

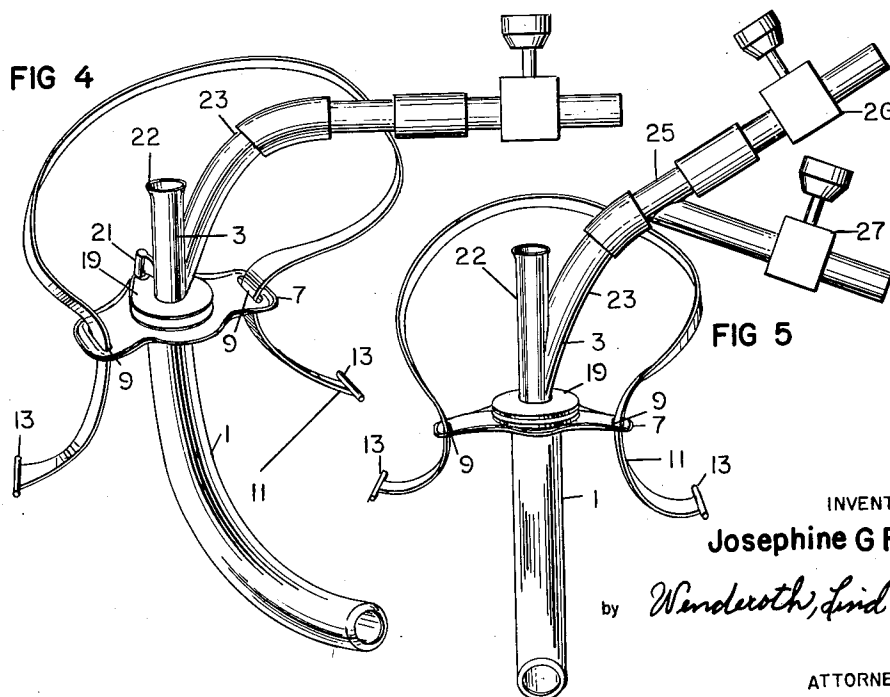
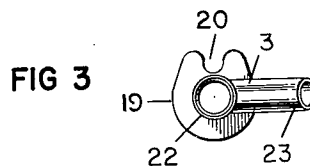
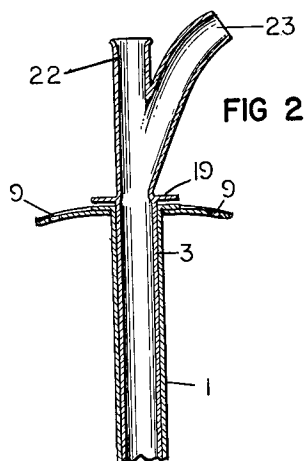
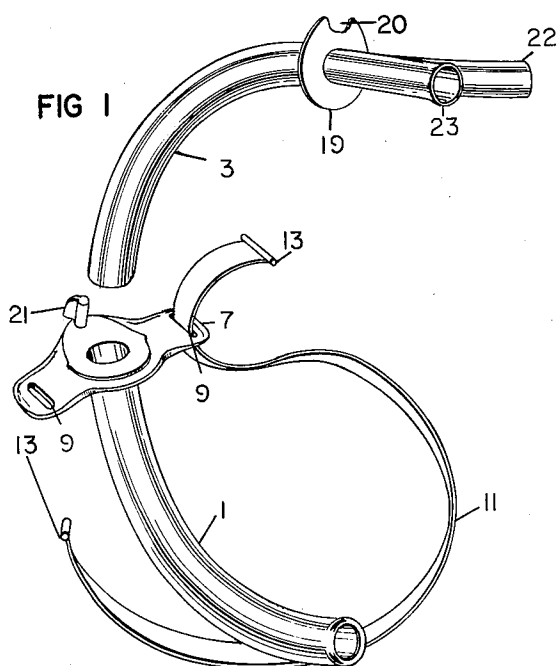
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DIRECT SUCTION TRACHEOTOMY TUBE

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1

3,039,469
DIRECT SUCTION TRACHEOTOMY TUBE
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The present invention relates to a surgical appliance, and more particularly to a tracheotomy tube.

Tracheotomy tubes, for example as described in U.S. Patent No. 2,765,792 to Edgar B. Nichols, generally comprise a curved outer cannula tube with a throat plate secured to the outer end thereof, and a curved inner cannula tube which fits within the outer cannula tube and protrudes from the outer end thereof. The throat plate has a strap attached thereto. In use, the outer cannula tube is inserted into the base of the throat of a person who for some reason has had his respiratory function impaired. It is common practice to make a slit at the base of the throat of the afflicted person through which the outer cannula tube is inserted until the throat plate comes against the outer surface of the neck. The inner cannula tube is then inserted into the outer cannula tube with the outer end of the inner cannula tube open. Air may then be drawn into the throat and expelled therefrom through the inner tube. The inner tube may be removed for cleaning without it being necessary to remove the outer tube.

The situation which frequently occurs, however, is that mucous secretions either partially or completely block the inner cannula tube. When a patient is particularly subject to such blockages, for example when he is hospitalized with a respiratory infection, it has heretofore been the practice to insert a suction tube into the inner cannula tube, sliding it down the inside of this tube. While this is fairly effective insofar as creating a suction effect, it reduces the cross section of the inner cannula tube which is available for conducting air therethrough, and very frequently creates a feeling of insecurity in the patient, and often makes breathing more difficult.

It is an object of the present invention to provide an improved tracheotomy tube which enables direct suction to be applied thereto.

A further object of the present invention is to provide an improved tracheotomy tube in which access can be gained to the tube for introducing gases other than air being breathed into the throat without reducing the effective diameter of the tube.

Other and further objects of the present invention will become apparent from the following description, taken together with the accompanying drawings, in which:

FIG. 1 is an exploded view of the tracheotomy tube according to the present invention;

FIG. 2 is a longitudinal sectional view of the assembled tracheotomy tube;

FIG. 3 is a perspective view of the inner cannula tube according to the present invention;

FIG. 4 is a perspective view of the tracheotomy tube according to the present invention arranged for suctioning; and

FIG. 5 is a perspective view of the tracheotomy tube according to the present invention arranged for suctioning and the administration of a gaseous anesthetic.

Referring more particularly to the drawing wherein the same reference numerals indicate like parts throughout, there is shown a tracheal device comprising an outer cannula tube 1 which is curved longitudinally to conform to the shape of the outlet end of the trachea, and a corresponding curved inner cannula tube 3 which is insertable into the outer cannula tube 1 on mating relation therewith. The outer cannula tube 1 is adapted to be

2

inserted into the trachea through an opening formed in the neck of a user. This is done in well known manner with the aid of a suitable pilot (not shown), after which the pilot is removed. The inner tube 3 is then inserted into the outer tube.

At its upper end the outer tube 1 is provided with a throat plate 7 which is curved to conform to the shape of and fits against the neck of the user when the tube 1 is fully inserted into the trachea. The tube 1 thus helps to conceal the incision or opening at the front of the neck. The plate 7 is provided with a pair of transverse slots 9 adjacent the ends thereof. A neckband 11 connected to the plate 7 by means of a pair of retaining members 13, serves to retain the tube 1 in place. To permit the user to turn his head freely while affording him a maximum degree of comfort, the clips 13 are designed to provide a floating yet positive, connection to the plate 7. The neckband 11 can be coupled to the clips 13 in any suitable manner.

For the major portion of its length, the internal diameter of the outer tube 1 is just slightly larger than the external diameter of the inner tube 3, as best seen in FIGURE 2, although this difference is somewhat exaggerated in this figure for the sake of clearness. Thus, the inner tube is freely insertable into the outer tube for this major length portion.

On the outer end of the inner cannula tube 3 is fixed a retaining plate 19 which is abutable against the throat plate 7. Retaining plate 19 has a notch 20 therein, and on throat plate 7 is mounted a catch 21 which is engageable in said notch 20 for retaining said inner cannula tube 3 in position in the outer cannula tube 1.

On the outer end of said inner cannula tube 3 is an airway tube 22. The airway tube 22 extends past the retaining plate 19 and forms a continuation of the inner cannula tube 3.

Joining the inner cannula tube 3 and the airway tube 22 which forms a continuation thereof is a suction tube 23 which branches off from the junction of the inner cannula tube and the airway tube at a small angle thereto, and curves gradually away from the airway tube 22. As seen in FIG. 2, the suction tube is in communication with said inner cannula tube and said airway tube.

The tracheotomy tube of the present invention can be made of any of the materials usually used, such as sterling silver or silver plate, plastic, nylon or hard rubber, to name the most common.

In use, the outer cannula tube 1 is first inserted through the slit in the base of the neck of the user into the lower portion of the throat, and the neckband 11 is secured to the clips 13 to hold the throat plate 7 and the outer cannula tube in place. The inner cannula tube 3 is then inserted into the outer cannula tube 1 until the retaining plate 19 abuts the throat plate 7. The notch 20 is aligned with the catch 21 so that the two engage when the plate 19 abuts the plate 7 thus preventing relative rotation of the plates.

The suction tube 23 can now be connected, by means of a rubber or plastic tube, to a suctioning device, as shown in FIG. 4. In order to apply suction to the inner cannula tube 3, which may have mucous secretions therein, the open end of the airway tube 22 is covered with the finger on expiration, thus reducing the intake of air therethrough. The force of the suction is then exerted on the inner cannula tube, the secretions thereby being drawn through the suction tube out of the inner cannula tube. It has been found that the wearer of the tracheotomy tube of the present invention can himself learn to control the suction effect exerted on the inner cannula tube, thereby giving him greater confidence in his ability to continue breathing.

It is of course very easy to seize the airway tube 22

and pull the inner cannula tube 3 and the associated airway tube 22 and suction tube 23 completely out of the outer cannula tube 1 in order to remove secretions which cannot be easily suctioned out, or for normal cleaning.

Moreover, the tracheotomy tube according to the present invention can be utilized to administer anesthesia to patients. After it has been inserted into the neck of the patient as described above, a tube having a Y branch 25 is connected to the suction tube 23 by a short rubber or plastic tube, and a valve 26 and 27 are placed in the tube to each branch of the Y branch 25. One of the branches is connected to a suctioning device, while the other is connected to a source of gaseous anesthesia. By appropriate positioning of the valves, suctioning and anesthesia can be applied as desired to the patient. It is of course possible to use clamps on plain tubing rather than the valves as shown.

As thus set up, the tracheotomy tube according to the present invention can be used in operations requiring trachea suction, such as chest surgery, cardiac surgery, brain surgery, etc. It can also be set up in this or a similar manner for use in oxygen inhalation therapy, oxygen then being substituted for the anesthesia, carbon dioxide inhalation therapy to stimulate deep breathing, mouth to tube breathing for emergency resuscitation, and Bennett valve inhalation therapy of a tracheotomy patient.

It will be seen that for all of these applications, the cross sectional area of the inner cannula tube 3 is not reduced by the passing down through it of a separate suction tube, or other tube for introducing a gaseous material into the throat of the patient. Consequently the cross sectional area available for the intake of air to the patient's lungs is not reduced at any time, thereby giving him greater comfort and a feeling of greater security.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the form hereinbefore described and illustrated in the drawings being merely a preferred embodiment thereof.

I claim:

1. A direct suction tracheotomy tube comprising an outer cannula tube, a throat plate secured to one end of said outer cannula tube, an inner cannula tube fitting snugly in said outer cannula tube, an airway tube integral with the end of said inner cannula tube extending past said throat plate in substantial alignment with said inner cannula tube and forming a continuation of said inner cannula tube, said airway tube having an opening only at the end thereof remote from said cannula tube, and a suction tube branching from said airway tube and said inner cannula tube at the point where said airway tube joins said inner cannula tube, said suction tube branching from said airway and inner cannula tube at a small angle thereto and curving gradually away therefrom, and said suction tube being in communication with said airway tube and said inner cannula tube.

2. A direct suction tracheotomy tube comprising a curved outer cannula tube, a throat plate secured to one end of said outer cannula tube, an inner cannula tube curved with the same curvature as said outer cannula tube and fitting snugly within said outer cannula tube, a re-

taining plate on one end of said inner cannula tube abuttable against said throat plate, means on said throat plate engageable with said retaining plate for retaining said inner cannula tube in place relative to said outer cannula tube, an airway tube integral with the end of said inner cannula tube extending past said retaining plate in substantial alignment with said inner cannula tube and forming a continuation of said inner cannula tube, said airway tube having an opening only at the end thereof remote from said cannula tube, and a suction tube branching from said airway tube and said inner cannula tube at the point where said airway tube joins said inner cannula tube, said suction tube branching from said airway and inner cannula tube at a small angle thereto and curving gradually away therefrom, and said suction tube being in communication with said airway tube and said inner cannula tube.

3. A direct suction tracheotomy tube comprising a curved outer cannula tube, a throat plate secured to one end of said outer cannula tube, an inner cannula tube curved with the same curvature as said outer cannula tube and fitting snugly within said outer cannula tube, a retaining plate on one end of said inner cannula tube abuttable against said throat plate and having a notch therein, a catch on said throat plate engageable in the notch in said retaining plate for retaining said inner cannula tube in place relative to said outer cannula tube, an airway tube integral with the end of said inner cannula tube extending past said retaining plate in substantial alignment with said inner cannula tube and forming a continuation of said inner cannula tube, said airway tube having an opening only at the end thereof remote from said cannula tube, and a suction tube branching from said airway tube and said inner cannula tube at the point where said airway tube joins said inner cannula tube, said suction tube branching from said airway and inner cannula tube at a small angle thereto and curving gradually away therefrom, and said suction tube being in communication with said airway tube and said inner cannula tube.

4. In a tracheotomy tube having a curved outer cannula tube with a throat plate secured to one end of it, the combination of an inner cannula tube having a curvature the same as the outer cannula tube and fittable snugly into said outer cannula tube, a retaining plate on one end of said inner cannula tube abuttable against said throat plate, an airway tube integral with the end of said inner cannula tube extending past said retaining plate in substantial alignment with said inner cannula tube and forming a continuation of said inner cannula tube, said airway tube having an opening only at the end thereof remote from said cannula tube, and a suction tube branching from said airway tube and said inner cannula tube at the point where said airway tube joins said inner cannula tube, said suction tube branching from said airway and inner cannula tube at a small angle thereto and curving gradually away therefrom, and said suction tube being in communication with said airway tube and said inner cannula tube.

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