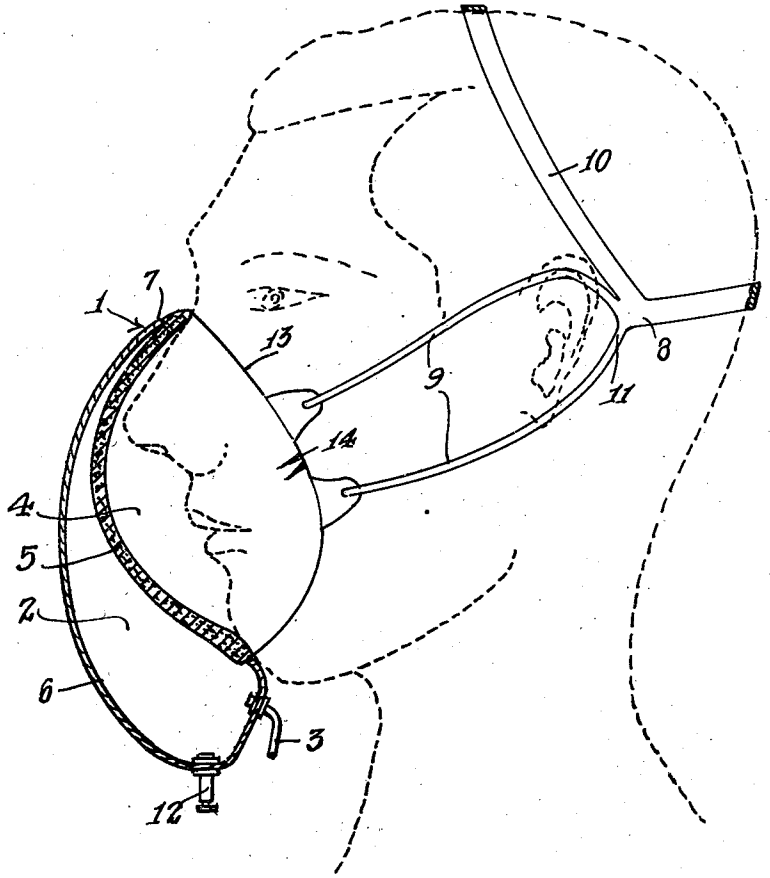
July 8, 1941. C. F. LOMBARD 2,248,477

METHOD AND APPARATUS FOR ADMINISTERING OXYGEN

Filed Feb. 27, 1940



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Patented July 8, 1941 2,248,477

UNITED STATES PATENT OFFICE

2,248,477

METHOD AND APPARATUS FOR ADMINISTERING OXYGEN

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Application February 27, 1940, Serial No. 321,028

5 Claims. (Cl. 128—202)

This invention relates to a method and apparatus for conserving gas being administered to a patient, and while the invention may be employed in administering anaesthetics in the form of a gas, it is intended to be particularly useful when employed as an oxygen mask for administering oxygen to a patient, thereby avoiding the necessity of employing a relatively expensive oxygen tent.

In the usual hospital practice, when employing an oxygen mask the entire exhalation from the patient is permitted to escape into the atmosphere, and of course when a patient is being administered this oxygen, a considerable quantity of oxygen is expelled from the patient's body with the vitiated oxygen that has passed from the patient's lungs.

The principal object of the present invention is to provide a method and apparatus, the practice of which will result in a considerable saving in the amount of oxygen gas consumed in administering the same to a patient.

A further object of the invention is to provide an apparatus of very simple construction, which can be applied over the patient's mouth and/or nose, and which will operate in such a way that when the patient exhales, the first portion of the gases exhaled will pass back toward the oxygen supply, while the remaining portion of the exhalation will be expelled or permitted to escape into the atmosphere. In this way the volume of oxygen that was filling the patient's trachea and bronchial tubes, and which is unvitiated, will be conserved and pass back into the oxygen supply, after which the vitiated portion of the exhaled gases will escape or pass out into the atmosphere.

Further objects of the invention will appear hereinafter.

The invention consists in the novel steps and novel elements of construction and combinations thereof, which cooperate to produce an efficient method and apparatus for administering oxygen.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

The drawing is a vertical section through an inhalating apparatus embodying my invention, and with which I prefer to practice my method.

In practicing my invention, I confine an accumulated volume, or quantity of the gas that is being administered to the patient in the vicinity of the patient's respiratory outlet, either his nose, mouth, or both; and at the same point I confine the first unvitiated portion of the gas exhaled by the patient from his trachea or bronchial tubes; after which I permit the remainder or vitiated portion of the exhalation to escape.

My novel apparatus for practicing this method preferably comprises a body with an outer chamber into which the gas is admitted, and an inner chamber that is in gaseous communication with the outer chamber. This gaseous communication may be effected by means of one or more perforations, but preferably by employing a porous wall between the inner chamber and the outer chamber. The inner chamber is of course located adjacent the patient's nose or mouth, or both, and the operation of the apparatus is such that as the first portion of the patient's exhalation passes into the inner chamber, a considerable portion of this exhaled gas which is unvitiated, will pass from the inner chamber to the outer chamber, mixing with the gas supply; and at some point during the patient's exhalation, the pressure in the outer chamber will rise considerably, and this higher pressure will be communicated to the inner chamber, and the portion of the exhalation after this moment is reached, is permitted to escape preferably in the atmosphere around the edge of the inhalator where the same is in contact with the patient's face.

Referring more particularly to the parts, 1 indicates the body of the inhalator, which contains an outer chamber 2, which constitutes an inlet chamber into which the gas such as oxygen is admitted through a supply tube 3.

When the inhaling apparatus is in use, of course it is applied over the patient's respiratory outlet, or outlets, as indicated by the dotted lines that indicate the relation of the patient's head and face with respect to the inhaling apparatus. The inhaling apparatus is so constructed that when applied to the patient's face, it cooperates with the patient's face to form an inner chamber 4.

The inhaling apparatus is constructed so that the inner chamber 4 is in gaseous communication with the outer chamber 2. This may be accomplished in any manner, for example, by providing a wall having one or more ducts through which the communication is established, but I prefer to employ for this purpose a wall 5 that is pervious to the gases. For this purpose I prefer to employ sponge rubber or similar material to form this wall, the said rubber being of a porous nature and capable of permitting gas to pass through the pores between the two chambers. Furthermore this material (sponge rubber) is admirably adapted for making contact with the patient's face, and for this reason the outer wall or sack 6 that forms the outer wall of the chamber 2, is preferably attached at its edge 7 to the outer face of the wall 5, which wall operates as a mask applied over the nose and mouth of the patient.

The inhaling apparatus is removably held in place by any suitable means such as a headgear or harness 8, that includes two forwardly ex-

tending straps or cords 9 attached at two points to the wall of the mask, and rear straps 10 that are preferably elastic and which may be applied to the patient's cranium as indicated. The cords 9 may form a loop 11 at their rear end, that passes around the patient's ear as indicated in the dotted lines in the figure.

The wall or sack 6 is preferably provided with a small drain valve 12 that may be opened at will to drain off moisture collecting at the lowest point of the chamber 2.

At the point of contact between the mask wall 5 and the patient's face, the mask wall 5 is preferably provided with a rounded lip 13 to insure that it will be comfortable when worn by the patient; and while this lip should fit reasonably closely to the patient's face, it is not necessary that it should form an absolutely gas-tight contact with the same. If, however, the lip 13 is so constructed as to fit gas-tight throughout its entire length, then I prefer to provide one or more small grooves 14 in the face of the lip, for a purpose that will appear hereinafter.

In the operation of this inhaling apparatus, of course when the gas such as oxygen is admitted to the chamber 2, this gas immediately passes in to the inner chamber 4 where it is inhaled by the patient. When exhalation occurs, the immediate effect of the exhalation is to slightly raise the pressure in the inner chamber 4, which causes a flow of the oxygen within the same outwardly through the wall 5 into the chamber 2. The inlet 3 for the oxygen being relatively small, insures that a rise in pressure in the chamber 2 will occur, and this rise in pressure in the outer chamber 2 is communicated back into the inner chamber 4. When this point in the act of exhalation occurs, most of the volume of the oxygen that occupied the patient's trachea and bronchial tubes, will have passed the wall 5, and the chamber 4 will commence to fill with vitiated oxygen carrying a large amount of carbon dioxide picked up from the patient's lungs, and as the exhalation continues, a large portion of this vitiated gas or oxygen from the patient's lungs, will escape at any points along the lip 13 where the mask does not fit tightly to the patient's face, or at the grooves 14 if it happens that the mask does fit gas-tight throughout the entire length of the lip. In considering the mode of operation described above, it should be understood that it is not intended to state that a complete separation of the unvitiated exhalation from the vitiated portion of the exhalation can be accomplished. However, this is of relatively slight importance. No harm will be done if some of the carbon dioxide passes through the wall 5 into the inlet chamber 2, and no great harm is done either if some of the exhaled unvitiated oxygen escapes along the lip 13 or at the grooves 14 in the first portion or stage of the exhalation. The practice of the invention will evidently result in a considerable saving in the amount of oxygen that would be consumed in administering oxygen to a patient.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. An inhaling apparatus to be applied to a patient's respiratory outlet, comprising a body with an outer chamber into which the gas is first admitted, and an inner chamber in gaseous communication with the outer chamber, located adjacent the patient's respiratory outlet, and into which the gas flows from the outer chamber, and operating so that the first portion of the patient's exhalation passes from the inner chamber to the outer chamber; said inhaler apparatus constructed so as to effect the escape of the vitiated latter portion of the exhalation.

2. An inhaler apparatus for administering gas to a patient, having an inlet chamber through which the gas is first admitted to the inhaler apparatus and having a mask wall to be applied to the respiratory outlet of the patient and cooperating therewith to form an exhalation chamber, with means for permitting communication through the mask wall into the inlet chamber, the parts of said inhaler apparatus cooperating so that the first portion of the gas exhaled by the patient passes back through the said wall into the inlet chamber, the latter portion of the exhaled gases, escaping into the atmosphere.

3. An inhaler apparatus for administering gas to a patient, having an outer wall, and having a mask wall cooperating with the first-named wall to form an inlet chamber, said mask wall constructed to be applied over the respiratory outlet of the patient and capable of permitting gases to pass through the same, the parts of said inhaler apparatus cooperating when applied to the patient to permit the first portion of the exhaled gas to pass through the wall of the mask into the gas inlet chamber and operating thereafter to permit the escape of the latter portion of the exhaled gases into the atmosphere adjacent the edge of said mask.

4. An inhaler apparatus for administering gas to a patient, having an outer wall and having a mask connected adjacent its edges with the outer wall and cooperating with the same to form a gas inlet chamber, said gas inlet chamber having an inlet connection for admitting gas thereto, said mask operating to fit over the respiratory outlet of the patient and cooperating with the patient's face to form an exhalation chamber, said mask wall being porous so as to permit gas to pass therethrough, and all of said parts cooperating so that the first portion of the gases exhaled by the patient, pass through the mask wall into the gas inlet chamber, and the latter portion of the same escape to the atmosphere between the surface of the patient's face and the edge of the mask.

5. In an inhalator mask for administering gas to a patient, the combination of an outer substantially gas-proof sack wall and a mask to be seated over the patient's nose and having a porous wall between the patient's nose and the interior of the said sack, and means for supplying gas to the said sack, said mask operating during an exhalation to permit the first portion of the exhalation to pass through the said porous wall into the interior of the gas sack, the latter part of the exhalation movement which is relatively laden with carbon dioxide from the patient's lungs, operating to escape from the exhalation chamber into the atmosphere.

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