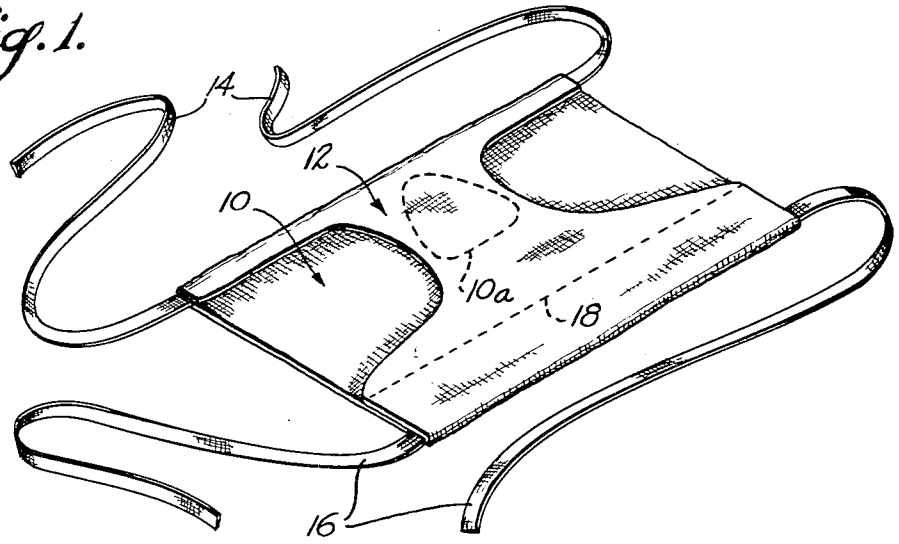
June 26, 1956 R. C. CREELMAN 2,751,905

ANTI-BACTERIAL MASKS

Filed Aug. 23, 1954

Fig. 1.



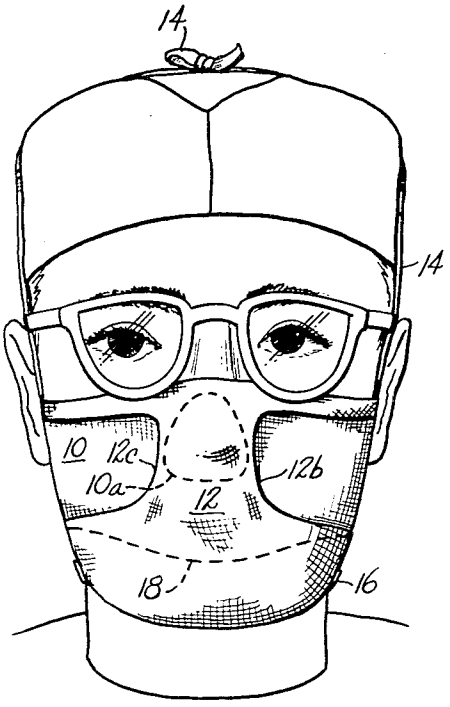


Fig. 2.

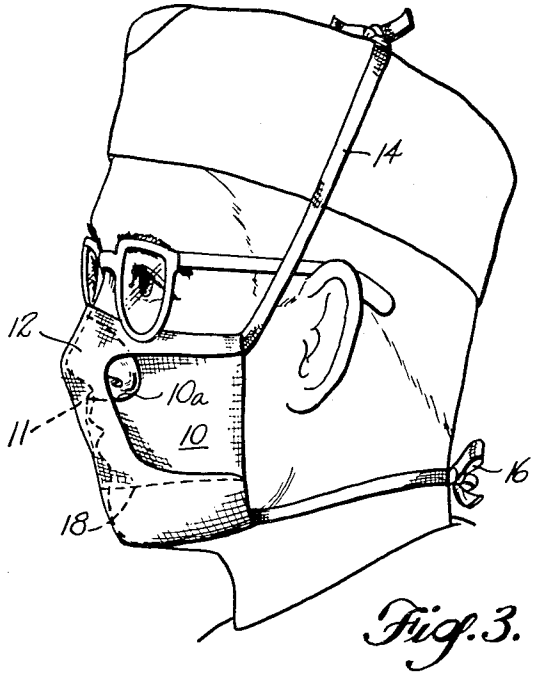


Fig. 3.

INVENTOR.
RAYMOND C. CREELMAN

BY
Reynolds, Beach & Christenson
ATTORNEYS

United States Patent Office 2,751,905
Patented June 26, 1956

2,751,905

ANTI-BACTERIAL MASKS

Raymond C. Creelman, Bremerton, Wash.

Application August 23, 1954, Serial No. 451,457

6 Claims. (Cl. 128—146)

This invention relates to an improved anti-bacterial mask intended primarily for surgical and related usages. The invention is herein illustratively described by reference to its presently preferred form; however, it will be understood by those skilled in the art that certain modifications and changes therein with respect to details may be made without departing from the essential or characterizing features of the invention.

It is widely recognized by surgeons who reflect over the matter that conventional surgical masks in general usage have certain disadvantages. Such masks are usually in the form of a generally rectangular panel of cheesecloth, gauze or other suitable filter material. This filter panel is secured in place covering the nose, mouth and frontal areas of the face by means of tie strings which extend around the neck and head. The surgeon is required to inhale and exhale through the one or more layers of cloth comprising the panel. Breathing under such conditions is harder than ordinary, hence tiring, if adequate quantities of fresh air are to be obtained as necessary in order to keep the surgeon's mind refreshed and clear. Moreover, the hot and humid nasal discharge air rising in the confined space between the mask panel and the skin creates undue perspiration and discomfort. Furthermore, such air rises upwardly past the top of the mask and tends to cause clouding of the surgeon's glasses if glasses are worn.

The primary function of a surgical mask, of course, is to catch spittle and other bacteria-laden particles discharged from the nose and mouth during breathing and speaking. Efforts have been made in the past to provide masks performing this function while at the same time permitting the surgeon to inhale fresh air freely and to exhale with equal ease. However, these various prior proposals have not been accepted, presumably because of practical difficulties arising from the fact that they almost invariably, if not in every case, required some sort of stiffening means or conduit means in the mask to furnish preformed guide passages for directing the ingress and egress of nasal air to a desired intake and discharge position. The requirement of conduit-forming stiffener means or the like involved undue complications and expense in the manufacture of these former proposed types of masks. Also their suitability as surgical masks from basic aspects was not entirely certain in some instances.

The present invention is directed generally to improvements in surgical masks overcoming the above-mentioned shortcomings of the conventional mask now in general usage, while preserving the favorable attributes thereof such as reliability as a bacteria control device, low cost, simplicity, durability, adaptability to widely varying physiognomies, and ease of washing and sterilizing the mask after each usage.

Another object of the invention is to provide a surgical mask or the like formed entirely of cloth or equivalent flexible filter material suitable for such usage which, without necessity of any stiffening means or preformed air

conduits, forms adequate free-breathing passages for the easy ingress and egress of nasal air, said passages being situated so as to avoid the direct discharge of nasal air toward the patient, and so as to afford ample opportunity for any bacteria-laden particles to be caught and retained by the mask material.

Another object of the invention is a surgical mask which is so constructed that the cool inhaled nasal air flows past the same surfaces which are swept by the exhaled and relatively warm and humid nasal air, thereby to induce the more rapid evaporation of perspiration and other moisture that may tend otherwise to accumulate in or upon the mask material. A related object is a mask of the described type which includes a face-contacting panel by which the face is effectively insulated from humid nasal discharge air, thereby to minimize perspiration and discomfort from that cause. The mask is constructed such that nasal discharge air is directed laterally away from the nose so that there is little tendency for the surgeon's glasses to become clouded from breathing through the mask as in the past. Moreover the mask is otherwise comfortable to wear and permits the surgeon to speak freely as with conventional masks.

In brief terms the improved anti-bacterial face mask comprises a cloth mask having two main panels, one formed to lie generally in contact with the wearer's face and the other overlying and secured to such face-contacting or inner panel. An aperture is formed in the inner panel to permit the wearer's nose to project therethrough and into contact with the overlying outer panel so as to form a breathing compartment between the panels at lower nose level. The outer panel is secured to the inner or face-contacting panel at a level above said aperture and at a level materially below said aperture, while having opposite side edges free, i. e. unattached to the inner panel. Preferably the panels are so formed and interconnected that the outer panel, which deflects nasal discharge air laterally and catches any particles carried thereby, is of restricted width at lower nose level so that the outward deflection and stretching of said outer panel by the projection of the wearer's nose causes the side edges of such outer panel to be stretched and thus to be held out of contact with the inner panel. As a result open passages are formed at the sides of said breathing compartment for ingress and egress of nasal air forced laterally between the panels.

These and other features, objects and advantages of the invention will become more fully evident from the following description by reference to the accompanying drawings which illustrate the presently preferred form thereof.

Figure 1 is a perspective view of the improved mask lying in outstretched or flattened position so as to illustrate generally the preferred form and arrangement of the mask components.

Figure 2 is a front view showing the mask being worn by a surgeon.

Figure 3 is a corresponding side view of the same.

As illustrated, the improved mask comprises a generally rectangular inner panel **10**, an overlying outer panel **12** secured thereto, and upper and lower pairs of tie strings **14** and **16**, respectively, for securing the mask in place on the head, as by the conventional technique illustrated in Figures 2 and 3. Preferably the mask panels and, if desired, also the tie strings, are formed of surgical gauze, cheesecloth, or other comparable material which has the desired properties well known to be suitable for surgical masks of the conventional type now in general usage. The same general characteristics of mask panel materials found through experience to be useful in the case of conventional surgical masks are also advantageous in masks of the present invention.

The inner mask panel **10** has an aperture **10***a* of a shape,

size and location to permit the wearer's nose to project therethrough. The outer mask panel **12**, of restricted width at least at lower nose level, overlies the aperture **10***a* so as to cover the nose and be deflected outwardly thereby, as illustrated in Figure 3. Inasmuch as the inner panel **10** is held closely in contact with the face at a location immediately beneath the wearer's nose and at the sides of such location, it is readily apparent that the outward deflection of the outer panel by the projection of the nose through the aperture **10***a* forms a nasal breathing compartment or pocket **11** between the two panels in the space generally beneath the nostrils.

Nasal discharge air entering this breathing compartment is warm and tends to rise past the mask. However, side openings for the breathing compartment are formed between the inner panel and the opposite side edges of the outer panel as a result of the stretching of such side edges by outward deflection of the outer panel by the wearer's nose projecting through the aperture **10***a*. Consequently the warm nasal discharge air escapes more readily from the sides of the breathing compartment than it does through the top thereof, which is closed by contact of the outer panel with the wearer's nose and with the inner panel. Hence very little humid discharge air rises directly through the mask and along the face as with conventional masks. Since the inner panel covers substantially all of the front of the face, except for the nose, below eye level, hot and humid nasal discharge air is kept out of contact with the skin.

The outer panel **12** is secured to the inner panel **10** along a generally horizontal line at a level above the aperture **10***a*. If desired, inner and outer panels joined at the top (or at the bottom) of the mask may be formed by folding in two a blank of panel material having the correct shape and size. The panels **10** and **12** are also joined together along a generally horizontal line **18** situated at a level materially below the aperture **10***a*. Preferably the lower line of securement **18** is situated below mouth level so as to gain the benefit of additional filtering from the inner panel for orally exhaled air. In any event the lower line of securement **18** should be sufficiently below nose level so that the outer panel **12** is free to be deflected outwardly by the projection of the wearer's nose, while the inner panel **10** remains in contact with the mouth area, thereby to form the breathing compartment between the two panels directly below the nose.

With more specific reference to the form of the outer panel **12**, it is obvious that the width of such panel at lower nose level should be sufficient to insure that such outer panel will directly intercept and deflect laterally all nasal discharge air, and thereby preclude any possibility of bacteria-laden particles escaping past the side edges of such outer panel and being carried to the patient. At the same time the width of the outer panel at nose level is preferably no greater than necessary for that purpose inasmuch as it is desirable for the opposite side edges of such outer panel to be stretched somewhat tautly by projection of the nose through aperture **10***a*, thereby to be held out of contact with the inner panel and form open breathing passages on opposite sides of the breathing compartment defined between the two panels. Since most of the nasal discharge air is directed downwardly, and very little is directed laterally as it emerges from the nostrils, it is possible to have the outer panel **12** quite narrow at nose level; in fact it need not be very much wider than the width of the base of the nose itself. For these reasons it is preferred that the outer panel be relatively wide at the lower securement line **18** and converge upwardly therefrom. Hence the relatively wide lower portion of the outer panel insures that all nasal discharge air will be intercepted, filtered and most of it deflected laterally, whereas the relatively narrow width of the outer panel at lower nose level insures the provision of open

side passages between the outer surface of the inner panel and the side edges of the outer panel.

Conveniently the outer panel is of substantially the same width as the inner panel at the top and bottom of the mask and converges downwardly from the top thereof in the manner shown. However, it will be apparent that the precise shape and the width of the outer panel, especially the portion thereof above lower nose level is not particularly critical, since the principal functions of the mask have to do with the interception, filtering and deflection of nasal air.

It will be evident from the illustration of the preferred form of the improved surgical mask that the various objects recited above and others are achieved thereby. The surgeon is able to breathe freely and easily, and is able to speak at least as easily as with a conventional surgical mask. Moreover, hot and humid nasal exhaled air entering the breathing compartment formed between the two panels is permitted to escape readily at the sides of the outer panel because of the stretching of the side edges thereof out of contact with the inner panel. Such exhaled air, commingled with cooler fresh air, is immediately cooled thereby and does not tend to cloud the surgeon's glasses, if glasses are worn; moreover it is kept largely out of direct contact with the surgeon's face because of the insulating coverage thereof afforded by the inner panel **10**. These and other advantages are accomplished without use of any stiffener material or conduit devices for the deflection and direction of nasal air, and at low cost. Since the entire mask may be manufactured of washable fabric, it may be reused an almost indefinite number of times with equal effectiveness.

I claim as my invention:

1. An anti-bacterial face mask comprising an inner mask panel of flexible sheet material formed to cover at least the front portion of the face from a level below the mouth to a level generally intermediate the bridge and the tip of the nose, said inner mask panel having an aperture therein of a form and location to permit the wearer's nose to project therethrough, an outer mask panel of flexible sheet material having an upper edge joined to said inner mask panel at a level above said aperture and having a lower edge joined to said inner mask panel at a level below said aperture, said outer mask panel being substantially centered transversely of the face to overlie the nose and be deflected outwardly and stretched by the end of the nose projecting through said aperture so as to form a nasal breathing compartment between said panels beneath the nostrils, said outer mask panel being of restricted width at lower nose level such that the opposite side edges of such outer panel stretched by the projection of the nose are held at least partly out of contact with said inner panel at lower nose level thereby to establish side openings for ingress and egress of nasal air flowing laterally through said breathing compartment, and means attached to the mask for securing the mask in position over the face.

2. An anti-bacterial face mask comprising an inner mask panel of cloth formed to cover at least the front portion of the face from a level below the mouth to a level generally intermediate the bridge and the tip of the nose, said inner mask panel having an aperture therein of a form and location to permit the wearer's nose to project therethrough, an outer mask panel of cloth having an upper edge joined substantially continuously along its length to the upper edge of said inner mask panel and having a lower edge joined substantially continuously along its length to said inner mask panel at a level below said aperture, said outer mask panel being substantially centered transversely of the face to overlie the nose and be deflecting outwardly and stretched by the end of the nose projecting through said aperture so as to form a nasal breathing compartment between said panels beneath the nostrils, said outer mask panel being of restricted width at lower nose level such that the opposite

side edges of such outer panel stretched by the projection of the nose are held at least partly out of contact with said inner panel at lower nose level thereby to establish side openings for ingress and egress of nasal air flowing laterally through said breathing compartment, and means attached to the mask for securing the mask in position over the face.

3. The anti-bacterial face mask defined in claim 2, wherein the inner mask panel is of generally rectangular shape, and the outer mask panel is formed with opposite side edges which mutually converge upwardly from its lower edge to approximately lower nose level and mutually converge downwardly from its upper edge.

4. An anti-bacterial face mask comprising a generally rectangular face-contacting cloth-like mask panel of a size and configuration to cover the face vertically from the chin to a level somewhat below the eyes, and horizontally at least substantially from cheek bone to cheek bone, said panel having an opening therein of a form and location to pass the nose therethrough, said opening having a lower edge situated to extend generally horizontally at a level above the upper lip and having side edges situated closely adjacent the respectively opposite sides of the nose, an outer clothlike mask panel overlying said face-contacting mask panel and secured by its upper and lower edges to said face-contacting panel and respective levels above and

below said aperture, said outer mask panel having relatively free edge portions situated to lie at opposite sides of the face at appreciable distances from the adjacent sides of the nose, respectively, whereby lateral passages for ingress and egress of nasal air are formed between such face-contacting panel and said free edges, and means attached to the mask for securing the mask in position on the face.

5. An anti-bacterial face mask comprising a cloth mask formed to cover the wearer's face generally below the eyes, said mask comprising an inner face-contacting panel having a nose reception aperture therein, an outer panel overlying portions of said inner panel and said aperture, and means attached to the mask for securing said mask in position on the wearer's head.

6. The mask defined in claim 5, wherein the outer panel is secured to the inner panel at levels above said aperture and materially below said aperture, respectively, and is unattached to said inner panel between said levels and at the opposite sides of said outer panel.

References Cited in the file of this patent

UNITED STATES PATENTS

1,850,016	Leduc	Mar. 15, 1932
1,946,334	Schwartz	Feb. 6, 1934