

[54] **DEVICE FOR MOISTENING AND HEATING INHALATION AIR WITH TRACHEOTOMY AND ENDOTRACHEAL INTUBATION**

[75] Inventor: **Carl-Eric Lindholm**, Uppsala, Sweden

[73] Assignee: **Medical Products Octagon AB**, Uppsala, Sweden

[22] Filed: **Oct. 25, 1973**

[21] Appl. No.: **409,571**

695,403	3/1902	Longden.....	128/146.2
3,491,754	1/1970	Weese.....	128/212
3,565,071	2/1971	Cobb.....	128/208

FOREIGN PATENTS OR APPLICATIONS

201,960	2/1966	Sweden.....	128/351
---------	--------	-------------	---------

Primary Examiner—Richard A. Gaudet
Assistant Examiner—Henry J. Recla
Attorney, Agent, or Firm—Fred C. Philpitt

[30] Foreign Application Priority Data

Nov. 6, 1972 Sweden..... 14331/72

[52] U.S. Cl. 128/212; 128/208; 128/351

[51] Int. Cl. A61m 15/00

[58] Field of Search 128/212, 208, 209, 205, 128/185, 254, 256, 147, 140 R, 142, 146, 146.2, 146.6, 145 R, 351

[56] References Cited

UNITED STATES PATENTS

681,622 8/1901 Cover 128/146.6

[57] ABSTRACT

A device for moistening and warming inhalation air with tracheotomy and endotracheal intubation is disclosed which device comprises a cavernous body which is made of a light, porous material having an open pore structure and which is partially encased in a casing of light, rigid or flexible material having a porosity which is denser than that of the body.

7 Claims, 2 Drawing Figures

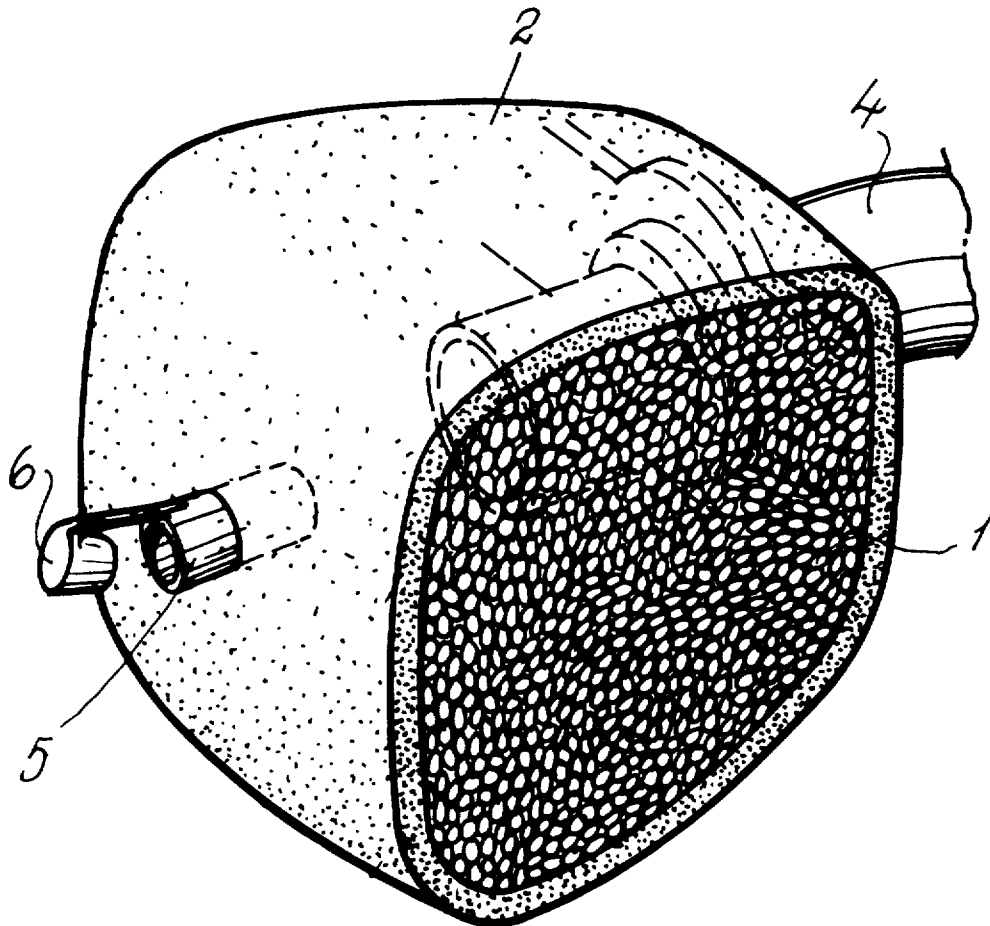


Fig. 1

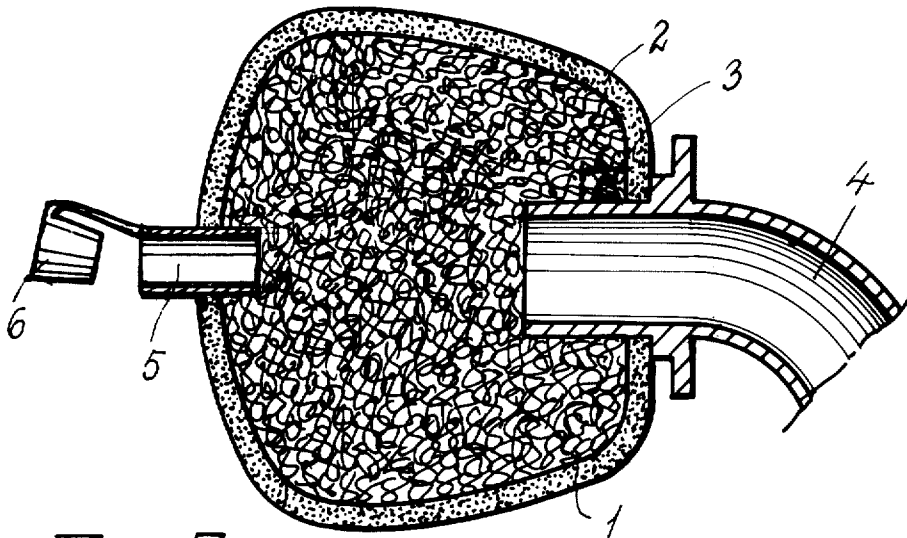
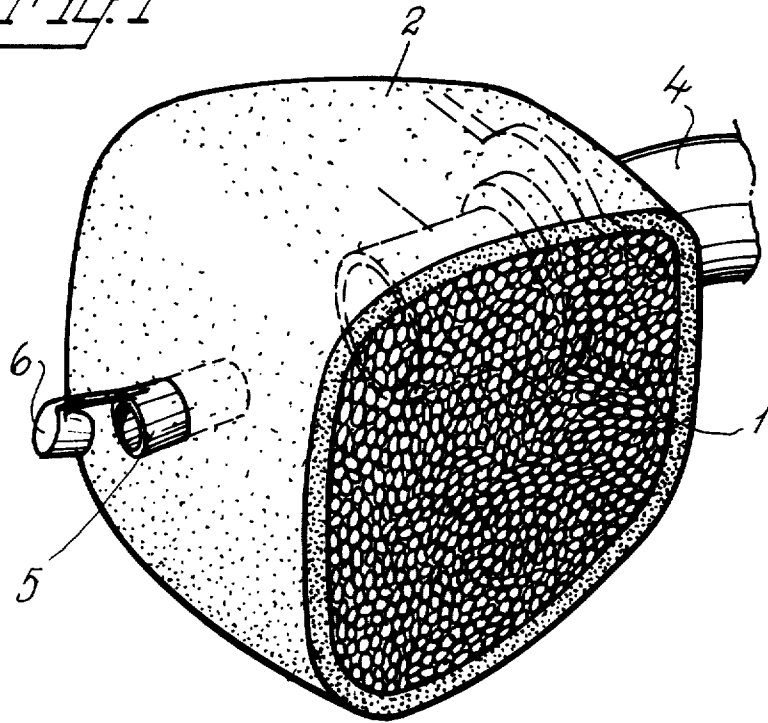


Fig. 2

DEVICE FOR MOISTENING AND HEATING INHALATION AIR WITH TRACHEOTOMY AND ENDOTRACHEAL INTUBATION

The present invention relates to a device for moistening air with tracheotomy, which device incorporates a body having cavities disposed therein.

In order to prevent the tracheal mucous membrane of a patient undergoing tracheotomy and endotracheal intubation from drying out, it is important that the air inhaled by the patient is warm and has a high moisture content. To this end there has previously been used, among other devices, a cup-shaped glass dish, which was placed over the tracheal cannula. A minor part of the moisture contained in the air exhaled by the patient settled on the glass surface of the dish in the form of condensate and as the patient inhaled the air breathed by the patient was moistened by the condensate and heated to some extent. The efficiency of this device is low, however. In an attempt to depart from the concept of a glass dish, there has been proposed a device in which a metal filter having the form of a folded metal plate coiled to the shape of a cylindrical body is placed in the upper portion of a plastic container, the lower portion of which has the form of a funnel intended for connection to a tracheal tube. The folds in the plate form openings through the filter for inhaled and exhaled air. The moisture contained in the air exhaled by the patient is deposited on the filter and absorbed by the air inhaled by the patient. Besides being expensive and relatively complicated in design, the weight of the device is troublesome to the patient and use of the device can readily cause sores, especially in the trachea. Further, as a result of its high cost of manufacture, this device must be used more than once if it is to be economic. Repeated use of the device means that it must be carefully cleaned after each occasion of use, which in turn means that the device may be in use for long periods before being changed. From the point of view of hygiene, however, long periods of use for such a device are not desirable.

The object of the present invention is to provide a device of the type aforementioned with which these and other disadvantages are substantially eliminated.

Thus, there is provided a device for moistening the air of a patient undergoing tracheotomy comprising a cavernous body, wherein the body is made of a light porous material having an open pore structure, for instance a three-dimensional mesh, and being partially enclosed by a casing of light and flexible or rigid material of more dense structure than the cavernous body.

Thus, in accordance with the invention the device can be made very cheaply and because of the fact that it is made of light materials is much less troublesome to patients than the heavier metal device.

So that the invention will be better understood and other features connected therewith made apparent, a device constructed in accordance with the invention will now be described with reference to the accompanying drawing, where

FIG. 1 is a perspective view of a device according to the invention fitted to a tracheal tube, and

FIG. 2 is a sectional view of the device shown in FIG. 1.

The device shown in FIG. 1 comprises a cavernous body 1 made from a soft, porous foamed plastics material having an open pore structure, and a casing 2 hav-

ing the form of a strap made of a rigid or a soft, flexible plastics material and stretched around the body 1. The porosity of the body 1 is much higher than the porosity of the casing 2. Extending through one side of the casing 2 and into the body 1 is a recess 3, which is intended to receive one end of a known tracheal tube. Located generally opposite the tracheal tube receiving recess 3 is a connection 5, which is retained in the casing 2 by glue or by being a part of the outer layer of the device. The connection 5 is capable of being closed by means of a plug 6.

The mode of operation of the device is as follows:

As the patient exhales, air from the tracheal tube 4 passes into the body 1 and out through the sides thereof not covered by the casing 2 and the heat and moisture of the inhaled air is caught on the walls of the three dimensional mesh of the body 1. As the patient inhales, the dry air passes in the opposite direction to the exhaled air, into the body 1 generally through the sides thereof not covered by the casing 2, and takes up moisture and heat from the walls of the pores of body 1 before passing into the tracheal tube 4. The casing 2 prevents the air from taking the nearest way out and in through the body 1 and provides for division of the air flow, thereby enabling a larger part of the pores contained by the body 1 to be used for moisture exchange. The purpose of the connection 5 is to enable other gases, such as oxygen for example, to be administered to the patient.

Although the invention has been described with reference to one embodiment thereof, it is not restricted thereto. For example, the body 1 and the casing or strap 2 can be given shapes different to that shown and may be made from different materials, the important feature being that the design of the strap 2 leaves large areas of the body 1 exposed to the surroundings, so that the patient can breath without difficulty. Further, the free surfaces of the porous body 1 are conveniently placed in relation to the recess arranged to receive the tracheal tube so that the flow of air is divided and so that the greatest portion of the porous body is used for moisture and heat exchange. Recess 3 may also extend through the whole body 1 to form a canal between connection 5 and tracheal tube 4. According to a further embodiment the casing 2 may be a thinwalled plastic cylinder with open ends in which cylinder the body 1 is enclosed.

As previously mentioned, the different components of the device are, where possible, made of a light, soft material, so as to avoid discomfort and injury to the patient. Polyurethane or polyether foamed plastic may be used to advantage for the porous body 1, while the casing or strap 2 may be made from fine-pore polyether, fine-pore foamed rubber, PVC foil, other plastic materials etc.

The body 1 should be nontoxic to the mucous membranes of the airway.

The size of the device may vary according to the age of the patient, although the lightness of the device permits the use of a standard size for adults and a standard size for children.

An additional feature is that the denser material of strap 2 can be folded in slightly at recess 3 in order to facilitate the introduction of tracheal tube 4 into recess 3.

What I claim is:

3

1. A device for moistening and warming inhalation air with tracheotomy and endotracheal intubation, said device having a cavernous body which is made of a light, porous material having an open pore structure and which is encased in a cylinder-like casing of light material having open ends and having a porosity which is denser than that of the body, said cavernous body completely filling said cylinder, a recess extending through the casing into the body intended to function as a passage-way through said casing for air passing between said cavernous body and a patient through a tracheal tube.

2. A device according to claim 1, wherein said light material of the cylinder-like casing is rigid.

3. A device according to claim 1, wherein said light material of the cylinder-like casing is flexible.

4

4. A device according to claim 1, wherein the cylinder-like casing has the form of a strap stretched about said body.

5. A device according to claim 1, wherein said cylinder-like casing is a thin-walled plastic.

6. A device according to claim 1, wherein both the body and the cylinder-like casing are made of soft foamed plastic, and wherein the porosity of the body is much greater than the porosity of the casing.

7. A device according to claim 1, wherein a pipe having a plug coacting with one end thereof is secured in the denser material of the cylinder-like casing, said pipe being arranged for the supply of gas to the patient when required.

* * * * *

20

25

30

35

40

45

50

55

60

65