

April 28, 1942.

C. S. CLARKE

2,281,181

RESPIRATORY MASK

Filed Aug. 31, 1940

3 Sheets-Sheet 1

FIG. 1.

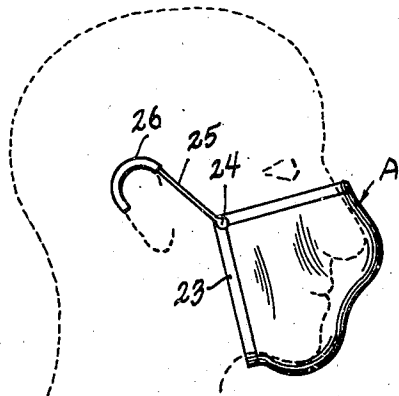


FIG. 2.

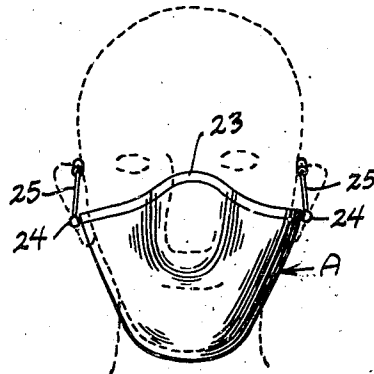


FIG. 4.

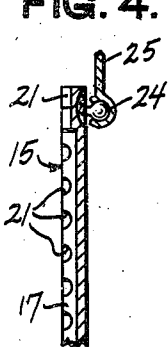


FIG. 3.

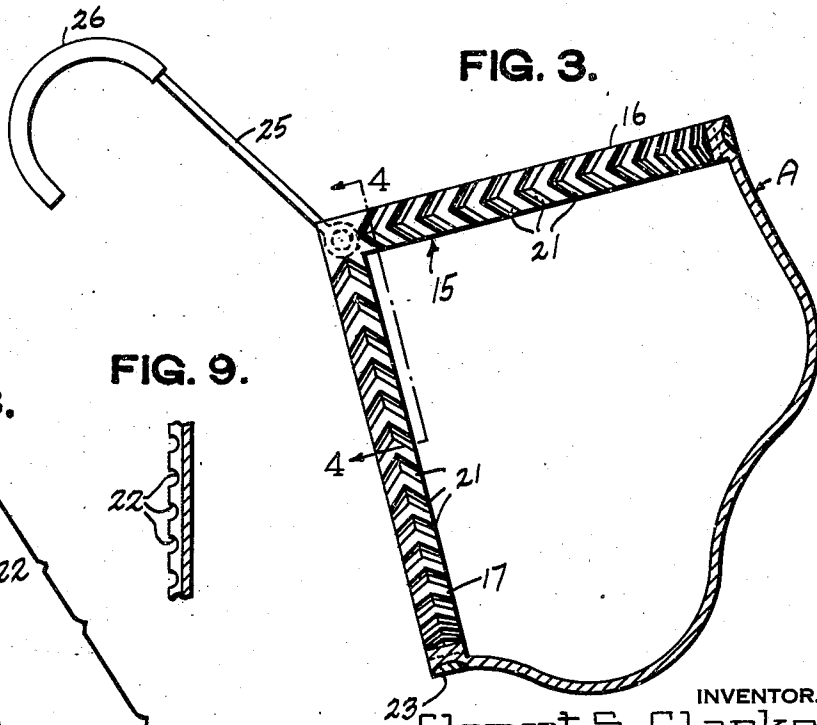


FIG. 8.

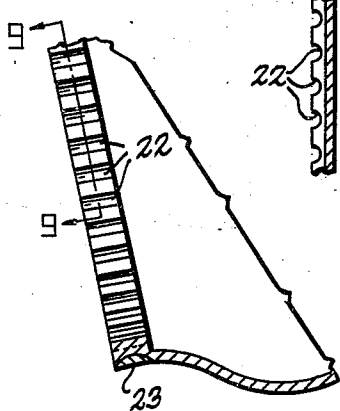


FIG. 9.



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FIG. 5.

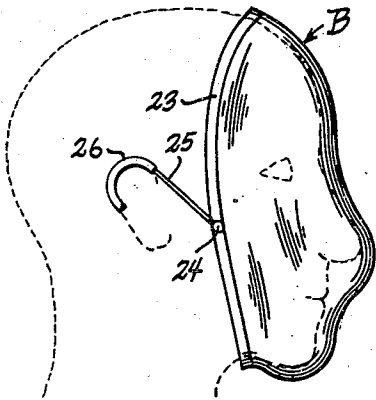


FIG. 7.

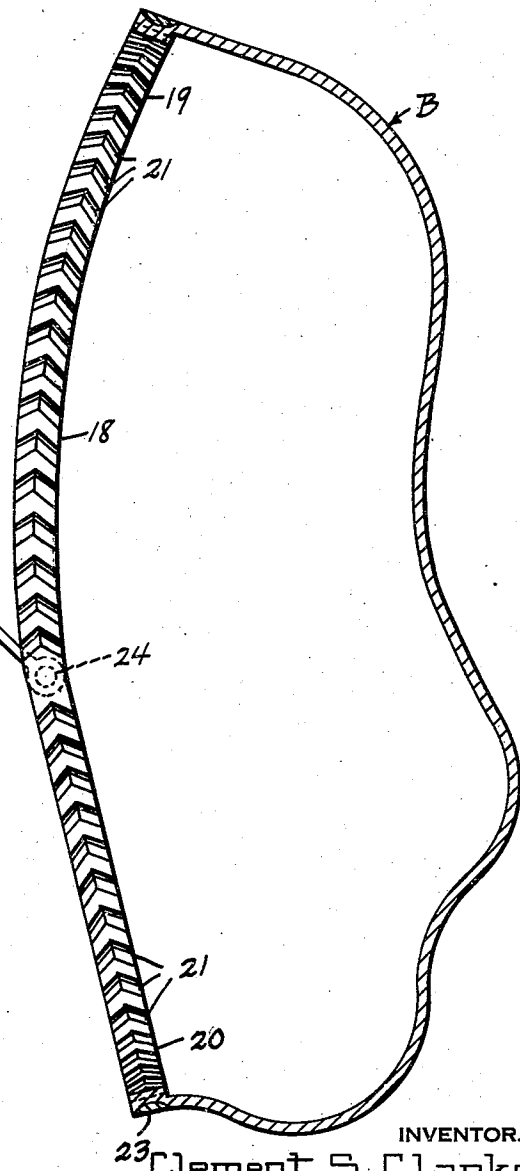
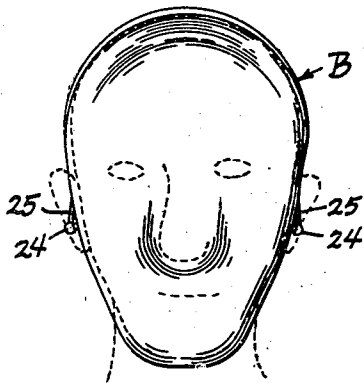


FIG. 6.



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FIG. 10.

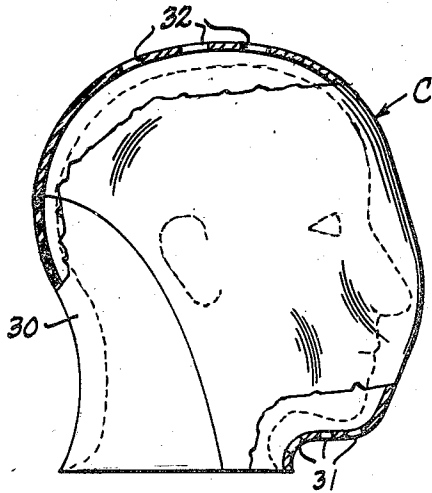


FIG. 11.

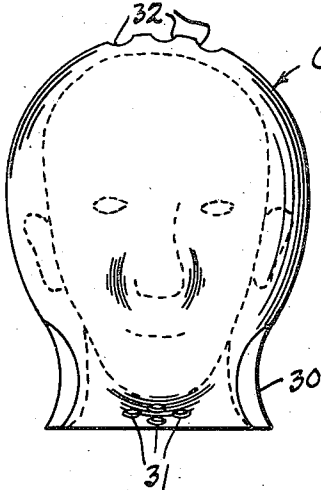
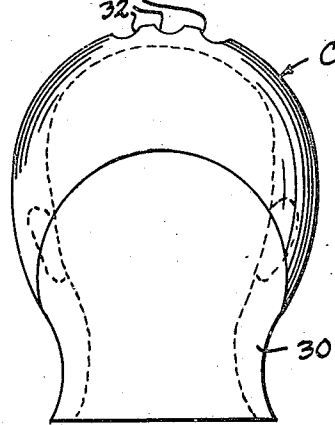


FIG. 12.



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UNITED STATES PATENT OFFICE

2,281,181

RESPIRATORY MASK

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Application August 31, 1940, Serial No. 355,057

6 Claims. (Cl. 128—146)

The invention relates to equipment for conditioning respiratory air and to air conditioning respiratory masks, to protect against respiratory infection and to be used by anyone having a respiratory disease to protect against the spreading of the disease.

Infections of the respiratory organs or tract of man are assumedly acquired by inhaling an infecting substance, such as bacteria, germs, virus or pollen, through the nose or mouth. It is known that the skin of man is the first line of defense against disease and that various types of bacteria, germs, virus and pollen that successfully attack the mucous membrane of the respiratory system are killed or rendered innocuous if they come in contact with the human skin, which is moist and self-disinfecting. The skin of man has a hair growth that also acts as a filter for harmful substances. It can readily be seen that if air is passed along the surface of the skin, the hair as well as the moist skin will tend to filter out or render innocuous any material substances not in the form of a gas.

The mucous membrane generates on its surface a fluid which appears to be destined to moisten the respiratory air and to also act as an adherent substance for harmful matter in the air. It is my opinion that moist respiratory air is a means of eliminating or retarding respiratory infection. Dehydrated air breathed in tends to cause a chapping and irritation of the mucous membrane. If dehydrated air is conducted over the surface of the human skin, it will pick up moisture therefrom and become moist air.

Drafts of cold air, or subjecting the human body to a severe decrease of temperature appears to be a partial cause of the acquisition of ailments such as colds and pneumonia. The temperature of the air brought into the respiratory tract appears to have a direct effect upon the heat regulating mechanism of the human body and cold air tends to increase the respiratory action causing more air to be breathed in so that the oxygen therefrom may be utilized to generate a greater amount of body heat. Physical body evolution has not had time to adjust itself to man's clothing so that cold air brought into the respiratory tract tends to cause an unbalancing of the heat regulating mechanism of the body. If the air that man breathes is brought into physical contact with the heated skin surface prior to introduction into the respiratory system, the resulting preheating of the air will tend to prohibit an unwarranted interference with the metabolism.

In the past numerous masks have been made entailing various principles of construction and used for various purposes, but no device of which I am aware has been so designed as to bring atmospheric air into direct contact with the skin prior or subsequent to introduction into the respiratory system.

The primary object of the present invention is to provide a mask to be used for the prevention or isolation of common colds, and which may also be used for the isolation, elimination or prevention of any other type of respiratory infection or irritation.

Another object of the invention is the provision of a mask particularly useful in retarding or eliminating the breathing of pollen, dust and other particles found in the atmospheric air that tend to upset or infect the respiratory tract.

A further object is to provide a mask for the protection of the eyes and the skin of the face against exposure to cold atmospheric weather.

The invention also aims to provide an attachment for conditioning the respiratory air of a wearer including respiratory air conducting means interposed between the respiratory system of the wearer and the outside atmosphere and so arranged as to bring the respiratory air into direct and turbulent contact with the wearer's skin.

The invention further aims to provide a mask so constructed as to provide for a circulation of the respiratory air therein by convection.

Other objects and advantages of the invention will become apparent during the course of the following detailed description, taken in connection with the accompanying drawings, forming a part of this specification, and in which drawings:

Figures 1 and 2 are views in side elevation and front elevation, respectively, of a preferred form of mask.

Figure 3 is a central vertical sectional view of the mask shown in Figures 1 and 2.

Figure 4 is a cross sectional detail view substantially on the line 4—4 of Figure 3.

Figures 5 and 6 are views in side elevation and front elevation, respectively, of a modified form of mask.

Figure 7 is a central vertical sectional view of the mask shown in Figures 5 and 6.

Figure 8 is a fragmentary central vertical sectional view of a mask and showing a modified detail of construction.

Figure 9 is a cross sectional detail view substantially on the line 9—9 of Figure 8.

Figure 10 is a view partly in side elevation and

partly in central vertical section of a helmet type of mask.

Figures 11 and 12 are views in front elevation and rear elevation, respectively, of the mask shown in Figure 10.

In the drawings, which for the purpose of illustration show preferred and modified forms of the invention, and wherein similar reference characters denote corresponding parts throughout the several views, the letters A, B and C designate masks of preferred and modified forms.

These masks may be made of any suitable transparent, semi-opaque or opaque material that is impervious to air, such as plastic material in one or more pieces, and this material may be pliable to permit bending or adjustment to fit the contours of the wearer's face, and which material will retain its adjusted form against unintentional or casual distortion.

In the example shown in Figures 1-4 of the drawings, the mask A is shaped and proportioned to cover the lower half of the face including the nose and mouth. Bounding the inside of the mask is an intra-marginal strip 15 including a bight portion 16 extending forwardly, when the mask is in its position of use, over the nose of the wearer and a bight portion 17 extending downwardly about the wearer's chin. The mask B is similar to the mask A except that it is adapted to cover the entire face and forehead and its inside is bounded by an intra-marginal strip 18 including a bight portion 19 extending upwardly, when the mask is in its position of use, over the head of the wearer, and a bight portion 20 extending downwardly about the wearer's chin. These strips 15 and 18 serve to space the masks A and B from the wearer's face and they are each provided along their contacting surfaces with a series of semi-cylindrical herringbone indentures or grooves 21 extending transversely of the strips. The grooves in the bight portions 16, 19 of the masks A and B constitute air exhaust means and they are disposed at a higher elevation in the position of use of the masks than the grooves in the bight portions 17, 20 respectively, and which constitute air intake means. Since these grooves 21 are relatively shallow, any air passing therealong will be brought into direct contact with the wearer's skin against which the strip 15 or 18 rests. I prefer to make the grooves of herringbone shape so as to change the direction of air flow therealong in order to cause a turbulence which will bring all of the air in direct contact with the skin, but it will be understood that straight indentures or grooves 22 may be employed as shown in Figures 8 and 9.

If the masks A and B are made from a pliable material that, when bent and adjusted to fit the contour of the face, will not retain its new form, a narrow external metal band 23 may be placed intra-marginally of the outside surface thereof, as shown, and this band will be of pliable material which will retain its form and the form of the mask against unintentional or casual distortion.

Connected to the masks A and B, at points thereon forwardly of the ears of the wearer in the position of use of the masks, as by ball and socket joints 24 are suitable spring wire ear hooks 25, similar to those used on spectacles, the wire being pliable for adjustment purposes and retaining its resiliency in adjusted form. That portion which partially encircles the upper section of the ear may be covered with a soft

material 26 which acts as a cushion. The mask B which not only covers the mouth and nose but also extends up over the forehead is particularly adapted for surgical operative work.

Referring now to Figures 10-12 of the drawings, the mask C, it will be noted, covers the entire head of the wearer with the lower portion of the mask adapted to encircle the wearer's neck and to rest on the shoulders. This type of mask is suitable for winter sports or beach wear as it affords complete protection for the skin of the face and the hair of the head. This particular mask C is made of transparent material which may be tinted any suitable color to eliminate undesirable rays of the sun. Any suitable provision may be made in its construction to enable a person to don and doff the mask. In the example shown, the rear lower section 30 thereof is made of elastic material, such as rubber, so that easy entrance or exit may be had. Provided in that area of the mask lying, in its position of use, adjacent the wearer's chin are apertures 31 constituting respiratory air inlet means, and in the dome area of the mask, similar apertures 32 are provided, which constitute respiratory air exhaust means.

It will be noted that each mask is provided with air inlet and exhaust means at the top and bottom portions, whereby convection air currents may pass across the wearer's face, and which air currents will carry off any excess heat from the skin covered by the masks so that the masks are internally air conditioned and may be comfortably worn in hot weather. On the other hand, any cold air entering through the openings at the bottom of the masks will come in contact with the skin where it will pick up heat and any excess air not breathed in will be exhausted at the top of the mask through convection. Thus there will always be present within the confines of the mask an abundant amount of fresh temperate air for respiratory breathing and by permitting the passage of the air from the intake to the exhaust ducts, the exhaled air will not tend to contaminate the intake air to be breathed.

Various changes may be made in the forms of invention herein shown and described without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. An air conditioning face mask formed of air proof sheet material adapted to cover a portion of the wearer's skin, the inside of said mask being bounded by an intra-marginal strip having an exterior surface adapted to fit snugly against the wearer's skin to dispose the inside of the mask in spaced relation to the wearer's skin whereby to form an air chamber communicating with the respiratory system of the wearer, the exterior surface of said strip being provided with transverse shallow grooves constituting means by which air traveling therealong is brought into direct contact with the skin of the wearer.

2. A structure as specified in claim 1, said grooves being of diagonal herringbone shape whereby to deflect and turbulate the air as it travels along said grooves so as to bring all portions of the air into direct contact with the wearer's skin.

3. An air conditioning face mask as specified in claim 1, said sheet material and said strip being pliable to fit the facial contours of the wearer, and tending to retain any set form against accidental or casual distortion.

4. An air conditioning face mask as specified

in claim 1, said sheet material and said strip being pliable to fit the facial contours of the wearer, the outside of said mask being bounded by an intra-marginal pliable metallic ribbon tending to retain any set form against unintentional distortion.

5. An air conditioning face mask as specified in claim 1, said mask being adapted to cover the lower portion of the wearer's face including the mouth and nose, said strip including two angularly disposed bight portions one of which extends forwardly over the nose and has grooves therein as aforesaid, and the other of which ex-

tends downwardly about the wearer's chin and is provided with grooves therein as aforesaid.

6. An air conditioning face mask as specified in claim 1, said mask being adapted to cover the wearer's face including the chin, mouth, nose, eyes and forehead, said strip including bight portions, one of which extends over the top of the head of the wearer and is provided with the aforesaid grooves therein, and the other of which extends downwardly about the wearer's chin and is provided with grooves therein as aforesaid.

CLEMENT S. CLARKE.