May 12, 1953 E. A. WALDHAUS 2,638,096

APPARATUS FOR ORAL ANESTHESIA

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Fig. 1

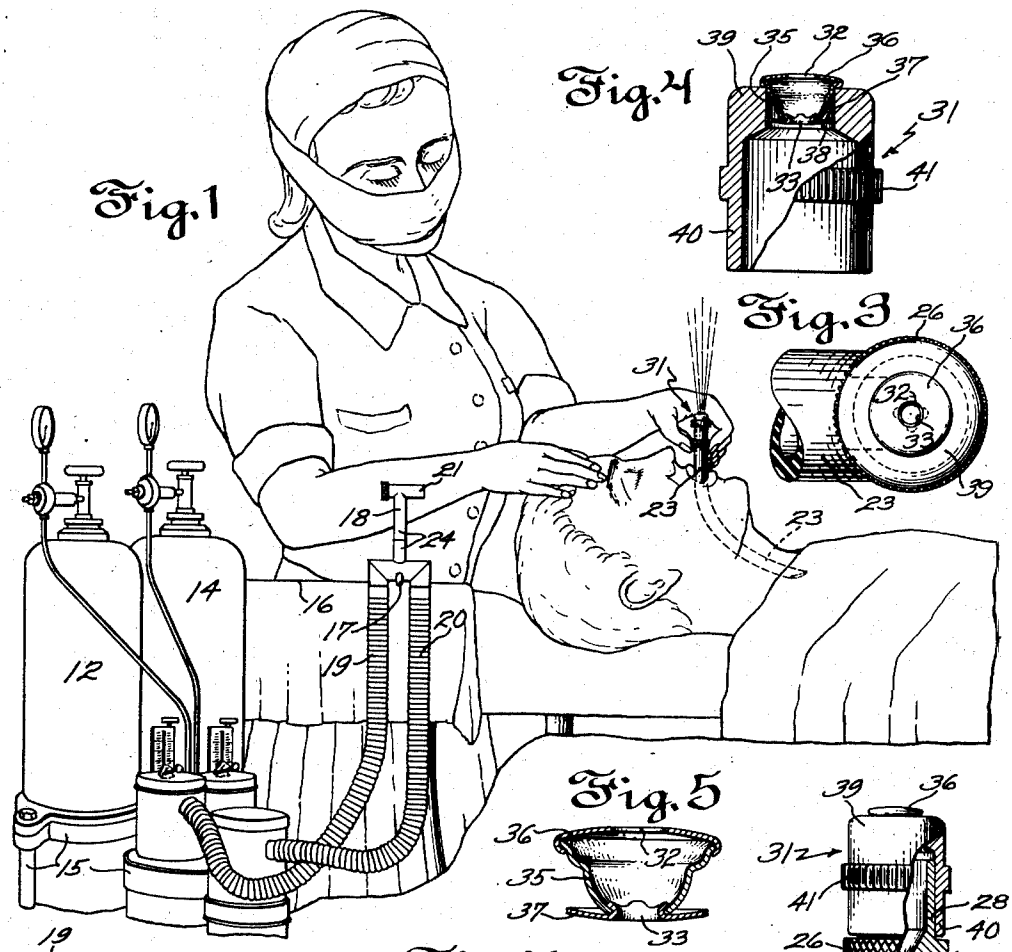

Fig. 4

Fig. 3

Fig. 5

Fig. 7

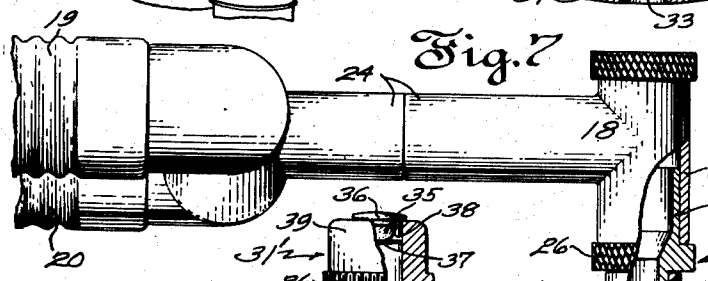

Fig. 6

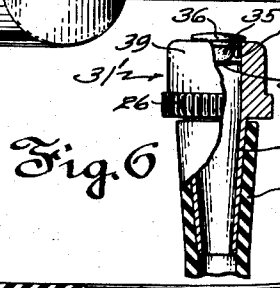

Fig. 2



INVENTOR
Edith A. Waldhaus
BY
ATTORNEY

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APPARATUS FOR ORAL ANESTHESIA

Edith A. Waldhaus, Birmingham, Ala.

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6 Claims. (Cl. 128—348)

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This invention relates to the art of administering anesthesia through a patient's mouth and throat where this is made necessary by circumstances which prevent nasal administration.

An object of the invention is to simplify, expedite and make safer the technique of intubation of an intratracheal catheter by affording prompt and reliable evidence of whether the inner invisible end of the catheter tube has been inserted properly in the trachea of the patient, since it can easily happen that the catheter will improperly enter the esophagus.

A contributory object of the present improvements is to provide a device that will sound a clearly audible signal, giving positive evidence of even feeble breathing through the catheter, and to make such signal device applicable to the outer end of the catheter in a manner not to interfere with the patient's breathing.

A related objective is to arrange such signal device to be instantly detachable from the outer end of the catheter tube and replaced by conduit means for supplying gaseous anesthetic without danger of any nerve irritating disturbance of the inserted end of the tube while it remains in the patient's throat.

These and associated objects of the invention will become apparent in fuller detail as the description proceeds, the following specification having reference to the accompanying drawing disclosing a successful embodiment of the invention in which drawing:

Fig. 1 is a view showing intubation of a tracheal catheter with an audible signal device temporarily applied thereto for the purpose of the invention.

Fig. 2 shows in practical actual size the trachea catheter of Fig. 1 with my improved signal device removably in place thereon.

Fig. 3 is a fragmentary plan view of the subject of Fig. 2.

Fig. 4 is an enlarged view of the signal device detached from the catheter tube shown partially in section on a central vertical plane.

Fig. 5 is an enlarged sectional view of the sound causing structure removed from the signal device of Fig. 4.

Fig. 6 shows a modified construction of the signal device adapting it to a catheter having a bare tubular end.

Fig. 7 shows the catheter terminal of Figs. 1 and 2 connected to a source of gaseous anesthetic after temporary test use and removal of the signal-giving device.

In Fig. 1 conventional surgical anesthesia apparatus is represented by upright pressure tanks or cylinders 12, 14 containing any of various anesthetic gases such as ethylene, nitrous oxide, carbon oxide, oxygen, ether, cyclopropane with helium, etc. The cylinders 12 and 14 may be supported by a floor stand 15 which may be of the cabinet type presenting a shelf 16 carrying the hook 17 on which is hung, so as to be instantly available for use, a T-shaped adaptor 18 branching into conduit connection with corrugated flexible respiration tubings 19, 20. These communicate with the usual bag, absorber, and other conventional parts of the apparatus including control valves serving to condition and proportion the delivery of gas mixtures to the lungs of the patient.

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The open end 21 of T-shaped adaptor 18 may have a slip fit on a metallic connector 22 which may be fixedly lodged in the outer end of the trachea catheter tube 23 to form the outer terminal thereof. The tube is usually of semi-soft rubber molded to somewhat toric-like curvature for conformity with the throat passage of a prone patient. In Fig. 6, however, the walls of the catheter tube 23' at its outer end are merely flared outward conically to form the tube terminal, no connector such as 22 being present. When a connector such as 22 is present, it may conveniently consist of a knurled flange 26 somewhat larger in diameter than the catheter tube integral with a nipple 27 fixedly lodged in the end of the tube and also integral with an outwardly projecting open ended barrel 28 exposed to receive the T-adaptor 18 with a slide fit therebetween. T-adaptor 18 incorporates a swivel joint at 24.

According to the present improvements, when connection is broken between adaptor 18 and connector 22, the latter remains embedded in the catheter tube 23 and its exposed barrel 28 is therefore always ready to receive my improved audible signal-giving device 31 which thereby forms a partial closure for the tube terminal and thus throttles the outer end of the catheter to a certain extent when temporarily and removably applied thereto as shown in Fig. 1. If the catheter is properly placed in the trachea, this fact will be evidenced at once by a whistle-like sound generated at orifices 32 and 33 of the signal device, these orifices being large enough to pass a flow of air into and out of the catheter tube sufficient to sustain normal breathing of the patient during the brief period of placement test.

I have discovered that this condition exists where the orifice or orifices such as 32, 33 are

combined with a tubular catheter having an inside diameter of 3/8" or thereabouts if the hole or holes are round and, say .111" to .134" in diameter. Successfully loud sound is produced if both holes are close to 1/8" in diameter. However, I have found that the sound-producing ability becomes impaired if the holes are made as large as .175" in diameter. Hence it is necessary that these holes lie within some range of sizes sufficiently smaller than the air passageway through the catheter tube to considerably throttle the open end of the latter. The extent of throttling must not interfere with safe breathing of the patient but must be sufficient to speed up and vibrate to an audible frequency the flow of air into or out of the tube induced by the respiration of the patient. In this sense the sound-producing unit, shown detached in Fig. 5, constitutes a partial closure for the outer end of the catheter.

Conveniently I may construct the sound unit of Fig. 5 as a sonant insert of three sheet-metal parts comprising a drawn metal cup-shaped resonance chamber **35**, a cap **36** covering and crimped over the larger top end of chamber **35** containing the hole **32**, and a baffle disc **37** upset to produce the central hole **33** therein bordered by rim prongs which protrude through an opening in the small end of the drawn metal cup **35** and are eyeletted over into interlocking relation to the cup. The external annular flange portion **37** of the disc is of size to be frictionally lodged in an opening **38** in the head **39** of the signal device **31** with a press fit. This thimble-like signal device further includes a rigid shell **40** having an open mounting end and having at its opposite end a transverse head wall containing the aforesaid resonance chamber, and a knurled flange **41** affording the maximum girth of shell **40** by means of which the signal device may be firmly grasped and placed on or removed from the connector barrel **28** of the permanent tube terminal **22** without touching or jarring the catheter or interfering with sound producing flow of respiratory air through said orifices. Head wall **39**, mounting shell **40** and flange **41** may comprise an integral screw machine part or casting. The confined space within cup chamber **35** acts as a resonance box to augment the vibration of the air stream passing through holes **32** and **33** in either direction and makes the whistling sound loud enough to be audible in case of the most shallow breathing.

In Fig. 6 the cylindrical mounting barrel **40** of a modified signal device **31'** is replaced by a conically tapered barrel **40'** which is capable of fitting and being lodged removably in the bare rubber end of catheter tubes of different sizes represented by the end portion **23'** of a catheter tube flared by stretching it onto the barrel **40'**.

The appended claims are directed to and intended to cover all variations and equivalents of the size, shape and arrangement of parts herein chosen to illustrate the principles of the invention that fairly come within the broadest interpretation of the definitive terms used in the claims.

I claim:

1. Apparatus for testing momentarily without disturbing the patient the proper intubation of an oral catheter inserted into the trachea, comprising in combination with an intra-tracheal catheter having a tubular terminal at its outer end, a test appliance comprising a perforate whistle affording unit mounted on said terminal and removably fitting said terminal in a manner to be joined quickly therewith and separated therefrom without disturbing the inserted portion of the catheter while it occupies the patient's throat, said whistle affording unit comprising a partial closure for said terminal containing a vent giving the catheter restricted communication with ambient air and forming the sole source of respiratory gas available to the patient through said catheter, said vent being of size, shape and arrangement to vibrate into clearly audible sound waves weak streams of air impelled gently through said vent by feeble breathing of the patient.

2. Test apparatus as defined in claim 1, in which the said whistle affording unit includes walls confining a space forming a resonance chamber and containing substantially co-axial holes, one of said holes opening to the said catheter and the other of said holes opening to ambient air.

3. Test apparatus as defined in claim 2, in which at least one of the said holes is substantially round and less than .175" in diameter.

4. Test apparatus as defined in claim 2, in which each of the said holes is substantially round and less than .175" in diameter.

5. Test apparatus as defined in claim 2, in which each of the said holes has a diameter of between .118" and .143".

6. Test apparatus as defined in claim 2, in which the said resonance chamber comprises a tapering cup-shaped barrel closed at its larger end by a transversely extending cap, said cap and the smaller end of said cup-shaped barrel respectively constituting the said walls.

EDITH A. WALDHAUS.

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