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T. COLAVITA
TRACHEAL APPLIANCE

2,491,647

Filed Nov. 12, 1948

2 Sheets-Sheet 1

FIG. 1.

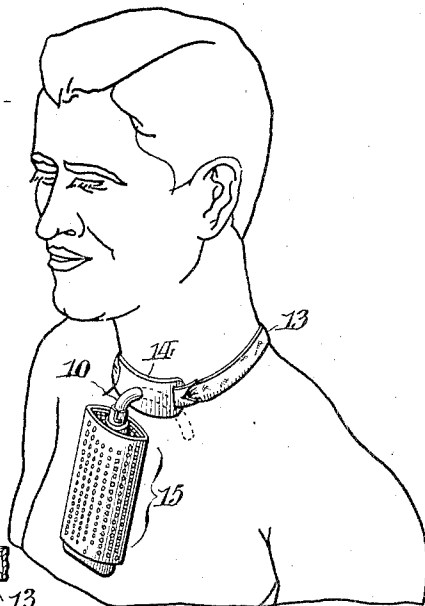


FIG. 2.

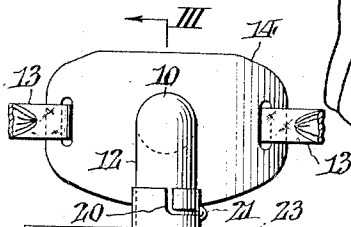


FIG. 3.

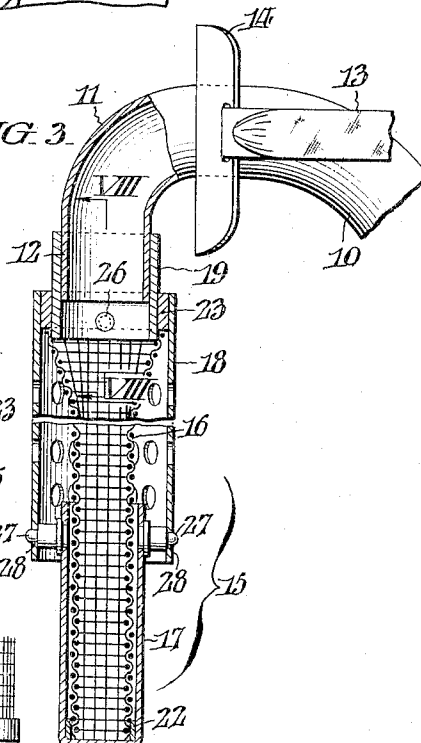


FIG. 8.

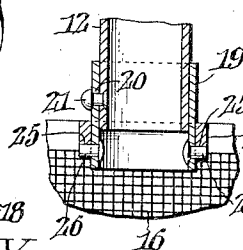
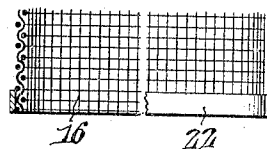


FIG. 9.



WITNESSES

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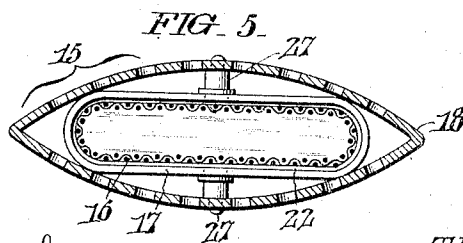
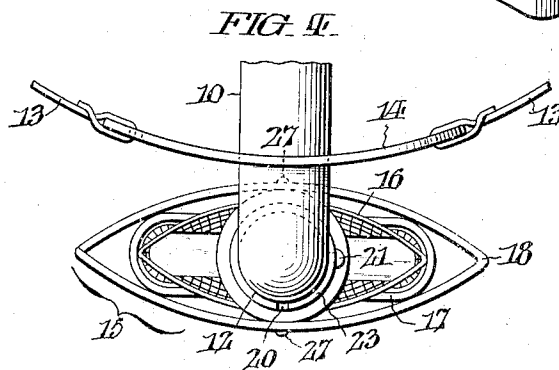
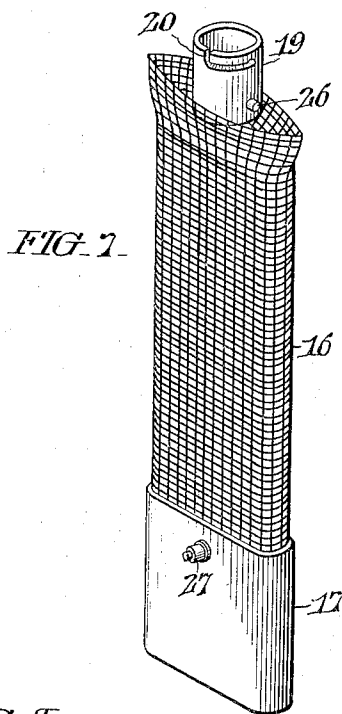
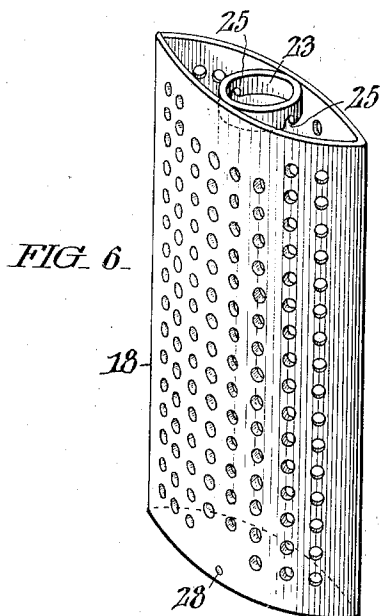
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WITNESSES

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TRACHEAL APPLIANCE

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10 Claims. (Cl. 128—275)

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This invention relates generally to surgical devices and more particularly to tracheal appliances. The tracheal tube is now well known in the art as a device to assist persons who have had the misfortune to have a laryngectomy operation. These tubes are designed to fit into the trachea and extend outwardly through the front portion of the neck. One great disadvantage of the simple tracheal tube or cannula, as generally used, is that mucous discharges from the lungs or respiratory tract of the wearer may be ejected through the tube and actually propelled considerable distances and over a wide area. This occurs particularly in cases of a single cough, and in cases of a series of coughs or a coughing spell the effect is correspondingly magnified. The wearer of the tube becomes apprehensive of unexpected coughs whenever he is out, and his friends become naturally aware of the problems of sneezes, coughs or even sharp exhalations of the wearer. This strained social condition does not lead to an easy, rich and normal life which is so important to man. Too often wearers of the old types of tracheal tubes have gradually withdrawn from their friends and become recluses.

Therefore the main object of this invention is the provision of a tracheal appliance which will effectively control the mucous discharge from the respiratory tract through the tube and protect not only those others who are present, but also the clothes of the wearer of the tube, house furnishings and the like.

Another object is to provide a tracheal appliance which will intercept and collect mucus discharged from the respiratory tract through the cannula in a manner that will require no attention from the wearer except to periodically remove the collected matter.

Another object of this invention is the provision of such a tracheal appliance which is simple in construction, inexpensive to manufacture, and easy to clean.

Still other objects and advantages of this invention will appear from the following detailed description of the accompanying drawings wherein

Fig. 1 is a perspective view of a man wearing a tracheal appliance conveniently embodying my invention.

Fig. 2 shows the device in front elevation.

Fig. 3 is a fragmentary view in vertical section taken as indicated by the arrows III—III in Fig. 2.

Fig. 4 shows the device in top plan with a portion of the cannula broken away.

Fig. 5 is a transverse section taken as indicated by the arrows V—V in Fig. 2.

Figs. 6 and 7 are perspective views of component parts of the device.

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Fig. 8 is a fragmentary vertical sectional view taken as indicated by the arrows VIII—VIII in Fig. 3, and

Fig. 9 is a fragmentary view partly in elevation and partly in section of a lower portion of one of the aforesaid component parts.

With more detailed reference to these illustrations, 10 designates the tracheal tube or cannula which, in accordance with my invention, is sharply curved as at 11 in Fig. 3 adjacent its posterior end 12 for a reason later disclosed. The appliance is held in place on the wearer as shown in Fig. 1 by a neck tape 13 attached to the opposite ends of an arcuate stop plate 14 which is fixedly secured to the tube 10.

For the purpose of intercepting and collecting mucous discharges forcibly expelled from the respiratory tract incident to coughing, I have devised a trap or retainer which is comprehensively designated 15 in Figs. 1-5, and which is pendently connected to the downwardly-directed posterior end 12 of the tracheal tube 10 with capacity for ready removal in a manner as also later explained. As shown, the retainer 15 is made up of separable parts including an inner mucus intercepting or baffle element 16, a catch cup 17 and an outer or shield element 18, which are separately illustrated in perspective in Figs. 6 and 7.

The inner or intercepting element 16 is fashioned from reticulate material, which may be of relatively fine wire mesh as conventionally indicated, tubularized to a relatively large diameter and flattened to elongate elliptic cross section, with a neck piece 19 fixed axially within the open top end thereof. As shown, the neck piece 19 is of small diameter to telescopically fit upwardly over the posterior end 12 of the tube 10 and provided at the top with an angular slot 20 for engaging, bayonet-lock fashion, a lateral stud 21 on said tube end. It is to be particularly noted that the slot 20 and the stud 21 are so allocated as to cause the intercepting element 16 to take a position at right angles to the plane of the tube 10 so that, when in place, it will extend crosswise of the chest of the wearer. The mesh of the intercepting element 16 is reinforced externally of its bottom end by a band 22 (Figs. 3, 5 and 9) that fits snugly into the catch cup 17 whereof the cross section is configured to correspond to that of said baffle element. The band 22 acts as a spacer to prevent direct contact of the mesh of the intercepting element 16 with the wall of the cup and possible spill, from the latter, of the collected mucus.

The shield element 18 is fashioned from perforated sheet material which is tubularized to a diameter greater than that of the baffle element 16, and which is likewise flattened to elliptic cross section so as to surround said baffle element and

to partly overlap the cup 17 with allowance of a comparatively wide perimetric clearance interval for free passage of air for the wearer in breathing. Fixedly secured axially within the open top end of the shield element 18 is a ring 23 which, in turn, is of small diameter to fit down over the neck of the intercepting element 16. By cooperation of diametral notches 25 in the lower edge of the ring 23 with diametral stud projections 26 on the collar 19, the shielding element 18 is positioned so as to lie in the same plane with the intercepting element 16 as shown in Figs. 4 and 5.

The open bottom end of the shield element 18 is adapted to be sprung over shouldered studs 27 projecting laterally from the front and back of the cup 17, for registry and engagement of apertures 28 in its front and back adjacent the lower edge thereof with said studs. It is by the means just described that the parts of the retainer 15 are detachably maintained in assembly.

Operation

Mucus carried along with air expelled at high velocity incident to coughing through the cannula or tracheal tube 10 is spattered upon the target surface at 11 within the sharply rounded portion of said tube. By the attendant impact, the mucus is spread in a thin film on the inner surfaces of the tube end 12. The mucus thus momentarily restrained imposes no appreciable resistance to the high pressure air stream which is allowed to continue unabated past the mucous film through the neck 19, and its force is soon dissipated in passing through the interstices of the intercepting element 16, the spacial interval between said element and the shield element 18, and the perforations in the latter to the atmosphere.

If the cough is a single one, the mucus clinging to the inner surfaces of the tube end 12 and neck 19 will, under gravity influence and by normal exhalation of the individual, find its way to the screen surface of the intercepting element 16 and be thereby held. In successive coughing, following masses of mucus will slide down over the preceding masses and onto the still unoccupied areas of the screen surface and remain there. At times of severe coughing, the masses of mucus which do not chance to strike the target surface at the bend 11 of the tube 10 are forced past it and down through the intercepting element 16 into the cup 17. Thus, if the mucus issuing from the tube 10 is in the form of a thin film, its destination will be the surface of the intercepting element 16, but if it is expelled as a thick mass at the tube end 12 it will end up in the cup 17. It will therefore be seen that the element 16 does not function as a filter or sieve, but rather as a retainer and guide, and in cases of watery mucus it operates to channel the fluid into the cup. The shield element 18 serves as a guard to prevent contact of the wetted screening of the intercepting element with the shirt front and the chest of the wearer. When necessary through complete coverage of the baffle element with the mucus, the retainer 15 is bodily removed from the tracheal tube 10, disassembled, and its parts cleaned for replacement.

I do not, of course, consider myself limited to the precise details of construction herein disclosed, since various modifications are possible within the scope of the appended claims. For example, if desired or found convenient, the cartridge may be shaped to conform with the curvature of the wearer's chest, and the intercepting element may be more cheaply constructed

of perforated cardboard or mesh fabric, discarded after having once been used, and replaced by an entirely new one.

The device is an artificial larynx insofar as coughing, sneezing and other manner of ejecta from the lungs is concerned, devised to benefit persons who have had a laryngectomy, its main object being to divert the high pressure air of a cough or sneeze into the atmosphere and at the same time trap the mucus instantly, hygienically and automatically as already pointed out hereinbefore.

Having thus described my invention, I claim:

1. A tracheal appliance comprising a tube for connection to the trachea, having a downwardly directed posterior end; a mucous discharge intercepting element dependently attached to the aforesaid end of the tube; and a catch cup at the bottom of said intercepting element.

2. A tracheal appliance according to claim 1, wherein the posterior end of the tube is turned through a sharp bend as and for the purpose described.

3. A tracheal appliance according to claim 1, further including a shield which extends, with intervening clearance, about the intercepting element.

4. In a tracheal appliance, a tracheal tube with a downwardly directed posterior end; and a mucous discharge retainer detachably connected dependently to said tube end, said retainer comprising a porous tubular mucous intercepting element in axial relation to the tube, a catch cup at the bottom of the intercepting element, and a perforated open ended shield element extending, with intervening clearance, about said intercepting element.

5. A tracheal appliance according to claim 4, wherein the intercepting element, the catch cup and the shield element are all of flat elongate cross section and disposed at right angles to the axial plane of the tube.

6. A tracheal appliance according to claim 4, wherein the intercepting element is provided at the top with a neck for telescopic connection to the posterior end of the tracheal tube; and wherein the shield element has a ring at the top adapted to engage down over the neck of the intercepting element.

7. A tracheal appliance according to claim 4, wherein the intercepting element is provided at the top with a neck and bayonet lock means for telescopic connection to the posterior end of the tracheal tube; and wherein the shield element has a ring at the top adapted to engage down over the neck of the intercepting element.

8. A tracheal appliance according to claim 4, wherein the intercepting element is provided at the top with a neck for telescopic connection over the posterior end of the tracheal tube; wherein the neck has outwardly projecting diametral studs; and wherein the shield element is provided at the top with a ring adapted to engage downwardly over the neck of the intercepting element, said ring having diametral notches in its lower edge to engage the diametral studs on the neck of the intercepting element.

9. A tracheal appliance according to claim 4, wherein the intercepting element is provided at the top with a neck for telescopic connection to the posterior end of the tracheal tube; wherein the shield element has a ring at the top adapted to engage down over the neck of the intercepting element; wherein the bottom end of the intercepting element extends down into the catch cup;

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and further including means by which the catch cup is detachably secured to the bottom of the shield element to hold the parts assembled.

10. A tracheal appliance according to claim 4, wherein the intercepting element is provided at the top with a neck for telescopic connection to the posterior end of the tracheal tube; wherein the shield element has a ring at the top adapted to engage down over the neck of the intercepting element; wherein the bottom end of the intercepting element extends down into the catch cup; wherein the catch cup is provided with lateral projections; and wherein the lower portion of the shield element is adapted to be sprung over the

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projections on the catch cup and is provided adjacent its bottom end with apertures to engage said projections.

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The following references are of record in the file of this patent:

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