Oct. 28, 1958 V. R. BENNETT 2,857,911

RESPIRATORY MOUTHPIECE

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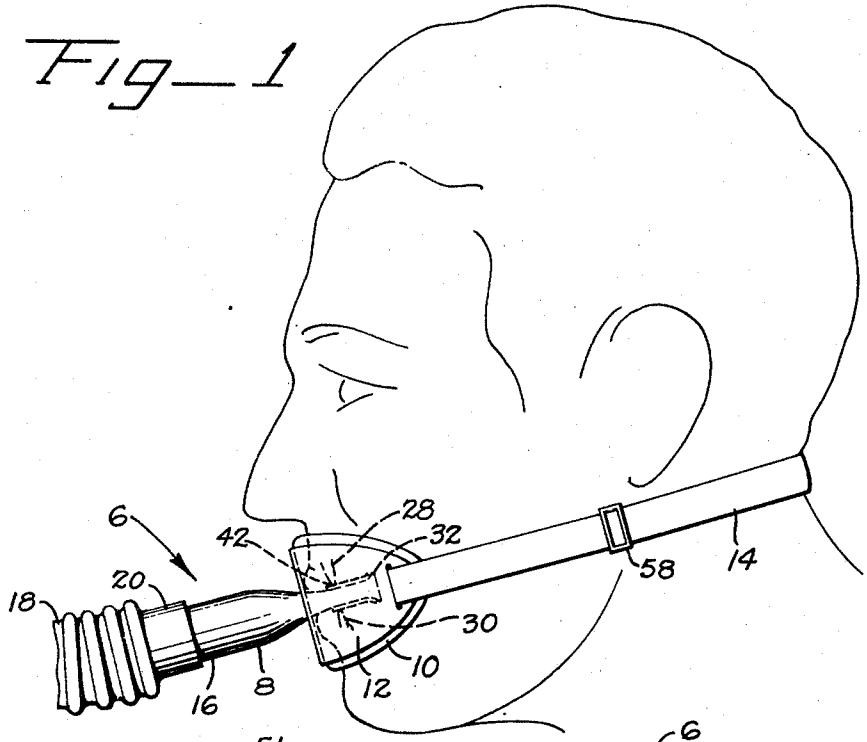
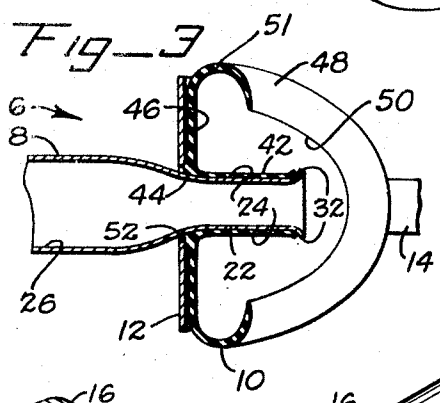
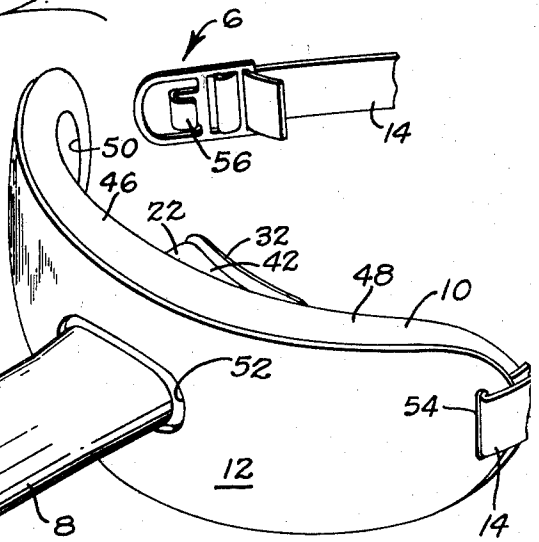
Fig—1

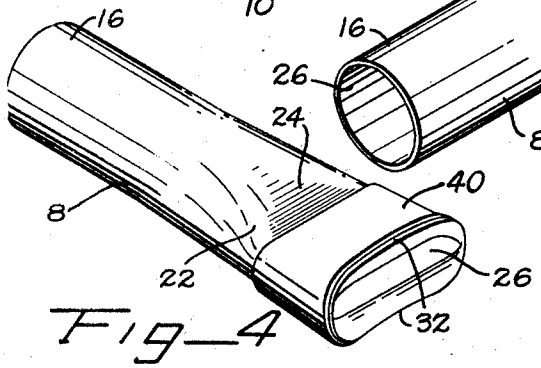


Fig—3





Fig—2



Fig—4

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RESPIRATORY MOUTHPIECE

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2 Claims. (Cl. 128—147)

This invention relates to respirating appliances, and more particularly to a mouthpiece for administering gas.

An object of the invention is to provide an improved respiratory mouthpiece.

Another object is to provide an improved attachment for respiratory apparatus that may be used to administer gas by mouth when circumstances make it inconvenient or otherwise less desirable to employ a conventional face mask.

Another object is to provide a respiratory mouthpiece including means providing a mouth airway and means for establishing an efficient external seal with the patient's face in an area encircling the mouth but excluding the nostrils.

Another object is to provide a mouthpiece for use in respiratory therapy involving the administration of gas either with or without positive pressure.

Another object of the invention is to provide a respiratory mouthpiece that is highly dependable in preventing loss of the gas being administered.

Another object is to provide a respiratory mouthpiece that will seal effectively with external portions of the patient's face under all conditions of medical and research use, such as in resuscitation, anaesthesia, administering intermittent pressure breathing, and performing basic metabolism tests.

Another object is to provide a mouthpiece of the general character described, which is highly efficient in carrying out the functions that it is intended to perform, and yet which is of very simple and inexpensive construction, which is adapted to be easily and quickly applied to a patient, and which is particularly adapted for facile and thorough sterilization.

The invention possesses other objects and advantageous features, some of which, with those enumerated, will be set forth in the following description of the form of the invention illustrated in the drawings accompanying the forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said drawings and description, but that I may adopt variations of the illustrated and described form within the scope of the invention as defined by the claims.

Referring to the drawings:

Figure 1 is an elevational view of the respiratory mouthpiece of the invention, illustrating one manner of affixing the device to a patient.

Figure 2 is a perspective of the mouthpiece of Fig. 1 apart from the patient. Part of the figure is broken away to reduce its size.

Figure 3 is a longitudinal, medial, vertical section of the mouthpiece of Figs. 1 and 2.

Figure 4 is a perspective of the body portion of the mouthpiece of Figs. 1, 2, and 3, with portions removed to permit use of the apparatus differently than when assembled as illustrated in the other figure.

The respiratory mouthpiece **6** of the invention comprises a tubular body portion **8**, a resiliently flexible cuff **10** adapted to be mounted on the body portion **8** to aid

in establishing a gas-tight seal between the mouthpiece and the patient's face, and a pressure plate **12** having a neck strap **14** for holding the mouthpiece **6**, and more particularly for holding the cuff **10** in operative position.

The body portion **8** is formed from a suitable length of rigid metal tubing, although various well-known plastics are satisfactory as the material that may be employed in the manufacture of the body portion **8**. In any event, the body portion is of cylindrical form at its outer end region **16** to provide means for easily attaching the body portion **6** to a conventional breathing tube **18** (Fig. 1) of the type commonly employed in various types of respiratory appliances for administering gas to a person. With this object in view, the cylindrical end region **16** is dimensioned so as to permit it to be inserted into the delivery end **20** of a breathing tube, and to fit sufficiently tightly therein to insure retention of the parts in operative interengagement and to prevent leakage of gas therebetween, without requiring a clamp or other fastening means, and yet to permit instant disengagement of the body portion **8** from the breathing tube **18** whenever desired.

The inner end region **22** of the body portion **8** is flattened to an extent making two opposite sides **24** thereof flat and parallel to each other throughout a transverse distance approximately equal to the diameter of the cylindrical portion of the tube. The flat sides **24** are spaced apart by a distance sufficient to avoid unduly restricting flow of gas through the bore **26** of the tube at the pressures commonly employed in administering gas, and yet to permit the flattened part **22** of the tube to be gripped between the upper and lower teeth **28** and **30**, respectively (Fig. 1), of a patient for prolonged periods without discomfort. The terminal edges of both flat sides **24** are flared outward to form flanges **32** extending in opposite directions from the outer faces of the top and bottom flat sides **24**. The flanges **32** assist in retaining the mouthpiece **6** in operating position, it being understood that the mouthpiece is employed in administering gas to a person by placing the inner end region **22** within the person's mouth, as illustrated in Fig. 1, to enable him to breathe gas supplied to him from any appropriate type of apparatus by the breathing tube **18**. The flanges **32** likewise assist in retaining in position a cushioning sleeve, presently to be described, that is adapted to be slipped over the inner end region **22** of the mouthpiece to provide a cushion between the teeth **28**, **30** of a person using the mouthpiece **6** of the invention, and the tubular body portion **8**.

The cushioning sleeve referred to can take either of two forms indicated at **40** (Fig. 4) and **42** (Figs. 1–3), respectively. The sleeve **40** is a simple, short length of tubing of rubber or rubber-like material, whose inside diameter when unstressed is slightly less than the outside diameter of the metal tubing of which the body portion **8** is formed, so that when the sleeve **40** is seated on the body portion **8**, the sleeve is in a slightly stretched condition, and consequently is retained in operative position by the inherent resiliency of the material of which the sleeve is formed. The sleeve **40** is intended to be used when the tubular body portion **8** of the mouthpiece **6** is used alone, i. e., without the sealing cuff **10**, pressure plate **12**, or neck strap **14**, to make the appliance more comfortable to the patient by permitting him to grip between his teeth the flat sides **24** of the inner end region **22** which is inserted into his mouth, but to prevent his teeth from coming into contact with the metallic tubular body portion **8**. The flanges **32** of the body portion **8** assist in retaining the cushioning sleeve **40** in operating position by preventing it from sliding toward and off the flanged inner end of the body portion **8**.

The sleeve 42, intended to be used instead of the sleeve 40, is of similar material and dimension, except for the fact that it is preferably somewhat longer than the sleeve 40 since in addition to serving as a cushion for the teeth of the person using the mouthpiece 6, the sleeve 42 co-operates with the cuff 10 in maintaining a gas-tight seal between the body portion 8 and the person's face. With this purpose in view, the outer end of the sleeve 42 is affixed, as by vulcanizing, to the cuff 10 in a manner establishing a gas-tight seal therewith, and throughout the entire periphery of a central aperture 44 (Fig. 3) in the cuff 10 through which the body portion 8 can be thrust to mount the cuff 10 and sleeve 42 on the body portion 8.

The cuff 10 is composed of rubber or rubber-like material that is soft enough to be resiliently flexible and yet sufficiently firm to retain its characteristic form against reasonably strong pressure. It is molded to the form of an ovaloid front piece 46 that is arcuate when viewed edgeways from above, substantially in conformity with the human face in the region of the mouth. The hereinbefore mentioned aperture 44 is approximately in the center of the front piece 46, and the sleeve 42 projects from the concave side of the front piece 46, as illustrated in Figs. 1–3 of the accompanying drawing. An inward and reversely extending flange 48 is formed on the front piece 46, extending throughout the entire outer periphery thereof, being so proportioned that the terminal region 50 of the flange 48 is spaced from the front piece 46 of the cuff 10 and thus presents a highly yieldable and yet resilient portion of the cuff 10 to the face of a user in an area completely encircling the mouth. Moreover, the spacing between the inturned flange 48 and the front piece 46 of the cuff 10, permits some of the gas being administered to a patient in the event that he does not maintain a tight seal with his lips with the exterior surface of the sleeve 42, to enter between the flange 48 and the front piece 46. In this manner, pressure of the gas is utilized to press the flange 48 more firmly against the patient's face and into conformity with its contours, to aid in preventing leakage of the gas from beneath the cuff 10.

Another feature of the cuff 10 of the present invention that assists in establishing an efficient external seal with the patient's face, is the tapered conformation of the flange 48. As shown in Fig. 3, the flange 48 corresponds to the front piece 46 of the cuff 10 in thickness throughout the region of the flange that extends from the front piece 46 and curves through approximately 90 degrees to extend in a plane perpendicular to the front piece 46. But as the flange 48 turns inward through approximately another 90 degrees, it is of gradually diminishing thickness, being so proportioned that its terminal region 50, which extends in a plane approximately parallel to the front piece 46, is feathered to a very thin edge. Consequently, the intermediate region 51 of the flange 48, while moderately flexible, possesses sufficient strength to support the terminal region 50 so as to space the terminal region 50 from the front piece 46, and to pass the terminal region into the depressions and hollows of the patient's face. The terminal region 50 being materially thinner than the other parts of the cuff, is materially more flexible, and is therefore adapted to readily and effectively conform to irregularities of the face, particularly in response to gas pressure within the cuff 10, and thus to establish an efficient seal with external portions of the face to prevent escape of gas from within the cuff.

The pressure plate 12 is a simple sheet of fairly stiff material (sheet aluminum and stainless steel of proper gauge, and several types of sheet plastic are suitable) similar in both shape and dimensions to the front piece 46 of the cuff 10, against whose front face the plate 12 is intended and adapted to bear, for the purpose of pressing the flange 48 more firmly against the face. The

plate 12 is provided with a central aperture 52 to permit the body portion 8 to be inserted therethrough. The aperture 52 is considerably larger than the region of the body portion 6 that is disposed within the aperture 52 when the plate 12 bears against the cuff 10. This permits the plate to float freely relatively to the other parts of the mouthpiece 6, and thus to be pulled against the cuff 10 by the neck strap 14, one end of which is looped through an eye 54 provided in one end of the pressure plate 12 and the other end of which carries a hook 56 releasably engageable within another eye (not shown) in the opposite end of the pressure plate. The neck strap is preferably adjustable by means of a conventional slide buckle 58 to adapt it to persons of different size, and is elastic so as to avoid discomfort to the wearer.

In practical operation, the mouthpiece 6 of the invention can be employed either with or without the cuff 10, pressure plate 12, and neck strap 14. If the person to whom gas is to be administered is conscious and cooperative, it may be preferable to use the tubular body portion 8 with only the cushioning sleeve 40 thereon. In such case, the inner end region 22 with the sleeve 40 thereon, is inserted into the patient's mouth, and the outer end 16 is connected to a suitable source of the gas to be administered, by means of the breathing tube 18 in the manner hereinbefore described. The patient may grip the flat sides 24 of the body portion 8 by biting onto the sleeve 40, thus to firmly hold the mouthpiece in position. In any case, he should press his lips against the sleeve 40 with just enough pressure to be comfortable. This will maintain a gas-tight seal with the mouthpiece to avoid loss of the gas.

Under other circumstances, as when concerned with an unconscious patient, it may be desirable or necessary to employ the sealing cuff 10 and pressure plate 12. The sleeve 40 should first be removed from the body portion 8 of the mouthpiece 6, and the plate 12 placed thereon with the concave face of the plate 12 facing toward the flattened, inner end of the body portion 8. The aperture 32 of the plate 12 is sufficiently larger than the flanged end of the body portion 8 to pass easily through the aperture 32. The cuff 10 should then be mounted, this being accomplished by slipping the sleeve 42 onto the body portion 8 from the flanged end of the latter and with the end of the sleeve 42 to which the cuff 10 is secured leading. The flattened, flanged end of the body portion 8, enclosed within the sleeve 42, should then be inserted into the patient's mouth far enough to press the flange 48 of the cuff 10 firmly against the patient's face in an area completely encircling his mouth. The neck strap 14 should then be placed in position and adjusted to keep the flange 48 in sealing engagement with the face. This will insure against loss of gas even if the patient does not keep his lips in sealing engagement with the sleeve 42.

Thus it may be seen that when the mouthpiece is employed with the cuff 10, pressure plate 12, and neck strap 14, it establishes an efficient external seal and therefore eliminates the necessity of employing sealing means that extend into the mouth, between the teeth and the lips. Consequently, the mouthpiece of the invention is far less uncomfortable to the patient, and yet establishes such an effective seal that it prevents loss of gas as in anaesthesia and loss of pressure as in resuscitation.

Having thus described my invention, what I believe to be new and desire to protect by Letters Patent is:

1. A mouthpiece for administering artificial respiration comprising a rigid tube, means for connecting one end of the tube to a source of gas to be administered, a sleeve of cushioning material covering the region of the tube adjacent the other end thereof and establishing a fluid-tight seal with the tube, a cuff of resiliently yieldable material having an aperture therethrough through which the tube extends, said cuff and said sleeve being continuously interconnected about the circumference of said

aperture thereby maintaining a fluid-tight seal between the sleeve and the cuff, said cuff projecting radially outward from said tube and having a peripheral flange projecting therefrom to engage the face of the patient in an area encircling the mouth, the distal edge of the peripheral flange being inturned toward the tube to present a flat surface to the patient's face, said inturned edge being spaced from the part of the cuff that projects outward from the tube whereby gas pressure within the cuff is imposed upon the inner face of the inturned edge to press the edge into sealing engagement with the patient's face, a plate of flexible material having therein an aperture through which the tube extends and engaging the face of the cuff remote from said other end of the tube, and

a neck strap secured to said plate adjacent the lateral edges thereof.

2. In a mouthpiece as set forth in claim 1, wherein said flange is tapered in cross section to a flexible edge region adapted to conform to facial depressions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,050,620	De Ford	Jan. 14, 1913
2,166,164	Lehmberg	July 18, 1939
2,360,193	Boothby	Oct. 10, 1944
2,540,567	Bennett	Feb. 6, 1951