POSITIONING DEVICE FOR USE WITH A TRACHEAL TUBE WHICH IS INSERTABLE INTO A PERSON'S TRACHEA FOR RESPIRATION PURPOSES

FIELD AND BACKGROUND OF THE INVENTION

The invention relates in general to respirating devices and in particular to a new and useful device for positioning a tracheal tube in lengthwise direction in the trachea, in particular for an HFJV (High Frequency Jet Ventilation) tube with at least one jet nozzle.

For ventilation by tube, attention must be paid to correct lengthwise positioning in the trachea. Especially in the case of HFJV the effectiveness of the gas exchange in the lung depends decisively on the position of the jet nozzle in the trachea. It has been found that the distance of the jet nozzle from the first bifurcation (carina) should be about 1.5–2.5 cm for optimum ventilation conditions to be obtained. A tracheal tube with jet nozzles is described in German OS No. 28 47 681.

According to the known state of the art, the position of a tracheal tube and of a jet tube can be determined by radiology or by bronchscopy. Although the jet nozzle clearly appears in the X-ray picture, in many cases the exact position of the carina cannot be established. Besides, frequent repetition of radiology is an unacceptable strain on the patient. Moreover, the results of the radiology are generally not immediately available if high radiation in direct image converter observation is to be dispensed with. With the fiber optics bronchoscope the position of the carina and the distance from the jet nozzles can indeed by determined with sufficient accuracy, but this is a complicated method to be carried out only be skilled personnel. It appears further as disadvantageous that during the examination the bronchoscope takes up almost the entire cross-section of the tube and thus unduly supresses the breathing of the patient who may already have suffered considerable prior damage.

SUMMARY OF THE INVENTION

The invention provides a device for the lengthwise positioning of a tracheal tube, in particular of an HFJV tube in a person's trachea, which permits satisfactory rapid localization without impeding the supply of respiratory air. The essence of the invention is to be seen in that a measuring probe to be pushed forward through the free cross-section of the tube is provided, which has at its distal end a roof-like crown or stop element to be placed on the carina in a roof fashion. With the aid of the probe to be pushed forward through the tracheal tube, the carina can be localized satisfactory by straddling of the stop element, and by appropriate scale division along the probe, or on a measuring sleeve fixable on the probe, a very accurate lengthwise positioning can be effected, in particular for the jet nozzles. During the adjusting process the cross-section of the tracheal tube is sufficiently free, so that ventilation and respirationprocesses are not substantially impeded.

For easy handling of the measuring probe, in particular when pushing it forward through the opening of the tracheal tube, it appears desirable to design the stop element with unfoldable sections, which can be unfolded by an actuating element after passage through

the tube and which form a roof type seating surface for straddling the carina.

It may further be advantageous to provide the measuring probe with a displaceable and fixable measuring sleeve, which can be placed on the measuring tube above the proximal end of the tube and which has an appropriate scale division. This scale division makes exact positioning possible. The diameter of the measuring sleeve is expediently selected so that the sleeve can be displaced inside the barrel of the tracheal tube, which is advantageously transparent.

Expediently the measuring probe may consist of x-ray opaque material at least in its distal region of the stop element. Thereby doubts as to the proper seating or unfolding can be eliminated by an X-ray picture.

With the features of the invention, lengthwise positioning of a tracheal tube, in particular of a jet tube, is possible in a short time and without undue hindrance of respiration.

Accordingly, it is an object of the invention to provide an improved positioning device for use with a tracheal tube particularly a tracheal tube having a spiration gas discharge and which includes an elastic measuring probe insertable into the tube and having a stop element therein which is engageable onto the carina which may be manipulated from the exterior end of the tube from which is projects and which advantageously includes a measuring device for measuring the amount of movement of the probe relative to the tracheal tube as an indication of the precise location of the carina within the person's trachea.

A further object of the invention is to provide a respiration device which is simple in design, rugged in construction and and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a schematic illustration of a tracheal tube having a positioning device constructed in accordance with the invention shown in position in a person's trachea; and

FIG. **2** is a view similar to FIG. **1** showing the measuring probe with its stop element unfolded for engagement over the carena.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular the invention embodied therein comprises a tracheal tube which, in the embodiment illustrated, is a jet type respiration tube **1** having a distal end **1***a* which is insertable into a person's trachea indicated **11**. The trachea **11** has a major branch bifurcation which has at its center a position or location referred to as the carena. Jet tube **1**, for example, is inserted through an incision of the trachea and it is provided with an expandable or flexible sealing member **12** in order to tightly engage the tube in the trachea. In this embodiment the jet tube **1** carries for example in its wall a connecting line for a deflectable jet nozzle **2**