Nov. 13, 1945. B. F. WILLIAMS 2,389,102

RESPIRATORY MASK

Filed July 14, 1943



Fig. 1

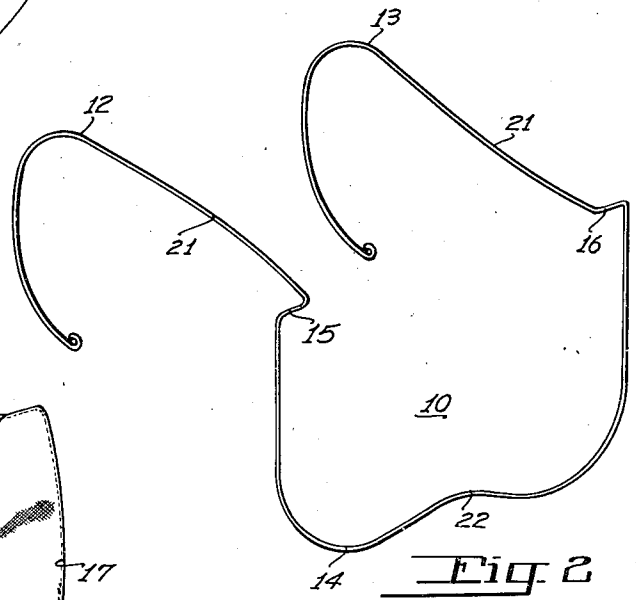


Fig. 2

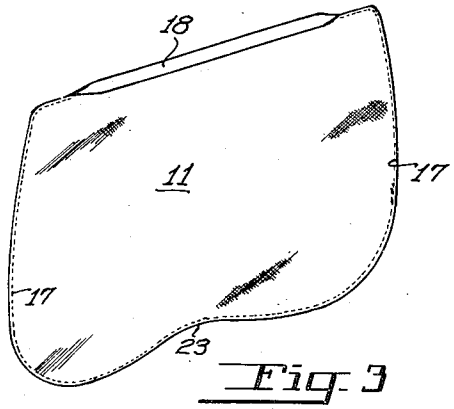


Fig. 3

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RESPIRATORY MASK

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1 Claim. (Cl. 128—146)

This invention relates to respiratory masks and, while it is not necessarily limited thereto, it is particularly suitable for use in the prevention of spreading of respiratory infections.

Sanitary respiratory masks of the conventional form generally comprise a plurality of rectangular layers of gauze material which is worn over the face covering the nose and mouth and attached by means of strings tied behind the head. Such masks must inherently be stretched relatively tightly over the face in order that they will stay in position and, consequently, upon inhaling, the mask material tends to be drawn toward the nostrils making breathing very difficult and tiresome. Upon exhaling, the air expelled from the lungs is forced through a relatively small area of the gauze directly in front of the nose so that the moisture vapor of the exhalation tends to condense upon the gauze. After a period of time, the accumulation of condensate commences to drip with resultant contamination of whatever the wearer is handling.

The conventional gauze mask being stretched over the mouth also seriously impairs speech so that it is practically impossible for the wearer to carry on conversation.

Because of these and other disadvantages and inconveniences of the conventional sanitary respiratory masks, they are worn only under special circumstances, such as in surgeries or other places which are maintained under strict supervision. The lack of availability of an effective and inexpensive respiratory mask which could be readily attached and worn with a reasonable degree of comfort both as to breathing and speaking has seriously hindered a more general adoption of the use of respiratory masks, not only in the home, in case of nasal or throat infections, but even in clinics, dentistries and the like.

It is an object of the present invention, therefore, to provide a new and improved respiratory mask which is of a relatively simple construction and convenient to use.

A further object of the invention is to provide a new and improved respiratory mask which may be worn with a greater degree of comfort than masks commonly used heretofore and which does not seriously impair either breathing or speech.

A still further object of the invention is to provide a new and improved respiratory mask comprising a frame holder unit and a mask unit which is removably attached to and firmly supported by the holder frame.

Another object of the invention is to provide a new and improved holder for supporting a mask unit over the nose and mouth of the wearer.

And another object of the invention is to provide a novel mask unit adapted to be supported over the face of a wearer substantially covering the nose and mouth.

In accordance with the illustrated embodiment of the invention the respiratory mask comprises a one piece resilient wire frame member defining at its opposite ends a pair of bows adapted to extend along each of the opposite sides of the head of the wearer and shaped so as cooperatively to hook behind the ears. The intermediate portion of the frame joining the forward ends of the bows is of a U-shaped configuration depending substantially at right angles with respect to the bows. Cooperatively supported by the U-shaped portion of the frame is a mask unit which is so constructed that it may be readily attached in a stretched relation upon the frame. The frame firmly supports the mask unit over the nose and mouth of the wearer but in a slightly spaced relation with respect thereto so that breathing and speech is not seriously impaired thereby while at the same time a high degree of protection is afforded.

For a consideration of what is believed novel and inventive, the attention is directed to the following description taken in connection with the accompanying drawing while the features of novelty will be pointed out with greater particularity in the appended claim.

In the drawing:

Fig. 1 is a view in perspective illustrating the respiratory mask of the invention in position upon the head of a wearer; Fig. 2 is a view in perspective showing the wire frame holder of the device; and Fig. 3 is a view in perspective illustrating the mask unit.

Referring to the drawing, the respiratory mask arrangement of the invention comprises a frame 10 and a relatively porous filter or other mask unit 11 removably attached thereto. While any suitable material may be used, the frame is preferably of a one piece stainless steel wire construction such as illustrated more clearly in the view of Fig. 2. The ends of the wire forming the frame define a pair of bows 12 and 13 which are adapted to extend along the opposite sides of the head of the wearer and are provided with hooks at the outermost portions for placement behind the ears. The intermediate portion 14 of the frame is of a U-shaped configuration depending in a plane substantially at right angles with respect to the bows 12 and 13. The opposite sides, or legs, of

the U-shaped frame portion are joined to the respective bows 12 and 13 by relatively short inturned offset portions 15 and 16, the purpose of which will be explained hereinafter.

The masking unit 11, as shown more clearly in Fig. 3, comprises a plurality of layers of a suitable porous filter material, such as gauze, which are secured together along the opposite sides and bottom as indicated by the stitching 17 and open at the top as indicated by the slit 18 so that a pocket is defined between the layers. The masking unit 11 is of a shape corresponding generally to that of the U-shaped frame portion 14 of the holder frame with exceptions as noted below. It will be observed that the stitching 17 extends a short distance around the opposite uppermost corners of the unit corresponding substantially to the length of the inturned offset portions 15 and 16 of the frame.

The mask unit 11, may, if desired, be made of any other suitable material such as Cellophane, paper, or the like, consisting of two layers of a shape similar to that shown, and secured together around the edges, as at 17, and having one open side 18 for the insertion of the frame portion 14. The mask units may be disposed of following a usage, or, in the case of cloth, be suitably cleansed for reuse.

The U-shaped portion of the wire frame may readily be inserted through the slot 18 into the pocket between the layers of the masking unit 11 and which may be facilitated by pressing the legs of the U-shaped frame portion together by simply holding the bows 12 and 13 between the thumb and forefinger and pressing them together. After insertion of the frame portion 14 into the pocket within the masking unit 11 the frame may be released whereupon the legs of the frame portion 14 will flex outwardly to engage firmly with the periphery of the pocket of the masking member. The height of the pocket within the masking unit 11 corresponds substantially with the height of the legs of the frame portion 14 so that the offset frame portions 15 and 16 will slide underneath the stitched corners on the opposite ends of the slot 18. It is preferred that the distance between the upper ends of the legs of the frame portion 14 in the unflexed condition be considerably greater than the distance between the upper corners of the pocket of the masking unit so that after the U-shaped frame portion 14 is inserted into the mask pocket and released, the frame legs, still under tension, will stretch the material of the mask unit relatively tightly therebetween.

In the particular embodiment disclosed the mask unit 11 is of a generally rectangular configuration of a height such that it will extend from a point on the bridge of the nose to the chin and of a width somewhat greater than the height, preferably slightly greater than the width of the face. It will be obvious, however, that the particular size and shape of the mask unit may be varied considerably. Also, the shape of the intermediate frame portion 14 may be varied to fit cooperatively within the pocket of the mask unit of another shape.

When the mask device is placed in position over the face, the bows 12 and 13 are kept from spreading apart at their forward ends by the mask unit 11 which effectively ties the bows together. The bows preferably fit rather snugly against the opposite sides of the head and may be bent slightly inwardly as indicated at 21 which portions are adapted to rest upon the upper portions of the cheek bones thereby increasing the stability of the mask device upon the face. While not necessary, it is also preferred to provide the lower edge of the mask device with a slightly upward curvature as indicated at 22 on the frame unit 10 and 23 on the mask unit 11 for cooperatively fitting upon the chin of the wearer as shown clearly in Fig. 1.

In the particular form of the device shown in the drawing, the intermediate frame portion 14 extends substantially in a plane so that the mask unit 11 is supported in a slightly spaced relation from the face contacting only on the bridge of the nose and upon the chin. Such a spaced relation permits of circulation of air behind the mask so that breathing and speech is not seriously impaired and condensation of moisture upon the mask material is substantially prevented. At the same time the germs expelled with the exhalation will be caught by the mask unit. It will also be understood that the exhaled, or virus bearing air, projected from the respiratory organs through the nostrils or the mouth, is interrupted at the mask when the forced current meets the mask. The currents that circulate behind the mask have no propulsive force and are soon rendered inert and relatively harmless by the natural processes of dilution as it mingles with the room atmosphere, or the surrounding air.

Having described the invention in what is considered to be a preferred embodiment thereof, it is desired that it be understood that the specific details shown are merely illustrative and that the invention may be carried out in other forms.

I claim:

A respiratory mask comprising a resilient one piece wire frame, the opposite ends of said frame defining a pair of bows, the intermediate portion of said frame being of a U-shape depending substantially at right angles from said bows, the upper ends of the legs of said U-shaped frame portion being joined to said bows by inturned frame portions, a mask unit of relatively flexible material comprising a plurality of layers secured together around the opposite sides and bottom and for a slight distance inwardly adjacent the opposite upper corners, said U-shaped frame portion being insertable between said layers through the open side thereof and tensioned so as to expand into relatively tightly fitting engagement with the inner periphery of the pocket between said layers, said inturned frame portions fitting under said opposite upper corners of said pocket for retaining said mask unit firmly in place.

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