May 18, 1954 H. BRÜNER ET AL 2,678,646

SEALING DEVICE FOR APPARATUS FOR ARTIFICIAL RESPIRATION

Filed March 19, 1951 2 Sheets-Sheet 1

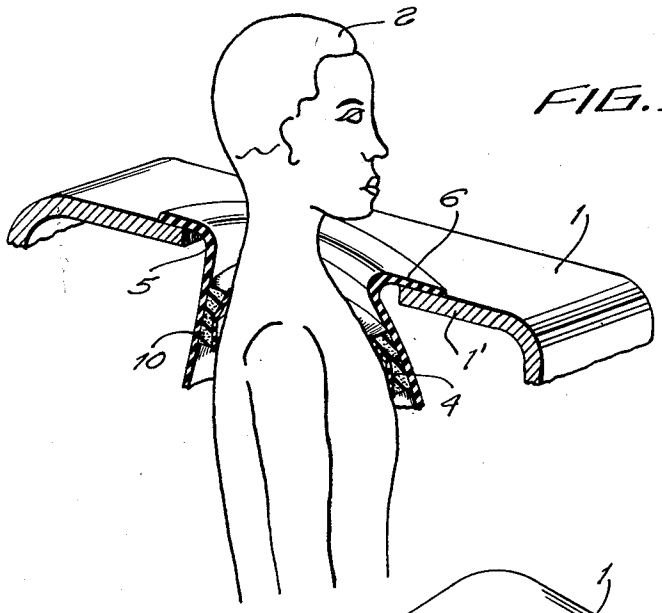


FIG. 1.

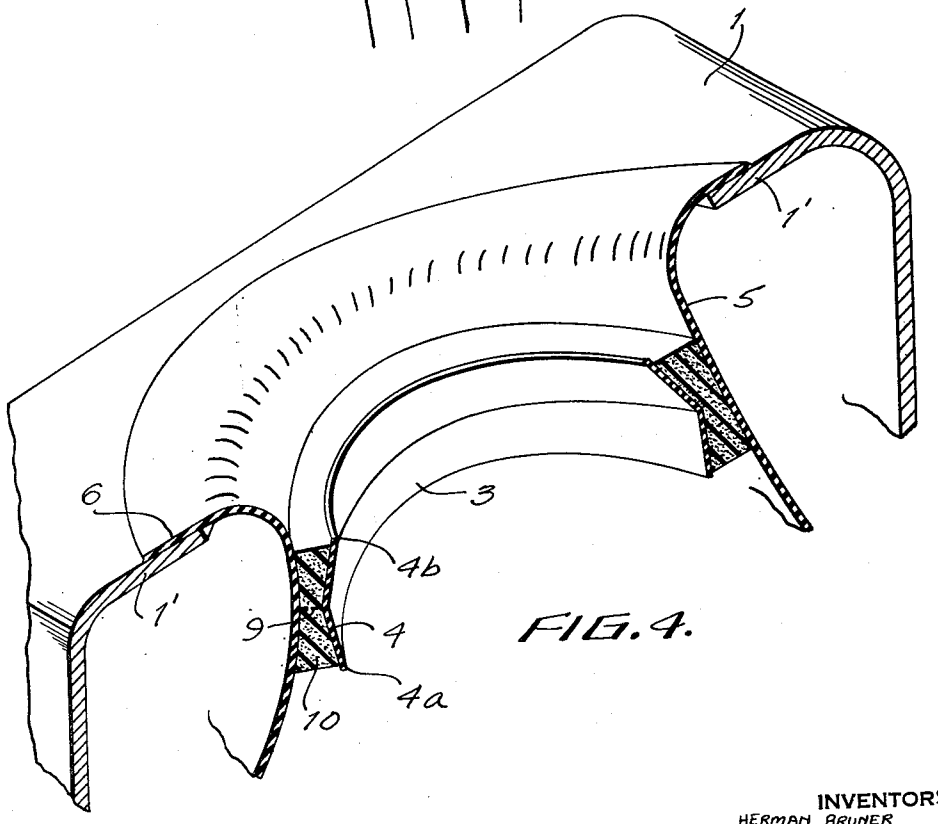


FIG. 4.

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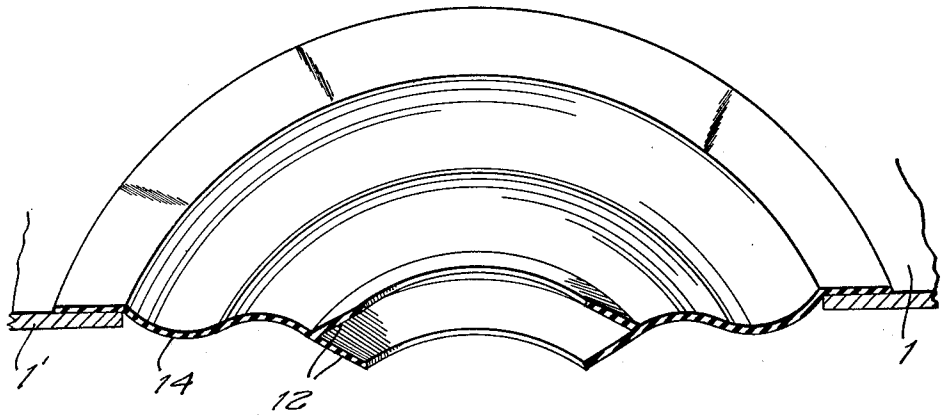
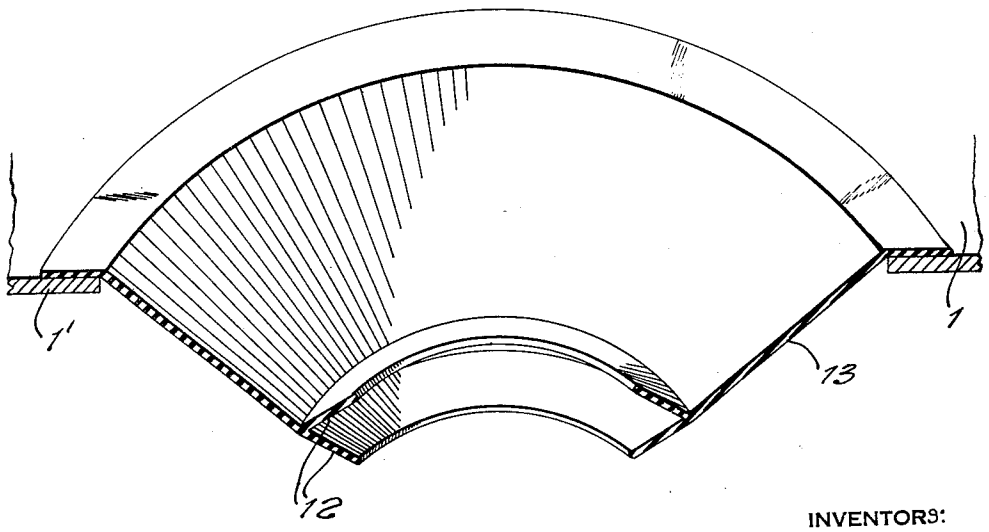


FIG. 2.

FIG. 3.



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SEALING DEVICE FOR APPARATUS FOR ARTIFICIAL RESPIRATION

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Claims priority, application Germany November 22, 1948

6 Claims. (Cl. 128—30)

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The present invention relates to a sealing device for the use in apparatuses for artificial respiration.

Apparatuses for artificial respiration are known in which the body of a patient is placed in a respiration chamber while the head is protruding out of it. The opening in the chamber provided for the neck of the patient must be air-tightly closed in a manner effectively sealing the chamber against positive and negative pressure since in the chamber pressure alternations are produced by an air pump. To obtain a reliable seal, the sealing device must be adjusted rather tightly which has a disadvantage of strong pressure on the blood vessels of the neck (carotis sinus) leading to undesired changes in blood pressure, or even symptoms of strangulation.

It is the object of the present invention to avoid the disadvantages of the known sealing devices by sealing the respiration chamber along the line leading from the chest and the collar bones to the nape of the neck of the patient by two annular sealing portions which seal the respiration chamber against higher pressure inside, and outside the respiration chamber, respectively. The advantage of a seal along that line is, that no blood vessels or nerves are influenced in any way since the seal presses against a bone structure. Any undesired irritation of the large blood vessels of the neck is thereby avoided.

A further advantage of the present invention is that head and neck of the patient are freely movable.

In a preferred embodiment of the invention the seal is effected by a V-shaped sealing ring made of a thin and flexible material such as rubber, one portion of which is facing outwards, while the other portion is facing the inside of the respiration chamber. The outer sealing portion mainly seals against higher outside pressure while the inner sealing portion mainly seals against higher inner pressure. The V-shaped sealing ring is attached to an annular supporting member which is secured to the front wall of the apparatus. Preferably an annular cushion is provided between the sealing ring and the supporting member.

The ring-shaped sealing device can also be secured to a vest which assures a constantly right position of the seal.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

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Fig. 1 is an isometric cross-sectional view showing the line along which the seal is in contact with the body of the patient;

Fig. 2 is a cross sectional view of an embodiment of the present invention;

Fig. 3 is a cross sectional view of another embodiment of the present invention; and

Fig. 4 is a cross-sectional view of a preferred embodiment of the invention.

In Fig. 1 the head 2 of the patient protrudes through an opening in the front wall 1 of the respiration chamber. The annular sealing means according to the present invention include a sealing ring 4 which is in contact with the body of the patient along a line extending substantially from the chest along the collar bones, over the shoulders and to the nape of the neck of the patient. The annular sealing means according to the present invention, also include an annular supporting member 5 which has an outer annular edge 6 air-tightly secured to the annular edge 1' which bounds the opening in the front wall 1. In the embodiment shown in Figs. 1 and 4, the annular supporting member 5 is substantially conical and is secured to the sealing ring 4 by means of a seam 9. Between the rubber ring 4 and the annular supporting member 5, an annular sponge rubber cushion member 10 is provided. The sealing ring 4 and the cushion member 10 are depressed by the seam 9 so that in the annular sealing face 3 of the sealing ring 4, an annular depressed face portion is formed which is bounded by annular sealing face portions 4a, 4b, extending along the annular edges of the sealing ring.

In the embodiments shown in Figs. 2 and 3, the seal is effected by a V-shaped sealing ring having annular portions 12, preferably consisting of thin rubber. In the embodiment shown in Fig. 3, the sealing ring portions 12 are secured to a conical supporting member 13, while in the embodiment shown in Fig. 2, the annular supporting member 14 is S-shaped.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of sealing devices differing from the types described above.

While we have illustrated and described the invention as embodied in an annular sealing means for an apparatus for artifical respiration,

we do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of our invention.

Without further analysis, the foregoing will so fully reveal the gist of our invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What we claim as new and desire to secure by Letters Patent is:

1. In an apparatus for artificial respiration in combination, a rigid front wall of the apparatus having an annular edge defining an opening; a sealing ring being located rearwardly with respect to said front wall and in the interior of the apparatus, said sealing ring having a first annular portion extending outwardly and forwardly and a second annular portion extending rearwardly and inwardly with respect to said front wall of the apparatus, said annular portions being shaped so as to fit to the body of a patient along parallel sealing lines extending along the chest, the collar bones, the shoulders, and the nape of the neck; and an annular supporting member consisting of a flexible material and having an outer annular edge air-tightly secured to said annular edge of said front wall, and an inner annular edge air-tightly secured to said sealing ring.

2. In an apparatus for artificial respiration, in combination, a rigid front wall of the apparatus having an annular edge defining an opening; a sealing ring having two annular parallel spaced sealing edges adapted to fit on the body of a patient along a sealing line extending along the chest, the collar bones, the shoulders, and the nape of the neck; and an annular supporting member having an S-shaped cross section and consisting of a flexible material and having an outer annular edge air-tightly secured to said annular edge of said front wall, and an inner annular edge air-tightly secured to said sealing ring.

3. In an apparatus for artificial respiration, in combination, a rigid front wall of the apparatus having an annular edge defining an opening; a sealing ring having a V-shaped cross section and being located rearwardly with respect to said front wall and in the interior of the apparatus; an annular supporting member consisting of a flexible material and having an outer annular edge air-tightly secured to said annular edge of said front wall, and an inner annular edge secured to said sealing ring, an annular cushion member consisting of a soft resilient material and located intermediate said sealing ring and said annular supporting member and a seam located centrally on the surface of said sealing ring fastening said sealing ring and said cushion

member to said annular supporting member in such a manner as to compress said cushion member in the center thereby elastically deforming said surface of said sealing ring so as to render the same V-shaped in order to form an airtight seal along the edges of said sealing member.

4. In an apparatus for artificial respiration, in combination a rigid front wall of the apparatus having an annular edge defining an opening; and annular sealing means secured to said annular edge and having an annular sealing face, said annular sealing face having an annular depressed portion bounded by outer and inner annular spaced sealing face portions along opposite edges of said annular depressed portion, said outer sealing face portion being adapted to seal mainly against outer gas pressure which is greater than the inner gas pressure in the apparatus, and said inner sealing face portion being adapted to seal mainly against inner gas pressure which is greater than the gas pressure outside the apparatus.

5. In an apparatus for artificial respiration, in combination a rigid front wall of the apparatus having an annular edge defining an opening; and annular sealing means secured to said annular edge and including a sealing ring having an annular sealing face, said annular sealing face having an annular depressed portion bounded by outer and inner annular spaced sealing face portions along opposite edges of said annular depressed portion, said outer sealing face portion being adapted to seal mainly against outer gas pressure which is greater than the inner gas pressure in the apparatus, and said inner sealing face portion being adapted to seal mainly against inner gas pressure which is greater than the gas pressure outside the apparatus.

6. In an apparatus for artificial respiration, in combination, a rigid front wall of the apparatus having an annular edge defining an opening; and annular sealing means secured to said annular edge and including a sealing ring consisting of a soft resilient material and having an annular sealing face, said annular sealing face having an annular depressed portion bounded by outer and inner annular spaced sealing face portions along opposite edges of said annular depressed portion, said outer sealing face portion being adapted to seal mainly against outer gas pressure which is greater than the inner gas pressure in the apparatus, and said inner sealing face portion being adapted to seal mainly against inner gas pressure which is greater than the gas pressure outside the apparatus.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,241,444	Bower	May 13, 1941
2,506,865	Forrey	May 9, 1950
2,521,679	Ackerman	Sept. 12, 1950