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(54) **Title:** ENDOTRACHEAL TUBE SECURING DEVICE

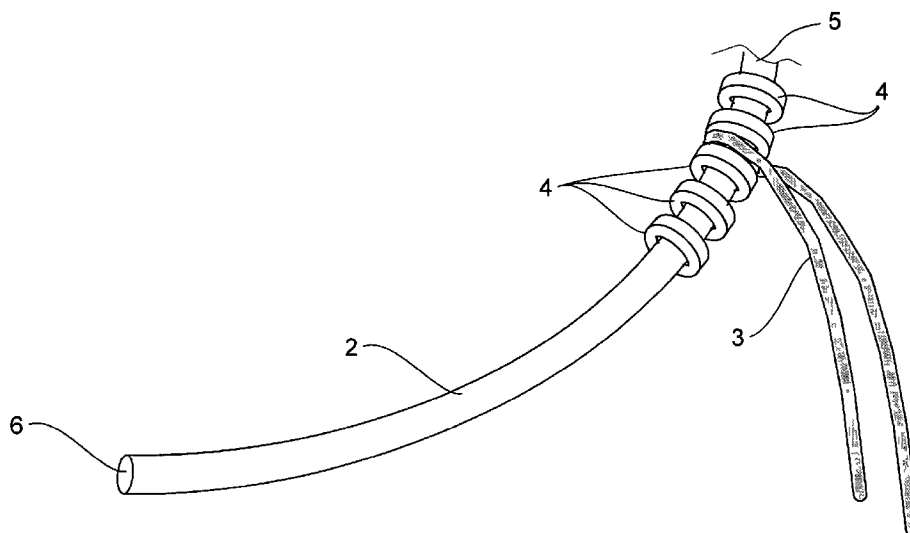


FIG. 1

(57) **Abstract:** An endotracheal tube with external circumferential rings which provide for a means of securing the tube to the patient preventing accidental extubation as well as a ridged accessory sleeve having ridges that can be positioned on the tube. The sleeve can be adhered to the external portion of the endotracheal tube and the sleeve will have the same external configuration as the modified endotracheal tube. The sleeve can use an adhesive to assist in securing the sleeve to the tube.

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## ENDOTRACHEAL TUBE SECURING DEVICE

**CROSS REFERENCE TO RELATED APPLICATIONS**

This application claims the benefit of U.S. provisional patent  
5 application: serial no. 60/861,009, filed November 27, 2007.

**BACKGROUND OF THE INVENTION**

This invention relates to endotracheal tubes and more specifically, to  
a means of attaching and securing endotracheal tubes. The attaching  
10 means include external circumferential rings along the proximal portion of  
the endotracheal tube, and a ridged sleeve that are designed to  
mechanically secure twill tape or any other holding device which may than  
be secured around the neck of the patient.

Endotracheal tubes are inserted, or intubated, into a patient's trachea  
15 to provide a clear passage for air flow to the lungs, an endotracheal tube is  
particularly useful if the trachea has been crushed or damaged.  
Endotracheal tubes are also used during anesthesia to maintain an open air  
passage to the lungs. In addition to the tube itself, many endotracheal tubes  
include an inflatable cuff which surrounds and is fixed near the distal end of  
20 the endotracheal tube. After the tube is inserted into the trachea, the cuff is  
inflated to prevent air from escaping around the outside of the tube and to  
prevent displacement of the tube. After an endotracheal tube has been  
intubated or inserted into the trachea, serious complications can occur. The  
tube can be removed or extubated either by the patient or by accident or the  
25 tube can migrate or change position in the trachea. Extubation of an  
endotracheal tube can cause serious complications and can be life  
threatening. To negate the chances of extubation from occurring, a variety  
of securing devices have been developed in an attempt to anchor  
endotracheal tubes in place. Endotracheal tube anchoring devices up to  
30 this point have required many accessories, have been bulky, have blocked  
access to the patients mouth, have applied excessive asymmetric pressure  
on the tube itself, and have been costly.

### **SUMMARY OF THE INVENTION**

The present invention is a modified endotracheal tube device, and a ridged sleeve that are designed to safely stay in position after intubation.

5 The object of this invention is to provide an endotracheal tube which after intubation into the trachea can be easy secured in place without cumbersome accessories and without blocking the patient's mouth. The a ridged sleeve is an accessory that uses the same principles as the modified endotracheal tube as it will wrap around the portion of the endotracheal tube

10 that remains outside of the mouth. A further object is to provide a lightweight anchoring method to existing endotracheal tubes without major modifications or excessive expense. The present invention accomplishes these objectives by utilizing a plurality of external circumferential rings that are secured on the proximal portion of the endotracheal tube, as well as on

15 the sleeve accessory. The rings are spaced apart equally, and provide for a mechanical means or stops for securing a cord or twill tape to the proximal end of the tube. The tape may then be secured to the patient to hold the tube in place.

20

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 shows the endotracheal tube including circumferential rings and twill tape for locating the tube.

Fig. 2 show the alternate design endotracheal tube with a sinusoidal sleeve configuration.

25

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

The endotracheal tube of the present invention is shown in detail in Fig. 1. The endotracheal tube assembly of the present invention may include an

30 oral endotracheal tube 2 of flexible, bendable polyvinyl chloride plastic which is curved to conform generally to the shape of the oral cavity and trachea. Alternatively the tube may be a nasal endotracheal tube shaped to conform

to the nasal cavity and trachea, or a tracheostomy tube shaped to conform to the trachea and project out of the tracheostomy incision. The general shape of all three of the tubes and the lower portion of each tube is conventional. A fourth form would be the accessory ridged sleeve that would wrap around the proximal portion of a standard endotracheal tube to help secure it.

The tube 2 has a proximal end 5 and a distal end 6. To enable intubation into the trachea of different sized patients, endotracheal tubes are made in different sizes with inside diameters or lumens graduated in 0.5 millimeter increments from 2 millimeters to 5.5 millimeters for pediatric use and 6 millimeters to 11 millimeters for adults. A standard adapter to which gas supply equipment may be connected is press fitted into the proximal or upper end of the tube. The projecting portion of the adapter is somewhat larger in diameter than the tube.

A plurality of circumferential rings 4 are spaced evenly apart on the proximal end of the tube and on the accessory ridged sleeve. The outer peripheral edges 6 and inner edges of the rings 4 preferably have a rounded or radiused shape to provide a smooth contour. The smooth contour has been found to be beneficial to avoid injury to a patient during use and to reduce the possibility of the collection of unwanted secretions on the tube. The accessory ridged sleeve will have the same configuration on the outside and it will be attached to the endotracheal tube outside the mouth by an adhesive. The adhesive can be a sticker peels wherein the backing can be removed when it is desired to secure the sleeve to the endotracheal tube. The adhesive is of a design to securely hold the sleeve in the desired position on the endotracheal tube. The number of circumferential rings may be between 2 and 7 with 5 rings being the preferred number. The rings have a peak height of between 0.5 to 4 millimeters; in practice it has been found that rings with a height of 2 millimeters are preferred. The rings are between 2 and 10 millimeters wide with ideal width of approximately 6 millimeters. The rings are spaced at a distance of approximately 5 to 15 millimeters apart on the tube; in practice it has been found that 8 millimeters

apart is an effective spacing distance. The rings are disposed to be in the area where the endotracheal tube exits the patient whether that is an oral, nasal, or tracheostomy cavity. The circumferential rings 4 provide a mechanical means for securing twill tape, medical tape or elastic cord 3.

5 The tape, cord, or any other securing device are positioned on the tube 2 between the circumferential rings 4. The rings act to locate the tape, cord, or any other securing device so that the tube 2 can be securely positioned on the patient by the tape or cord. The tape or cord 3 is then secured to the patient to hold the endotracheal tube in place and prevent extubation.

10 Fig. 2 shows the endotracheal tube of the present invention with an alternate design incorporating a sinusoidal wave design instead of the previously described rings. The sinusoidal rings 6 may be formed as an integral part of the endotracheal tube 2 or may be part of a sleeve 7 that fits over the tube 2 as shown in Fig. 2. The sleeve 7 can use an adhesive to  
15 secure the sleeve to the endotracheal tube as previously discussed with the embodiment shown in Fig. 1. In this sinusoidal configuration, a plurality of sinusoidal ridges and grooves are used to provide a mechanical means for securing twill tape or cord as described in Fig. 1. The number of sinusoidal ridges in the design shown in Fig. 2 can range between 2 and 7 with 5 being  
20 the preferred number. The ridges have a peak height of between 0.5 to 4 millimeters; in practice it has been found that a height of 2 millimeters is preferred. The ridges are between 2 and 10 millimeters wide with an ideal width of approximately 6 millimeters. The ridges are formed or ridged sleeve is placed in the area where the endotracheal tube exits the patient.

25 The above description of the present invention is given for explanatory purposes. It will be apparent to those skilled in the art that numerous changes and modifications other than those cited can be made without departing from the scope of the invention. Accordingly, the whole of the foregoing description is to be construed in an illustrative and not a limitative  
30 sense, the scope of the invention being defined solely by the appended claims.

CLAIMS

I claim:

5           1.       An endotracheal tube comprised of an elongated tube having an interior diameter, an exterior surface with a plurality of circumferential rings positioned on the exterior surface of the tube whereby the rings provide a mechanical means for locating a securing means for securing the endotracheal tube to the patient.

10

2. The tube of claim 1 wherein the securing means is a twill tape.

3.       The tube of claim 1 wherein the securing means is an elastic cord.

15

4.       The tube of claim 1 wherein the rings are positioned on the exterior of the tube.

5.       The tube of claim 4 wherein the rings extend from the area  
20 where the endotracheal tube exits the patient whether that be an oral, nasal, or tracheostomy cavity.

6.       The tube of claim 5 wherein the rings are spaced apart on the exterior surface of the tube at a distance of between 5 and 15 millimeters  
25 apart.

7. The tube of claim 1 wherein the circumferential rings are formed on a sleeve that fits over the endotracheal tube.

8. The tube of claim 7 wherein the sleeve is secured to the  
5 endotracheal tube with an adhesive.

9. An endotracheal tube comprised of a tube having an interior diameter and an exterior surface on which sinusoidal ridges are formed as part of the tube whereby the ridges provide a mechanical means for locating  
10 a securing means for securing the endotracheal tube to the patient.

10. The tube of claim 9 wherein the ridges are formed on a sleeve that fits over the endotracheal tube.

15 11. The tube of claim 10 wherein the sleeve is attached to the endotracheal tube outside the mouth by an adhesive.



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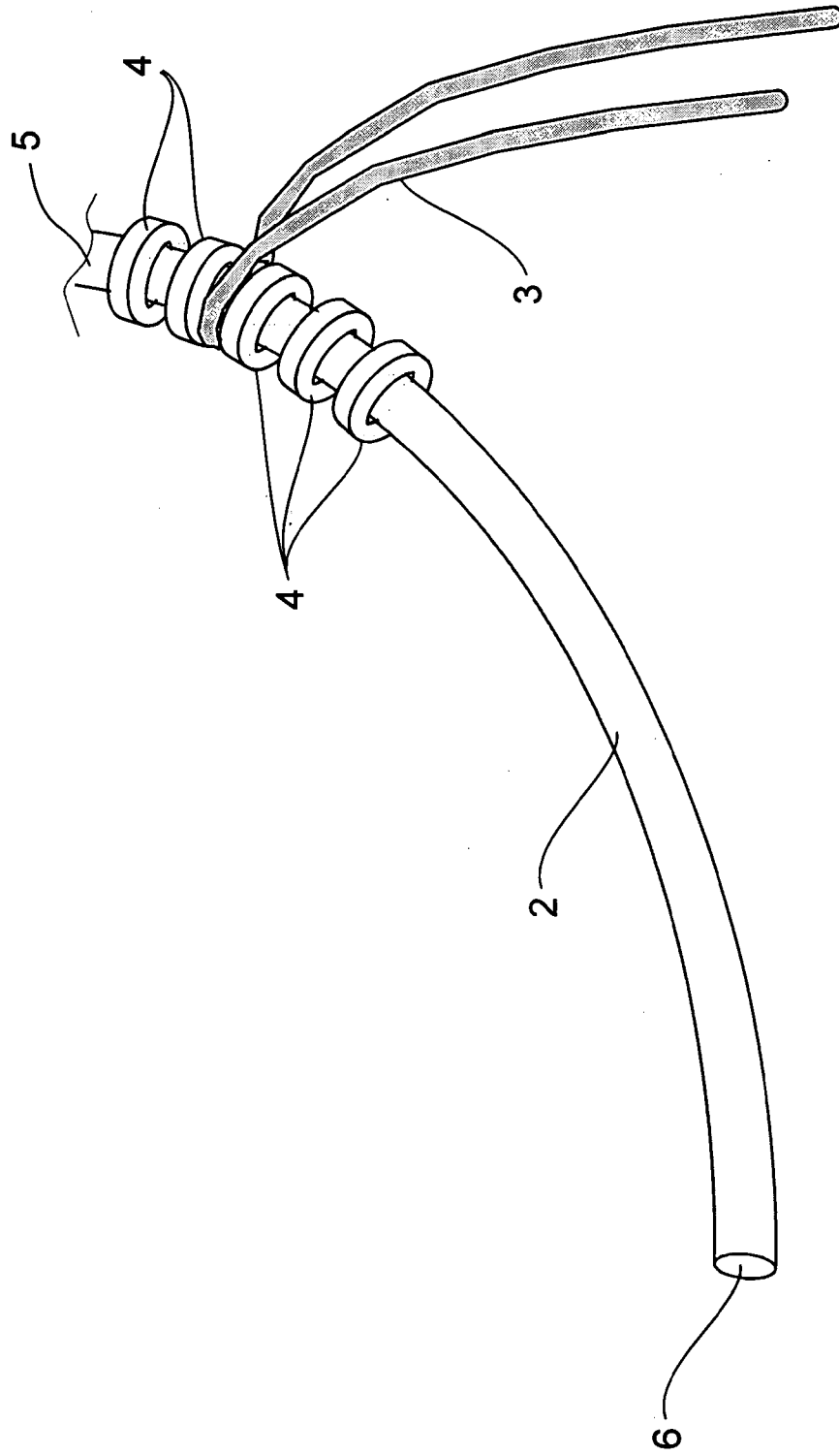


FIG. 1

Sheet 2/2

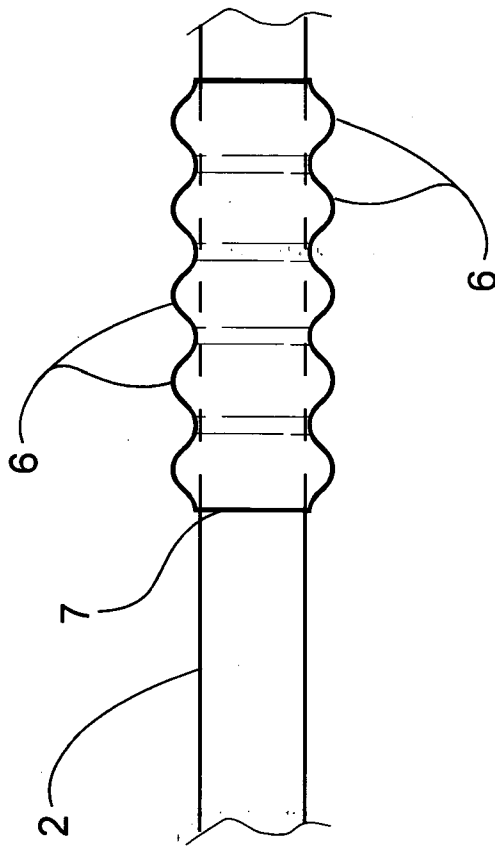


FIG. 2

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US 07/24426

<b>A CLASSIFICATION OF SUBJECT MATTER</b> IPC(8) - A61 M 16/00, A62B 9/06 (2008.04) USPC - 128/207.17 According to International Patent Classification (IPC) or to both national classification and IPC														
<b>B FIELDS SEARCHED</b> <b>Minimum documentation searched (classification system followed by classification symbols)</b> USPC 128/207 17 IPC(8) A61M 16/00, A62B 9/06 (2008 04)														
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC 128/207 14, 912														
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) <b>WEST, Google Scholar (endotrach\$4 or tracheos\$4) near 5 tube and (pdg\$4 or png) near 5 (tube or sleeve) and sleeve and twill near5 tape and elastic and mm and adhesive</b>														
<b>C DOCUMENTS CONSIDERED TO BE RELEVANT</b>														
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No												
X ----- Y	US 2006/0174893 A1 (KANOWITZ) 10 August 2006 (10 08 2006) para [0013]-[0017], [0047], [0070], Fig 3-4 and 10	1, 4-5, and 7-1 1 ----- 2-3 and 6												
Y	US 4,527,559 A (ROXBURG et al) 09 July 1985 (09 07 1985) col 5, ln 23-29	2												
Y	US 2005/0133038 A1 (RUTTER) 23 June 2005 (23 06 2005) para [0031]	3 and 6												
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input type="checkbox"/>														
<table border="0"> <tr> <td>* Special categories of cited documents</td> <td>"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</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			* Special categories of cited documents	"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	"A" document defining the general state of the art which is not considered to be of particular relevance	"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	"E" earlier application or patent but published on or after the international filing date	"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	"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)	"&" document member of the same patent family	"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	
* Special categories of cited documents	"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													
"A" document defining the general state of the art which is not considered to be of particular relevance	"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													
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Date of the actual completion of the international search 03 June 2008 (03 06 2008)		Date of mailing of the international search report <b>16 JUN 2008</b>												
Name and mailing address of the ISA/US Mail Stop PCT, Attn ISA/US, Commissioner for Patents P O Box 1450, Alexand πa, Virginia 22313-1450 Facsimile No 571-273-3201		Authorized officer Lee W Young PCT Hβ pd βsk 571 272-4300 PCTOSP 571-272-7774												