which the suction tube is connected; and a connecting member attached to an end of the suction tube for connecting the suction tube to a suction generating device.

[0010] It is another object of the disclosure to provide a more efficient system for controlling a patient's tongue and for removing noxious fumes, smoke and vaporized tissue or plumes generated by electrocautery from a patient's mouth during surgery.

[0011] It is another object of the disclosure to provide a device combining a tongue blade and suction device as a single tool to increase the rate of noxious fumes, smoke and vaporized tissue evacuation from a patient's mouth during surgery.

[0012] It is still another object of the disclosure to provide a method of controlling a patient's tongue and evacuating noxious fumes, plumes generated by electrocautery, smoke and vaporized tissue from a patient's mouth during surgery.

[0013] It is another object of the device to provide a removable and disposable suction tube.

[0014] It is still another object of the disclosure to provide a one-piece tongue blade and suction device made of disposable plastic.

[0015] It is another object of the disclosure to provide a suction tube and fiber optic light and two receiving rings on the tongue blade for retaining the tube and light.

[0016] Still other objects of the disclosure will become apparent upon a reading and understanding of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] For a fuller understanding of the nature and objects of the disclosure, reference should be made to the following detailed description and accompanying drawings, in which:

[0018] FIG. 1 is a perspective view of a tongue blade with a suction device in accordance with a preferred embodiment of the invention;

[0019] FIG. 1A illustrates an exploded view of a tongue blade with a suction device in accordance with the disclosure;

- [0020] FIG. 1B is another perspective view of the tongue blade and suction device of FIG. 1;
- [0021] FIG. 1C is a detail view of FIG. 1B;
- [0022] FIG. 2 is a perspective view of a tongue blade with a suction device in accordance with another embodiment of the disclosure;
- [0023] FIG. 2A is a side elevational view of the tongue blade of FIG. 2;
- [0024] FIG. 2B is a rear elevational view of the tongue blade of FIG. 2;
- [0025] FIG. 3 is a perspective view of the tongue blade and suction device of FIG. 2 with a suction tube attached;
- [0026] FIG. 4 is a perspective view of a one-piece tongue blade and suction device in accordance with another aspect of the disclosure;
- [0027] FIG. 5 is a side elevational view of a tongue blade and suction device with gripping members formed thereon;
- [0028] FIG. 6A is a side elevational view of another embodiment of the disclosure with a suction tube and a fiber optic light;
- [0029] FIG. 6B is a front elevational view of the device of FIG. 6A;
- [0030] FIG. 6C is a rear perspective view of the device of FIG. 6A;
- [0031] FIG. 7A is a rear elevational view of another embodiment of the disclosure with a suction tube receiving member and a fiber optic light receiving member;
- [0032] FIG. 7B is a side elevational view of the device of FIG. 7A; and
- [0033] FIG. 7C is a rear perspective view of the device of FIG. 7A.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0034] FIGS. 1-1C show illustrations of a preferred embodiment of the disclosure including a tongue blade 10 having a distal end 12 for inserting into a patient's mouth during a surgical application and a proximal end 14 coupled in fluid communication with a hollow tube 16. The tongue blade has a curved or rounded shape body 18 which acts as a tongue depressor and rests on the patient's tongue. The distal end 12 has a fork or U-shaped appearance formed by two protrusions 22, 24 (FIG. 1B) extending therefrom which form a channel or opening 26. Protrusions 22, 24 extend or curve upwardly as seen in FIG. 1B.

[0035] A disposable hollow plastic or rubber suction tube 16 is connected to an elongated spine 28 which is in communication with a barb or hollow connector 30. The spine is preferably formed from stainless steel or any other suitable material. The spine has a first elongated portion 31 and a shorter portion 33 which extends at about 90 degrees from end 35 of portion 31. Portion 33 has an opening 32 for receiving the tube 16 therethrough. Further, in the embodiment illustrated in FIG. 1C, the suction tube 16 has a receiving outlet member 34 having an opening 36 formed therethrough located adjacent to the proximal end 14 of the blade for removing anesthetic gases, noxious fumes, smoke, vaporized tissue, plumes generated by electrocautery and other debris from a patient's mouth during use in surgery.

[0036] When in use, smoke, plumes generated by electrocautery, noxious fumes and vaporized tissue removal is effectuated by attaching barb or connector 30 to any pneumatic device (not shown) typical of the art which causes a suction effect from the tongue blade.

[0037] While the surgical application is taking place, the spine 28, which is manually held in one of the doctor's hands, is held near the patient's mouth directing the suction tube 16 into the patient's mouth which removes smoke, fumes, plumes generated by electrocautery, and vaporized tissue from the patient's mouth using opening 36 (FIG. 1B). Meanwhile, the tongue blade 10, which is connected to the tube, is in the patient's mouth controlling the patient's tongue, thus preventing the tongue from obstructing the application of the suction tube and removing smoke and vaporized tissue at the same time. The tongue blade suction tube 16 evacuates the smoke, fumes, plumes generated by electrocautery, and vaporized tissue by sucking it through the receiving port or opening 36, through tube 16, and out through any well known pneumatic or other suction causing device (not shown), attached to the tube barb 30.

[0038] In a preferred embodiment, the device is a tongue blade 10 used with a McIvor mouthgag. The device is used intraoperatively to retract the tongue and mandible and open the mouth for surgeries involving the oral cavity/oropharynx. The device 10 is preferably a one-piece surgical stainless steel tongue blade with a

built-in suction tube 16 to evacuate any noxious/dangerous fumes or plumes generated by electrocautery, or other similar devices. This serves as a protective feature to help ensure the safety of the Operating Room Staff as well as the patient.

[0039] Alternatively, the tongue blade and suction device can also be used to oxygenate or jet ventilate a patient intraoperatively by passing oxygen through the suction tube 16 down into the oral cavity/oropharynx through opening 36.

[0040] FIGS. 2-2B and 3 show illustrations of an alternate embodiment of the disclosure including a tongue blade 50 having a distal end 52 for inserting into a patient's mouth during a surgical application and a proximal end 54 coupled with a hollow tube receiving member 56 and an elongated support member or spine 70 via a curved connector 71. A substantially U-shaped opening 55 is formed near end 54. The tongue blade has a curved or rounded shape body 58 which acts as a tongue depressor and rests on the patient's tongue. The distal end 52 has a fork or U-shaped appearance formed by two protrusions or walls 60, 62 extending therefrom which form a rounded or curved channel 64 having opening 66. Walls 60, 62 curve upwardly as seen in FIG. 2A. A hollow disposable suction tube 70 is connected to elongated spine 72 and is in fluid communication with hollow connector or receiving member 56. The spine has a pair of cylindrical shaped members 74, 76 having openings 78, 80 formed therein for receiving the tube 70 therein. Further, in the embodiment illustrated in FIG. 2, the suction tube receiving outlet member 56 has an opening 86 located adjacent to the proximal end 54 of the blade for removing noxious fumes, smoke, vaporized tissue, plumes generated by electrocautery and other debris from a patient's mouth during use in surgery. Spine 72 also has a wall 88 extending from end 90 which has an opening 92 therethrough for receiving tube 70. Wall 88 is bent at approximately 90 degrees with respect to spine 72. On a rear side 94 of the spine are formed a plurality of gripping notches or knurl recesses 96 which provide an ergonomic manual grip for the user to grip and hold the spine. Alternatively, referring to FIG. 5, gripping members, protrusions or extensions 98 can be provided to also provide an ergonomic grip.

[0041] When in use, smoke, plumes generated by electrocautery, noxious fumes and vaporized tissue removal is effectuated by attaching barb or connector 93 (FIG.

3) to a pneumatic device typical of the art which causes a suction effect from the tongue blade.

[0042] While the surgical application is taking place, the spine 72, which is held in one of the doctor's hands, is held near the patient's mouth directing the suction tube 70 in the patient's mouth and removing smoke, fumes, plumes generated by electrocautery, and vaporized tissue via opening 86. The tongue blade 50, which is connected to the tube, is in the patient's mouth controlling the patient's tongue, thus preventing it from obstructing the application and removing smoke and vaporized tissue at the same time. The tongue blade suction tube 70 meanwhile evacuates the smoke, fumes, plumes generated by electrocautery, and vaporized tissue by sucking it through the receiving port or opening 86, through tube 70, and out through the pneumatic or other suction causing device (not shown) attached to barb 93. After use, the suction tube 70 can be removed and discarded. The spine 72 can be sanitized and reused with a new suction tube.

[0043] Another variation of the disclosure is a one-piece unit which is fabricated from a high impact plastic that is disposable.

[0044] FIG. 4 shows an illustration of an alternate embodiment of the disclosure for a one-piece disposable tongue blade and suction device which can be fabricated of thermoplastic or any other suitable material. That is, the device can be used with one patient for a one-time use and then discarded or disposed. The device includes a tongue blade 100 having a distal end 102 for inserting into a patient's mouth during a surgical application and a proximal end 104 coupled in fluid communication with a hollow tube 106 integrally formed with the tongue blade. The tongue blade has a curved or rounded shape body 108 which acts as a tongue depressor and rests on the patient's tongue. The distal end 102 has a fork or U-shaped appearance formed by two protrusions 110, 112 extending therefrom and curved upwardly which form a channel or opening 116 therebetween. The hollow tube 106 extends from an elongated spine 118. The suction tube 106 has an opening 120 located adjacent to the proximal end 104 of the blade for removing noxious fumes, smoke, vaporized tissue, plumes generated by electrocautery and other debris from a patient's mouth during use in surgery.

[0045] When in use, smoke, plumes generated by electrocautery, noxious fumes and vaporized tissue removal is effectuated by attaching connector end 122 of tube 106 to a pneumatic device typical of the art which causes a suction effect from the tongue blade.

[0046] While the surgical application is taking place, the spine 118, which is manually held in one of the doctor's hands, is held near the patient's mouth directing the suction tube 106 in the patient's mouth and removing smoke, fumes, plumes generated by electrocautery, and vaporized tissue via opening 120. Meanwhile, the tongue blade 100, which is connected to the tube, is in the patient's mouth controlling the patient's tongue, thus preventing it from obstructing the application and removing smoke and vaporized tissue at the same time. The tongue blade suction tube 106 meanwhile evacuates the smoke, fumes, plumes generated by electrocautery, and vaporized tissue by sucking it through the receiving port or opening 120, through tube 106, and out through any well known device the pneumatic or other suction causing device (not shown), attached to the tube barb 122.

[0047] Referring now to FIGS. 6A-6C, another alternate embodiment of the suction device is shown. The device is preferably used with a Dingman mouthgag such as used in plastic surgery. A fiber optic light also can be added to the device. This device can be one-piece and disposable as well.

[0048] FIGS. 6A-6C show illustrations of an alternate embodiment of the disclosure including a tongue blade 140 having a distal end 142 for inserting into a patient's mouth during a surgical application and a proximal end 144 coupled with a hollow tube receiving members 146 and a ring or receiving member 147 for connecting a light such as a fiber optic light 180 and an elongated support member or spine 148. A substantially U-shaped opening 152 is formed in blade 140. The tongue blade has a curved or rounded shape body 156 which acts as a tongue depressor and rests on the patient's tongue. The U-shaped appearance is formed by two protrusions or walls 160, 162 extending therefrom which form a rounded or curved channel 164. Walls 160, 162 curve upwardly as seen in FIG. 6A. Hollow disposable suction tube 170 is connected to elongated spine 148 and is in fluid

communication with hollow connector or receiving member 147. Further, in the embodiment illustrated in FIG. 6C, the ring or receiving outlet member 146 accommodates a light such as a fiber optic light 180 extending therefrom. Fiber optic light 180 can be attached via ring 146 for illuminating the patient's mouth. A connecting wire 182 extends from the light to an external power source (not shown).

[0049] Tube 170 is located adjacent to the proximal end 142 of the blade for removing anesthetic gases, noxious fumes, smoke, vaporized tissue, plumes generated by electrocautery and other debris from a patient's mouth during use in surgery. Spine 148 also has a wall 184 extending from end 186 which has an opening 188 therethrough for receiving tube 170. Wall 184 is bent at approximately 90 degrees with respect to spine 148. On a rear side 190 of the spine are formed a plurality of gripping notches or knurl recesses 192 which provide an ergonomic manual grip for the user to grip and hold the spine. Alternatively, gripping members, protrusions or extensions can also be provided to also provide an ergonomic grip.

[0050] When in use, smoke, plumes generated by electrocautery, noxious fumes and vaporized tissue removal is effectuated by attaching barb or connector 194 to a pneumatic device typical of the art which causes a suction effect from the tongue blade.

[0051] Referring now to FIGS. 7A-7C, another alternate embodiment of the suction device is shown.

[0052] FIGS. 7A-7C show illustrations of an alternate embodiment of the disclosure including a tongue blade 200 having a distal end 202 for inserting into a patient's mouth during a surgical application and a proximal end 204 coupled with a pair of hollow tube receiving members 206, 208 and an elongated support member or spine 210 via a curved connector 212. A substantially U-shaped opening 214 is formed in blade 200. The tongue blade has a curved or rounded shape body 216 which acts as a tongue depressor and rests on the patient's tongue. The distal end 202 has a fork or U-shaped appearance formed by two protrusions or walls 218, 220 extending therefrom which form a rounded or curved channel 224 having opening 214. Walls 218, 220 curve upwardly as seen in FIG. 7B. A hollow disposable suction tube is connected to elongated spine 40 and is in fluid communication with

one of hollow connector or receiving members 206, 208, such as shown in FIGS. 6A-6C. Further, in the embodiment illustrated in FIGS. 7A-7C, the suction tube receiving outlet members 206, 208 have openings 225, 226 located adjacent to the proximal end 204 of the blade for removing anesthetic gases, noxious fumes, smoke, vaporized tissue, plumes generated by electrocautery and other debris from a patient's mouth during use in surgery. One of the members 206, 208 can also accommodate a light such as a fiber optic light as shown in the embodiment of FIGS. 6A-6C. The spine also has a wall 228 extending from end 230 which has an opening 232 therethrough for receiving portions of suction tubes or fiber optic lights therein. Wall 228 is bent at approximately 90 degrees with respect to the spine. On a rear side 233 of the spine are formed a plurality of gripping notches or knurl recesses 234 which provide an ergonomic manual grip for the user to grip and hold the spine. Alternatively, gripping members, protrusions or extensions can be provided to also provide an ergonomic grip. Rings or receiving members 236 and 238 are formed on a first side 240 of wall 210 to accommodate or retain a suction tube or a fiber optic light.

[0053] When in use, smoke, plumes generated by electrocautery, noxious fumes and vaporized tissue removal is effectuated by attaching barb or connector 93 (FIG. 3) to a pneumatic device typical of the art which causes a suction effect from the tongue blade.

[0054] The exemplary embodiment has been described with reference to the preferred embodiments. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the exemplary embodiment and the appended claims be construed as including all such modifications and alterations.

CLAIMS:

1. A suction device for evacuating fumes, comprising:
a tongue depressor comprising a pair of opposed walls;
at least one suction tube connected at a first end to said tongue depressor;
an elongated support member to which a second end of said suction tube is connected; and
a connecting member attached to said suction tube for connecting said suction tube to an associated suction generating device.
2. The device of claim 1, wherein said tongue depressor comprises a body having a curved configuration.
3. The device of claim 1, wherein said pair of opposed walls form a substantially U-shaped channel.
4. The device of claim 3, wherein said opposed walls curve upwardly.
5. The suction device of claim 1, wherein said suction tube is made from flexible plastic.
6. The suction device of claim 5, wherein said suction tube is removable from said suction device and is disposable.
7. The suction device of claim 1, wherein said elongated support member comprises a spine.
8. The suction device of claim 7, wherein said spine is made from stainless steel.
9. The suction device of claim 1, wherein said elongated support member comprises an opening for receiving a second end of said suction tube.

10. The suction device of claim 2, wherein said body of said tongue depressor comprises a proximal end and a distal end.
11. The suction device of claim 10, wherein said suction tube comprises an opening located adjacent said proximal end of said body.
12. The suction device of claim 1, wherein said elongated support member comprises a first portion and a second portion approximately perpendicular to said first portion.
13. The suction device of claim 1, wherein said tongue depressor, said suction tube, and said elongated support member are fabricated as one-piece.
14. The suction device of claim 13, wherein said tongue depressor, said suction tube and said elongated member are made of plastic.
15. The suction device of claim 1, wherein said elongated support member comprises at least one retaining member for securing said suction tube to said elongated support member.
16. The suction device of claim 1, wherein said elongated support member comprises a pair of retaining members for securing said suction tube to said elongated member.
17. The suction device of claim 15, wherein said elongated support member comprises a plurality of gripping notches for facilitating gripping of said support member.
18. The suction device of claim 15, wherein said elongated support member comprises a plurality of gripping members for facilitating gripping of said support member.
19. The suction device of claim 1, wherein said tongue depressor comprises a first retaining member for retaining said suction tube.

20. The suction device of claim 19, wherein said tongue depressor comprises a second retaining member for retaining a light.

21. The suction device of claim 20, wherein said light comprises a fiber optic light.

22. The suction device of claim 19, wherein said first retaining member comprises a ring.

23. The suction device of claim 20, wherein said second retaining member comprises a ring.

24. The suction device of claim 20, wherein said elongated support member comprises a pair of retaining members for securing said light to said elongated member.

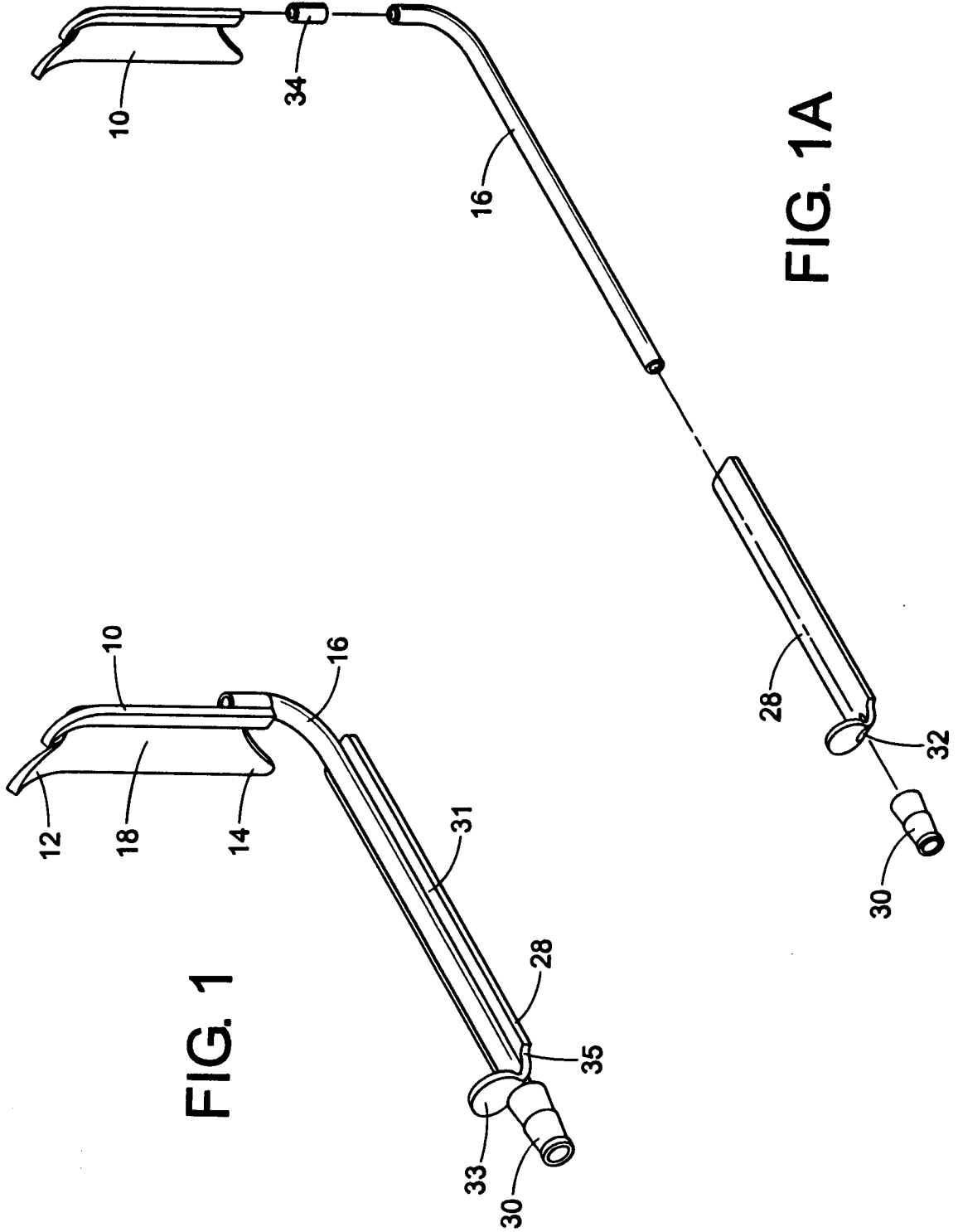
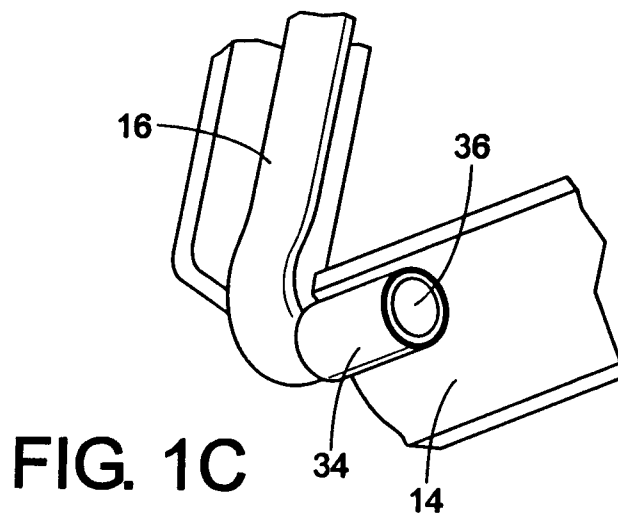
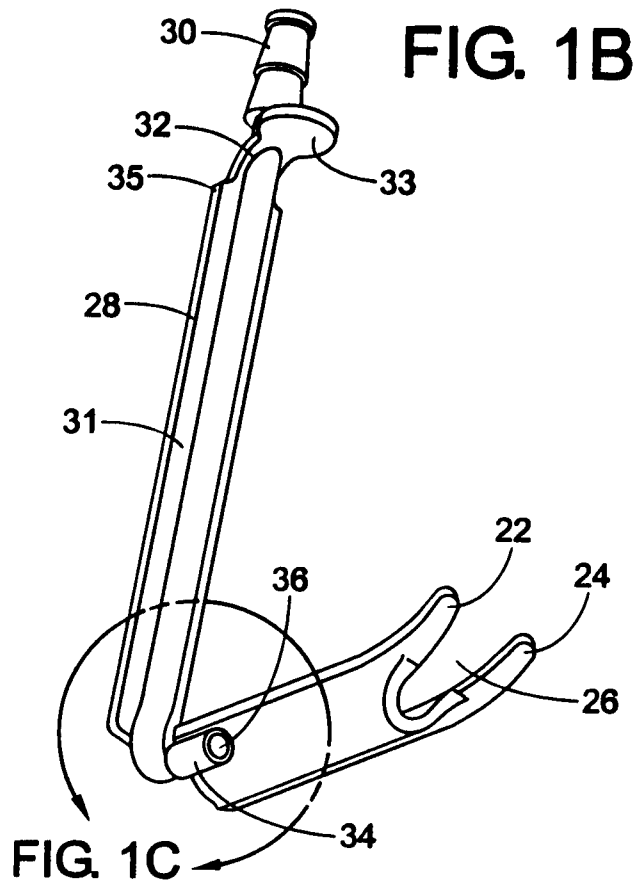


FIG. 1

FIG. 1A



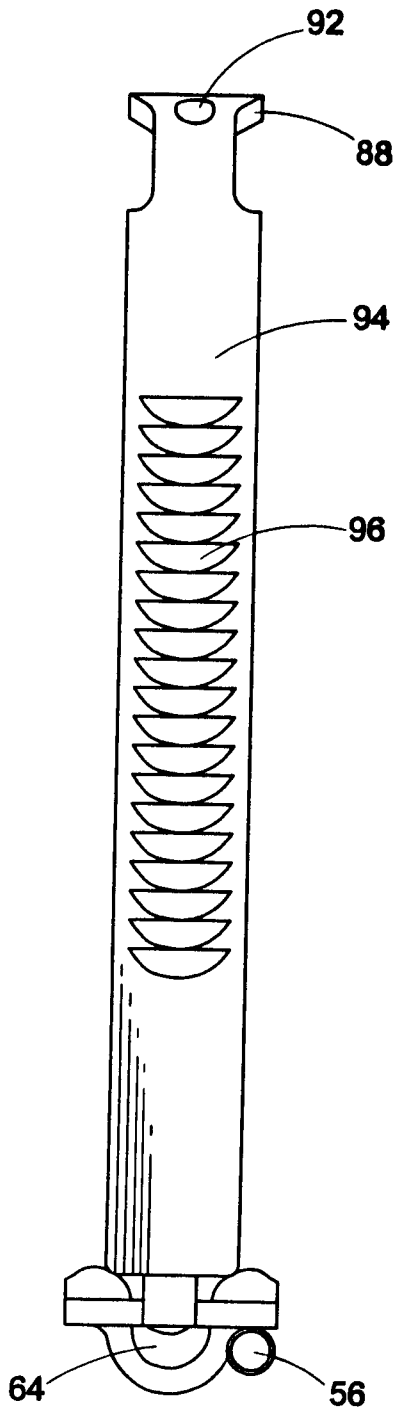


FIG. 2B

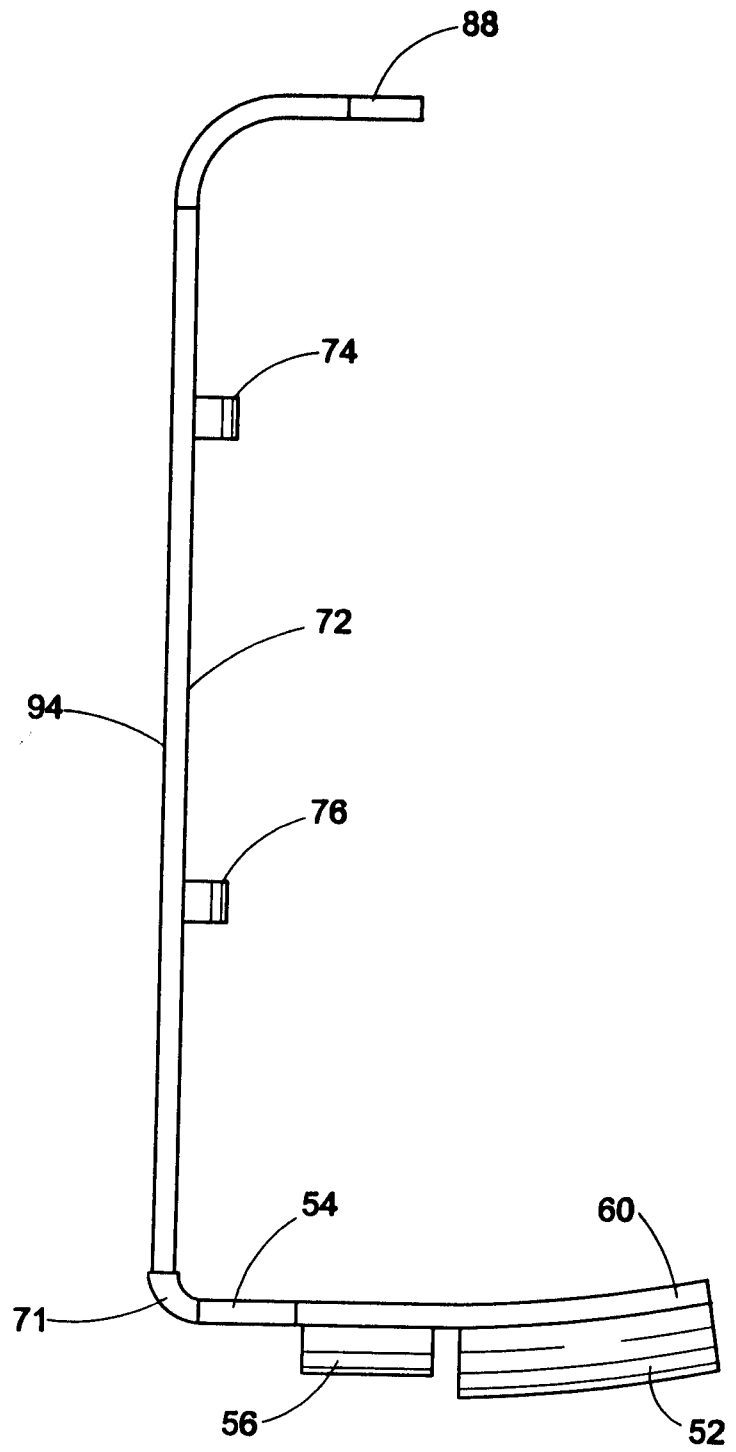


FIG. 2A

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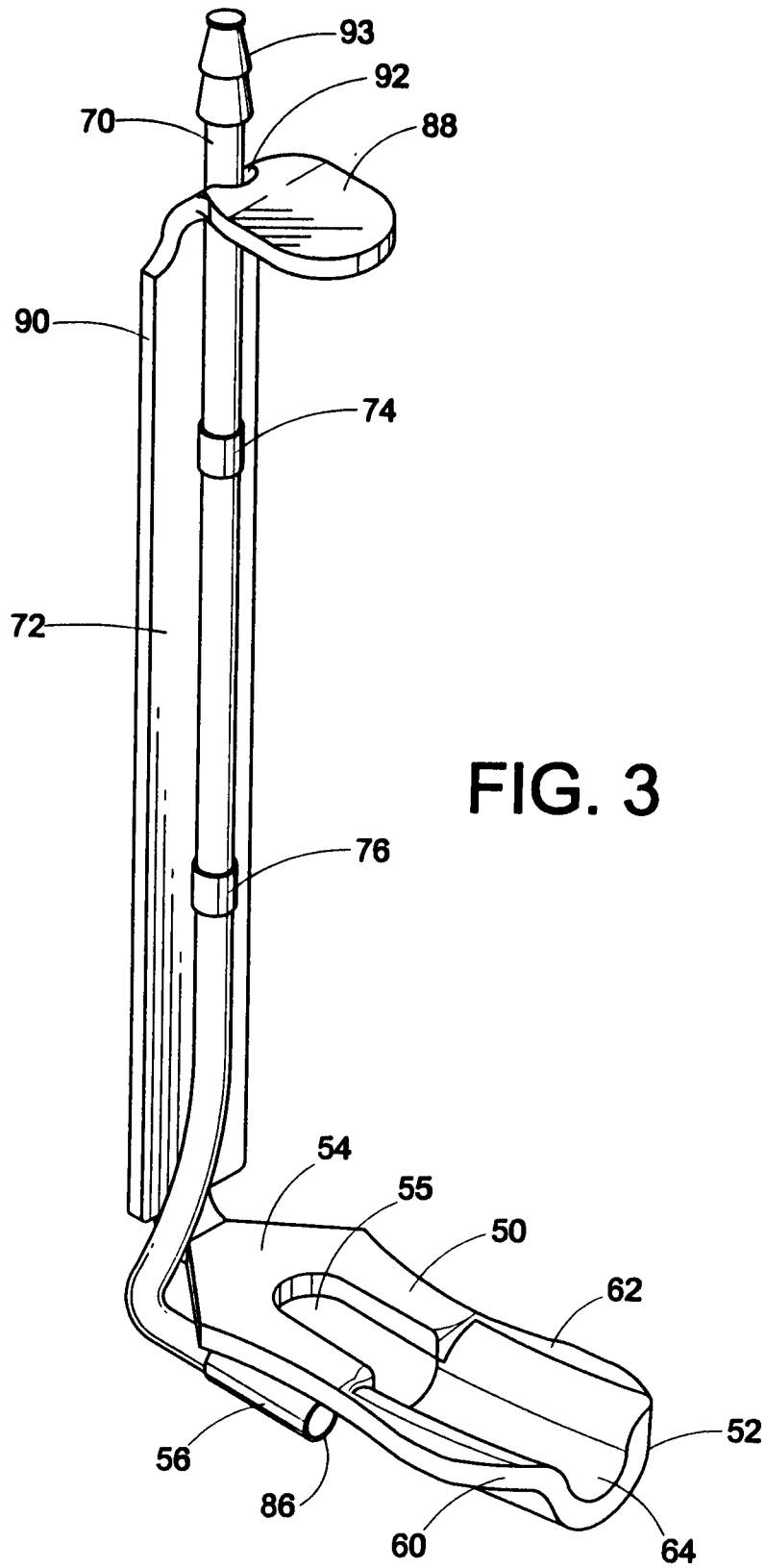


FIG. 3

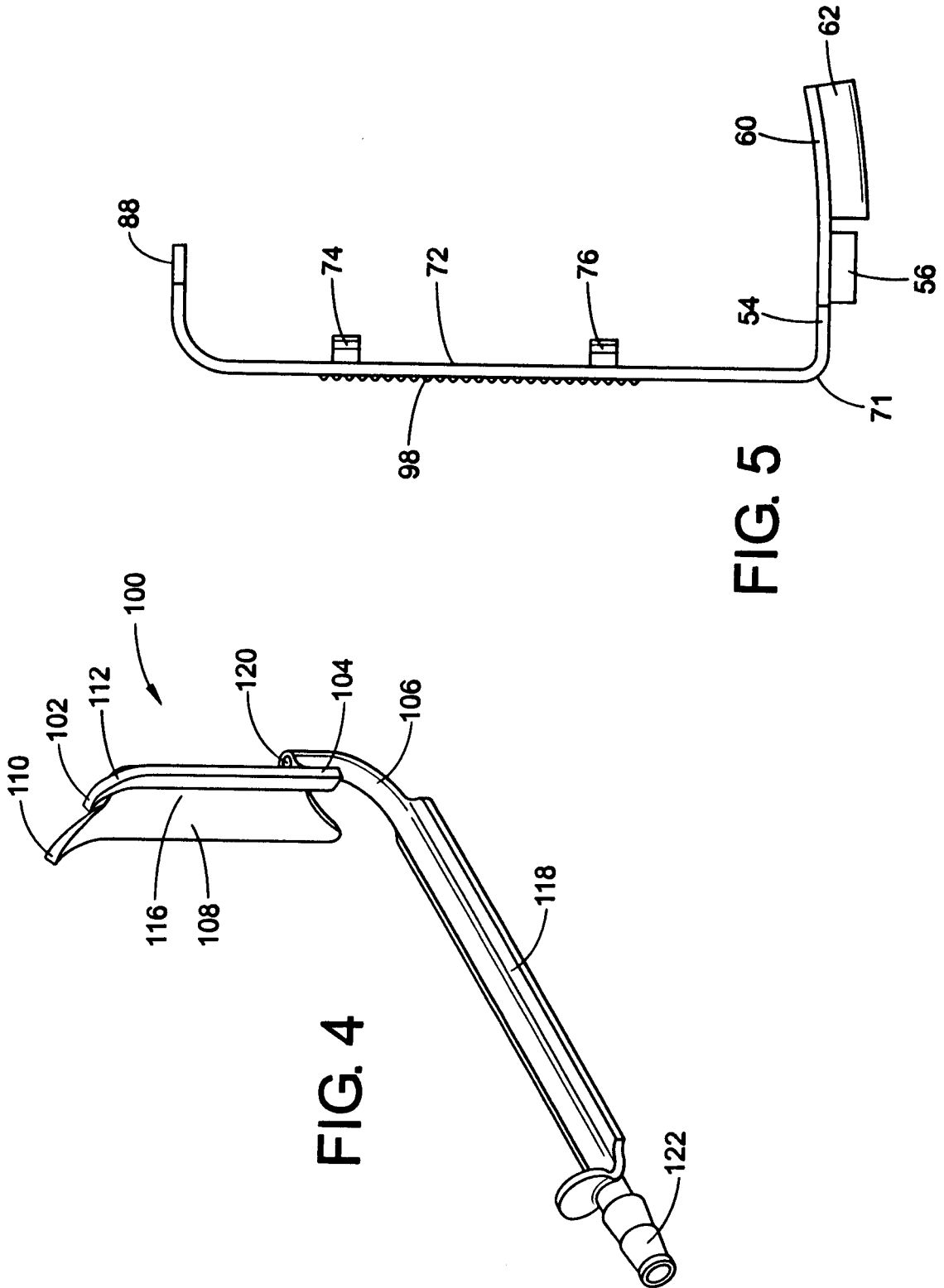
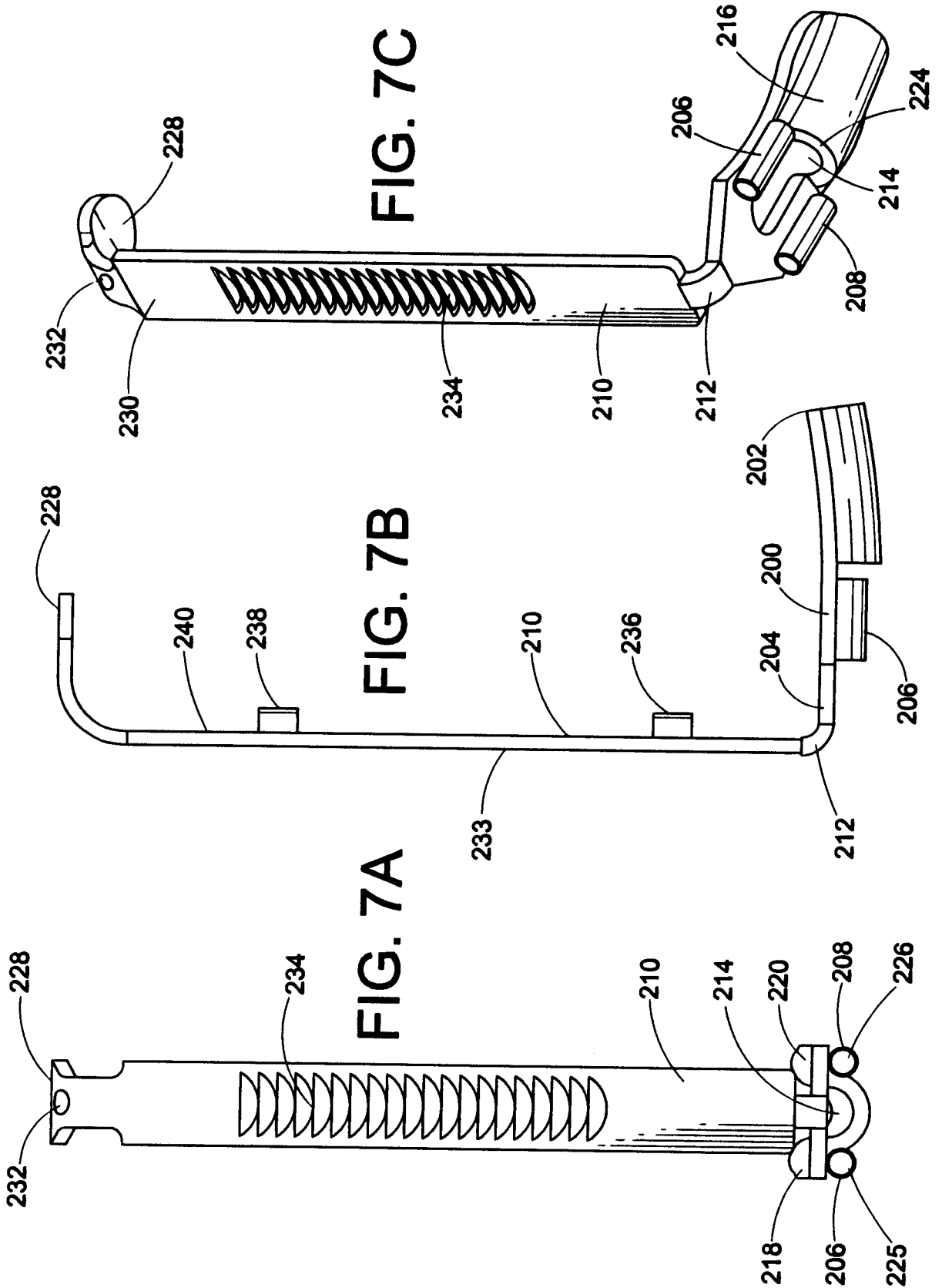


FIG. 4

FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/023619

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61M 1/00 (2011.01) USPC - 600/205 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A61B 1/06, 1/24, 13/00; A61M 1/00 (2011.01) USPC - 433/91; 600/205, 241; 604/541; 604/35 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Patbase, Google Patents		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,254,591 B1 (ROBERSON) 03 July 2001 (03.07.2001) entire document	1-24
Y	US 3,154,069 A (RING) 27 October 1964 (27.10.1964) entire document	1-24
Y	US 4,562,832 A (WILDER et al) 07 January 1986 (07.01.1986) entire document	9,15-24
A	US 2,697,432 A (SCINTA) 21 December 1954 (21.12.1954) entire document	1-24
A	US 2010/0121152 A1 (BOEDEKER) 13 May 2010 (13.05.2010) entire document	1-24
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 15 March 2011		Date of mailing of the international search report 30 MAR 2011
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774