Jan. 7, 1958 H. WILKINS ET AL 2,818,857

COLD WEATHER FACE MASK

Filed March 14, 1956

Fig. 1.

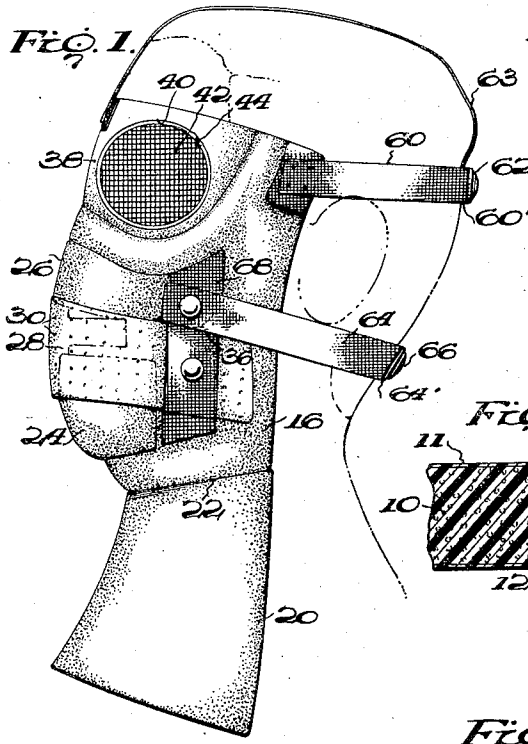


Fig. 2.

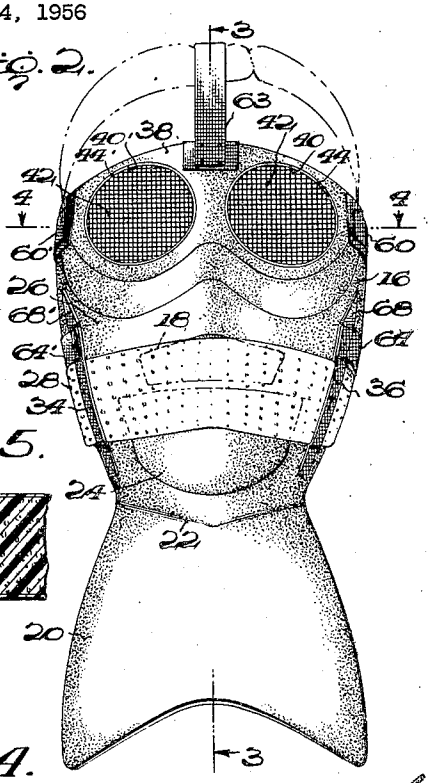


Fig. 5.

Fig. 4.

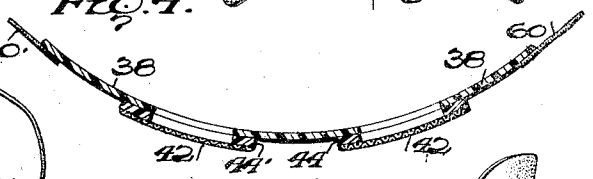


Fig. 3

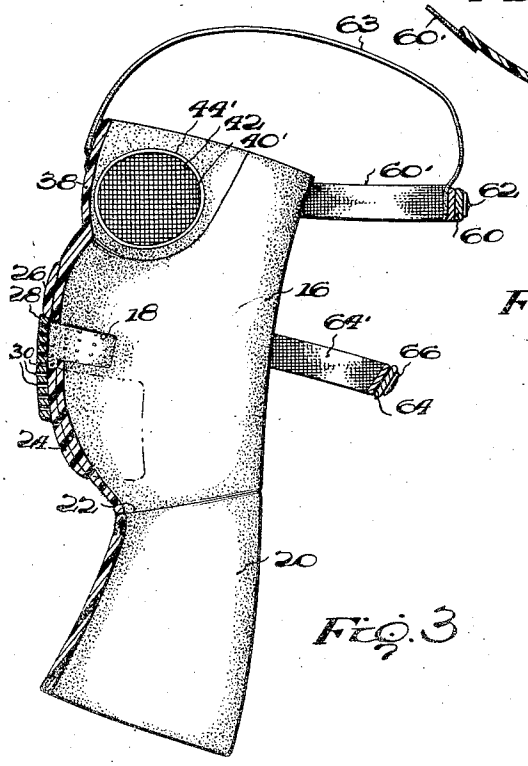
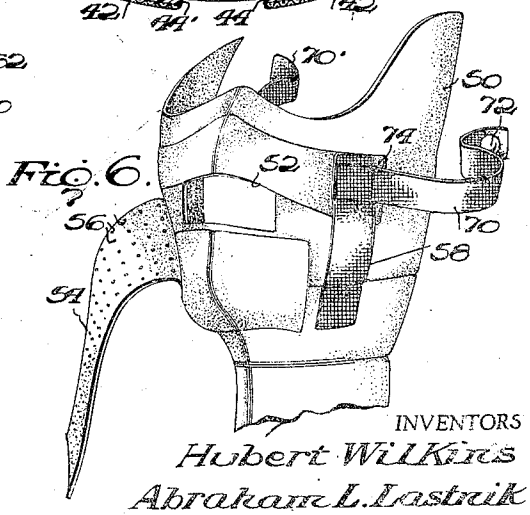


Fig. 6.



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COLD WEATHER FACE MASK

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Application March 14, 1956, Serial No. 571,580

11 Claims. (Cl. 128—141)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to cold weather face masks.

Heretofore, there has been no adequate face protection available for use in extremely cold climates.

An object of the invention is to provide a new and improved cold weather face mask designed to protect the wearer against the effects of wind, snow and sleet at low temperatures, and particularly at sub-zero temperatures.

Another object of the invention is to provide an improved cold weather face mask which is sufficiently flexible at low temperatures to conform closely to a human face and to be foldable so that it may be carried in a pocket when not in use.

A further object of the invention is to provide an improved cold weather face mask which is free from the formation of frost on its inside surface and is made of a non-wettable material.

Other objects and advantages of the invention will be apparent from the following detailed description of specific embodiments thereof, when considered in conjunction with the appended drawing, in which:

Fig. 1 is a side elevation view of a cold weather face mask embodying the invention, shown in operative position;

Fig. 2 is a front elevation view of the face mask illustrated in Fig. 1;

Fig. 3 is a vertical section taken along lines 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken along lines 4—4 of Fig. 2;

Fig. 5 is an enlarged transverse section of a sheet of insulating material utilized in the construction of cold weather face masks embodying the invention, and

Fig. 6 is a perspective view of another mask embodying the invention, in which the portion protecting the eyes is omitted.

In order to provide adequate protection for the human face in extremely cold climates, such as the Arctic regions, a mask possessing outstanding insulating ability is essential. Furthermore, it is highly desirable for the mask to be sufficiently flexible to conform closely against the face of a person wearing it. The mask should lack excessive bulkiness, and yet be thick enough to provide adequate insulation. Flexibility and lack of bulkiness are also desirable to allow the mask to be folded compactly and carried in a pocket when not in use.

Another desirable attribute of cold weather face masks, is freedom from the formation of frost on the inside surfaces thereof. It is important to prevent the condensation and possible freezing of moisture in interior pores and on the inside surfaces of the masks. Such difficulties may be avoided, in accordance with the present invention, by employing a flexible, moisture impervious, non-wettable, elastomeric insulating material in the fabrication of the masks.

The insulating material which best satisfies the requirements of masks embodying the invention, is a unicellular elastomeric plastic or synthetic rubber containing a multiplicity of minute, non-interconnecting cells distributed uniformly throughout its interior. Among the most suitable materials are expanded GRS arctic rubber, an expanded neoprene sold under the tradename "Cell-Tite," and an expanded blend of polyvinyl chloride and butadiene acrylonitrile sold under the tradename "Ensolite." These unicellular elastomeric materials may be manufactured by incorporating a blowing agent into the normally solid materials, which agent expands the materials by generation of a gas, usually nitrogen, in a multiplicity of minute, closed cells.

The insulating material is produced in the form of relatively thick sheets, from which sections are cut to fabricate the masks. Preferably, both sides of the unicellular sheets are covered with a continuous, smooth thin skin of unexpanded elastomeric material. An enlarged section of such composite insulating material is illustrated in Fig. 5, wherein a sheet **10** of expanded, unicellular elastomeric material is provided on opposite sides thereof with a pair of thin skins **11** and **12** of unexpanded elastomeric material. In less preferred embodiments of the invention, either one or both of these thin skins may be omitted. However, the presence of these skins, especially the skin on the inner surface of the mask, greatly contributes to freedom from the formation of frost inside the mask.

In the fabrication of masks embodying the invention, sheets of such insulating material are cut and tailored or molded to conform to the contours of a human face. As is best shown in Fig. 1 in relation to a wearer, a facial portion **16** fits over the bridge of the nose, under the lower eyelids, upwards covering the temples and the sinuses, and backwards as far as the ears of the wearer. As shown in Figs. 2 and 3, the facial portion **16** is provided with a mouth opening **18** extending horizontally a distance approximately equal to the length of the wearer's mouth and extending vertically from just below the nose down to the lower lip. The mouth opening **18** is normally about one inch wide and three inches long, but it may be trimmed as required to register with the mouth of an individual wearing the mask. The lower edge of the mouth opening **18** should fit tightly under the lower lip of the wearer to prevent moisture from the nose and mouth from condensing on the chin.

The insulating facial portion **16** is molded or tailored to fit snugly against the wearer's chin and the facial area beneath the chin. A bib portion **20** composed of the same insulating material is secured to the lower end of the facial portion **16** along a continuous seam **22**. The bib portion **20** is designed to spread over the frontal neck area of the wearer, and to seal this area against the entrance of cold air. Ordinarily, the lower end of the bib portion **20** will lie beneath a parka, jacket or other environmental clothing (not shown). Under some circumstances, it may be considered desirable to eliminate the bib portion **20**. Hence, it is contemplated that the bib portion **20** may be permanently secured to the rest of the mask, or it may be removably attached thereto, or bib portion **20** may be eliminated entirely.

In order to provide additional insulation in cold-sensitive areas, an extra pad **24** of the unicellular insulating material may be secured to the chin and the cheek areas of the facial portion **16**, and another pad **26** of such material may be secured across the nose area. The pads **24** and **26** may be secured to the facial portion **16** in any suitable manner, such as by cement or by stitching or by heat fusion of the elastomeric materials.

A perforated tab **28**, which is composed of the same unicellular insulating material but is provided with a

plurality of small transverse perforations **30**, is arranged to removably cover the mouth opening **18** as well as the lower portion of the nose area and the upper portion of the pad **24** on the chin area. The perforated tab **28** may be permanently secured at one end thereof to a reinforcing strip (not shown) which is attached to the facial portion **16** on the left side of the mouth opening **18**, as viewed in Fig. 2. The tab **28** passes through a loop **34** mounted adjacent to said reinforcing strip. The other end of the tab **28** removably passes through and is secured by another loop **36** which is mounted on the facial portion **16** at the opposite side of the mouth opening **18**. Extra strength may be imparted to the reinforcing strip and the two loops **34** and **36** by employing a plastic coated fabric in their construction.

It is evident that the perforations **30** in the tab **28** permit breathing and conversation to be carried on through the mask, while at the same time providing adequate cold weather protection for the face of the person wearing it. Greater access to the mouth for other purposes, such as eating and drinking, may be obtained merely by pulling the free end of the tab **28** out of the loop **36**, and allowing the tab **28** to dangle from the loop **34** on the left side of the mask, as viewed in Fig. 6, thereby completely exposing the mouth opening **18**. Or instead of allowing the tab **28** to dangle in this fashion, it may be held away from the mouth by doubling it upon itself and passing its free end back through the loop **34**.

Protection for the eyes may be obtained by securing to the upper end of the facial portion **16** an eye portion **38** composed of the same insulating material. The eye portion **38** is provided with a pair of eye openings **40—40'**, registering with the wearer's eyes. Netting **42** is mounted in these eye openings. Transparent lenses made of glass or plastic may be substituted for the netting **42**, if desired. Under some circumstances the mask may be modified by leaving the eye openings **40—40'** empty, or by entirely eliminating the eye portion **38**. Circular pieces **44—44'** of insulating material are secured to the eye portion **38** around the openings **40—40'** to build up the thickness of the insulation in these areas and to space the netting **42** further away from the wearer's eyes, as is best shown in Fig. 4.

Fig. 6 shows an embodiment of the invention in which the portion protecting the eyes is omitted. In this embodiment, a facial portion **50** of the mask is formed from a sheet of the previously described expanded insulating material, either with or without the thin skins of unexpanded elastomeric material. The facial portion **50** of the mask is shaped to fit over the bridge of the wearer's nose, under the lower eyelids, upwards covering the temples and the sinuses, and backwards as far as the ears. A mouth opening **52** in the facial portion **50** registers with the mouth of the wearer. A tab **54** of the insulating material provided with a plurality of small transverse perforations **56** is secured at one end thereof to the facial portion **50** at one side of the mouth opening **52**. The tab **54** is arranged to form a removable cover for the mouth opening **52** by inserting its other end through a loop **58** of coated fabric secured to the facial portion **50** at the opposite side of the mouth opening **52**. The tab **54** may be allowed to dangle from the facial portion **50** when the mouth opening **52** is uncovered, as shown in Fig. 6.

Masks embodying the invention may be secured to the wearer's head by means of a flexible suspension having encircling straps of elastic webbing which must be capable of remaining elastic at low temperatures. In the embodiment of the invention illustrated in Figs. 1, 2 and 3, a pair of elastic straps **60—60'** are secured at one end thereof to the opposite upper edges of the facial portion **16** in the vicinity of the temples, and they extend around the head to the back thereof, where they may be detachably connected by a snap fastener **62**. From the top center of the facial potrion **16** an elastic strap **63** extends to the back of the head and is joined to one of the straps **60—60'** near the snap fastener **62**. A similar pair of elastic straps **64—64'** extend from the sides of the facial portion **16** around to the back of the head below the ears, where they are detachably connectable by means of a snap fastener **66**. The straps **64—64'** are secured to the facial portion **16** by sewing them onto a pair of coated fabric tabs **68—68'** which are cemented to the facial portion **16** in the cheek areas.

The embodiment of the invention illustrated in Fig. 6 is likewise provided with a flexible suspension arranged to encircle the wearer's head to hold the mask snugly against his face. This suspension includes a pair of elastic straps **70—70'** and a snap fastener **72** which connects the ends of the straps at the back of the wearer's head. The straps **70—70'** are attached to the sides of the facial portion **50** by a pair of coated fabric tabs, of which a tab **74** is shown.

The above-described flexible suspensions are quickly releasable, and the masks are readily removable from the face without the necessity of first removing any other environmental clothing, such as headgear. It is evident that instead of employing this type of suspension, other means may be used to secure the mask against the wearer's face. For example, the mask may be attached to a helmet or a parka likewise designed to provide protection against cold weather.

A primary feature of masks embodying the invention is their outstanding insulating ability. The sheets of insulating material from which the masks are constructed are preferably but not necessarily uniform in thickness, and good insulating ability is obtained when they are only about ⅛ inch in thickness. A ¼ inch thickness of the specified composite expanded unicellular insulating material has proved adequate to protect the face at temperatures as low as —40° F., and a ⅜ inch thickness has been tested satisfactorily at about —60° F. The non-wettability of this material and the fact that it is moisture impervious, contributes greatly to its freedom from the formation of frost on its inside surfaces. Due to the thin unexpanded skins in the preferred embodiment, the material contains no pores in which moisture may condense. Moisture cannot penetrate through the thin skins **11** and **12** (Fig. 5) of unexpanded elastometric material and thereby reach the multitudinous minute cells contained in the expanded unicellular elastomeric material **10**. These smooth thin skins allow the mask to fit closer against the wearer's skin, and they are conducive to reabsorption of moisture through his skin. However, masks constructed of smooth surfaced expanded unicellular material in which the thin unexpanded skins are absent likewise possess outstanding insulating ability against extremely cold weather.

Although the drawing shows only two embodiments of the invention, it is evident that numerous changes and modifications may be readily devised by persons skilled in the art without departing from the spirit and the scope of the invention. For example, either the bib or the eye portion, or both of these members, may be eliminated entirely under some circumstances, and means other than the flexible strap suspension may be employed to secure the mask against the wearer's face. Consequently, the scope of the invention as defined in the subjoined claims should be given the broadest possible interpretation.

We claim:

1. A cold weather face mask comprising a flexible sheet composed of a unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior and having a smooth, thin skin of unexpanded elastomeric material covering that surface of said sheet which is next

to the face of the wearer to minimize frosting said sheet being designed to conform closely against a wearer's face and having sufficient thickness to insulated against low temperatures.

2. A cold weather face mask comprising a flexible sheet composed of an expanded, unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior and havng a smooth, thn skin of unexpanded elastomeric material covering its surfaces to minimize frosting, said sheet being designed to conform closely against a wearer's face and having sufficient thickness to insulated against low temperatures.

3. A cold weather face mask comprising a flexible sheet composed of a unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior and having sufficient thickness to insulate against low temperatures, said sheet being designed to cover and conform closely to a human face and having an opening registering with the mouth of said face, and a tab of said insulating material provided with a plurality of small transverse perforations therein secured to the sheet and covering the mouth opening.

4. A cold weather face mask comprising a composite, flexible sheet composed of an expanded, unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior and having a smooth, thin skin of unexpanded elastomeric material covering its exterior, said sheet having a shape designed to cover and conform closely to a human face and having an opening registering with the mouth of said face, the thickness of the sheet being sufficient to insulate against low temperatures, and a tab of said insulating material provided with a plurality of small transverse perforations therein secured to the sheet and covering the mouth opening.

5. A cold weather face mask comprising a composite, flexible sheet composed of an expanded, unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior and having a continuous, smooth, thin skin of unexpanded elastomeric material covering both of its sides, said sheet having a shape designed to cover and conform closely to a human face and having an opening registering with the mouth thereof, said sheet having a bib portion designed to cover the front neck area, the thickness of the sheet being sufficient to insulate against low temperatures, and a tab of said insulating material provided with a plurality of small transverse perforations therein secured to the sheet and covering the mouth opening.

6. A cold weather face mask comprising a flexible sheet composed of an expanded, unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior, said sheet having a shape designed to cover and conform closely to a human face and having openings registering with the mouth and the eyes thereof, a bib made of said insulating material secured to the lower end of the sheet and designed to cover the front neck area, the thickness of the insulating material being sufficient to insulate against low temperatures, a tab of said insulating material provided with a plurality of small transverse perforations, and means for removably securing the tab to the sheet and removably covering the mouth opening.

7. A cold weather face mask comprising a composite, flexible sheet composed of an expanded, unicellular, elastomeric insulating material containing a multiplicity of minute, non-interconnecting cells distributed throughout its interior and having a continuous, smooth, thin skin of unexpanded elastomeric material covering both its sides, said sheet having a shape designed to cover and conform closely to a human face and having openings registering with the mouth and the eyes thereof, a bib made of said

insulating material secured to the lower end of the sheet and designed to cover the front neck area, the thickness of the insulating material being sufficient to insulate against low temperatures, a tab of said insulating material provided with a plurality of small transverse perforations, and means for removably securing the tab to the sheet and removably covering the mouth opening.

8. A cold weather face mask comprising a flexible, non-wettable, moisture impervious sheet of insulating material composed of an expanded, unicellular, elastomeric material containing a multiplicity of minute, non-interconnecting cells distributed substantially uniformly throughout its interior and having a continuous, smooth, thin skin of unexpanded elastomeric material covering both of its sides, said sheet having a facial portion shaped to cover and conform closely to a human face and having openings registering with the mouth and the eyes thereof, a bib portion secured to the lower end of the facial portion and shaped to cover the front neck area, the thickness of the insulating material being sufficient to insulate against low temperatures, a tab of said insulating material secured to the facial portion and covering the mouth opening therein, said tab having a plurality of small transverse perforations to permit breathing through the mask, and means for securing the mask snugly against the face.

9. A cold weather face mask comprising a flexible, non-wettable, moisture impervious sheet of insulating material composed of an expanded, unicellular, elastomeric material containing a multiplicity of minute, non-interconnecting cells distributed substantially uniformly throughout its interior and having a continuous, smooth, thin skin of unexpanded elastomeric material covering both of its sides, said sheet having a facial portion shaped to cover and conform closely to a human face and having an opening registering with the mouth thereof, a bib portion joined to the lower end of the facial portion and shaped to cover the front neck area, the thickness of said sheet being sufficient to insulate against low temperatures, a tab of said insulating material having one end secured to the facial portion at one side of the mouth opening therein, means for detachably securing the other end of the tab to the facial portion at the opposite side of the mouth opening to provide a removable cover for said opening, said tab having a plurality of small transverse perforations to permit breathing through the mask, and a flexible suspension arranged to encircle the wearer's head to hold the mask snugly against his face.

10. A cold weather face mask comprising a flexible, non-wettable, moisture empervious sheet of insulating material composed of an expanded, unicellular, elastomeric material containing a multiplicity of minute, non-interconnecting cells distributed substantially uniformly throughout its interior, said sheet having a facial portion shaped to cover and conform closely to a human face and having an opening registering with the mouth thereof, a bib portion joined to the lower end of the facial portion and shaped to cover the front neck area, an eye portion joined to the upper end of the facial portion and having a pair of openings registering with the eyes, the thickness of said sheet being sufficient to insulate against low temperatures, a tab of said insulating material having one end secured to the facial portion at one side of the mouth opening therein, means for detachably securing the other end of the tab to the facial portion at the opposite side of the mouth opening to provide a removable cover for said opening, said tab having a plurality of small transverse perforations to permit breathing through the mask, and a flexible suspension arranged to encircle the wearer's head to hold the mask snugly against his face.

11. A cold weather face mask comprising a flexible, non-wettable, moisture impervious sheet of insulating material composed of an expanded, unicellular, elastomeric material containing a multiplicity of minute, non-interconnecting cells distributed substantially uniformly throughout its interior and having a continuous, smooth,

thin skin of unexpanded elastomeric material covering both of its sides, said sheet having a facial portion shaped to cover and conform closely to a human face and having an opening registering with the mouth thereof, a bib portion joined to the lower end of the facial portion and shaped to cover the front neck area, an eye portion joined to the upper end of the facial portion and having a pair of openings registering with the eyes, the thickness of said sheet being sufficient to insulate against low temperatures, a tab of said insulating material having one end secured to the facial portion at one side of the mouth opening therein, means for detachably securing the other end of the tab to the facial portion at the opposite side of

the mouth opening to provide a removable cover for said opening, said tab having a plurality of small transverse perforations to permit breathing through the mask, and a flexible suspension arranged to encircle the wearer's head to hold the mask snugly against his face.

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U. S. DEPARTMENT OF COMMERCE

PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,818,857 January 7, 1958

Hubert Wilkins et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 3, for "insulated" read -- insulate --; line 9, for "thn" read -- thin --; lines 12 and 13, for "insulated" read -- insulate --; column 6, line 49, for "empervious" read -- impervious --.

Signed and sealed this 25th day of February 1958.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON

Commissioner of Patents