

[54] COLD WEATHER FACE MASK
[75] Inventors: Richard Colman, Los Angeles;
David H. Mangelsdorf, Santa
Monica, both of Calif.
[73] Assignee: The United States of America as
represented by the Secretary of the
Army, Washington, D.C.
[22] Filed: May 23, 1972
[21] Appl. No.: 256,050

[52] U.S. Cl. 2/9, 2/206
[51] Int. Cl. A42b 1/18
[58] Field of Search 2/206, 9, 202, 204,
2/205, DIG. 6, 10, 173, 171, 6; 128/146,
146.7, 163, 212; 112/420; 24/DIG. 18, 204; 28/72

[56] References Cited

UNITED STATES PATENTS			
505,653	9/1893	Gumeson	2/206
825,170	7/1906	Allen	2/206
1,655,007	1/1928	Boettge	2/6
1,665,386	4/1928	Walmer et al.	2/9
2,642,574	6/1953	Eloranta	2/205

2,909,782	10/1959	Mizell	2/9
2,914,772	12/1959	Lemelson	2/206
3,295,511	1/1967	Crouzet	2/205
3,327,316	6/1967	Pukish, Jr.	2/9
3,359,567	12/1967	Zemme et al.	2/2

FOREIGN PATENTS OR APPLICATIONS

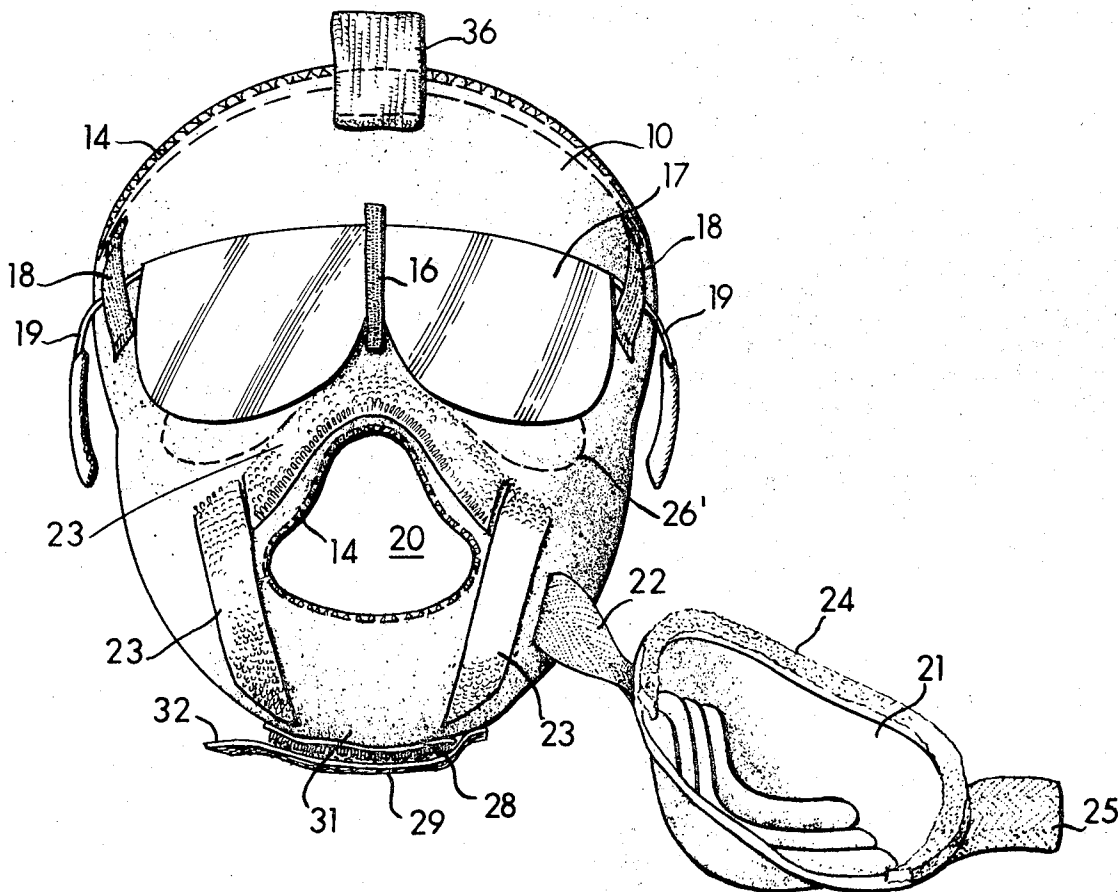
38/2848	4/1963	Japan	28/72 FT
---------	--------	-------------	----------

Primary Examiner—James R. Boler
Assistant Examiner—Peter Nerbun
Attorney—Harry M. Saragovitz et al.

[57] ABSTRACT

Cold weather mask for protection of faces against low temperatures and high wind velocities while providing for easy access to the mouth and nose. A wide range of adjustability to fit faces of varying sizes and shapes is produced by an adjustable chin pocket comprising the lower portion of a facepiece element of the face mask and a flexible, adjustable retention harness for maintaining the facepiece in position in close-fitting relation to the face of the wearer.

4 Claims, 6 Drawing Figures



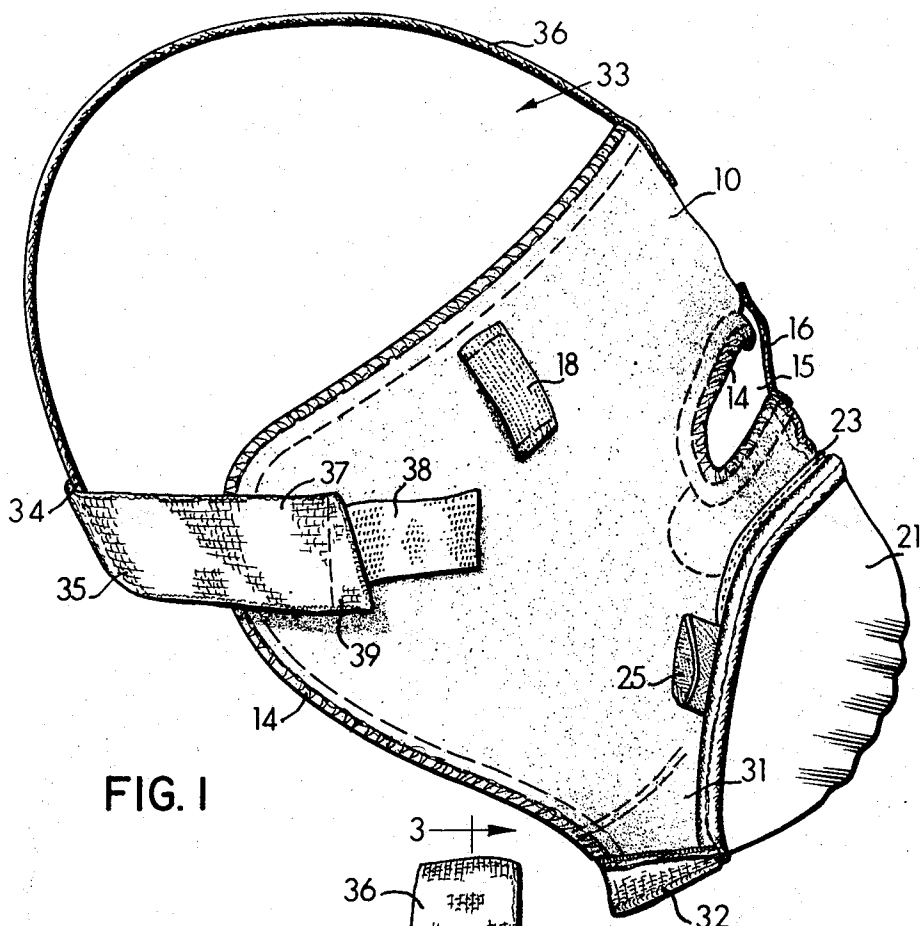


FIG. 1

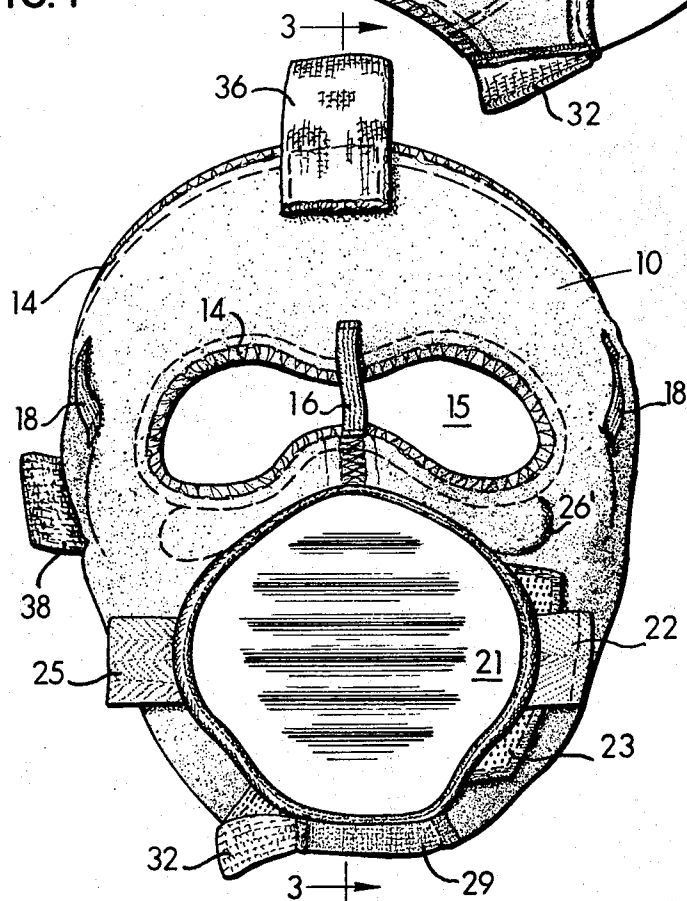


FIG. 2

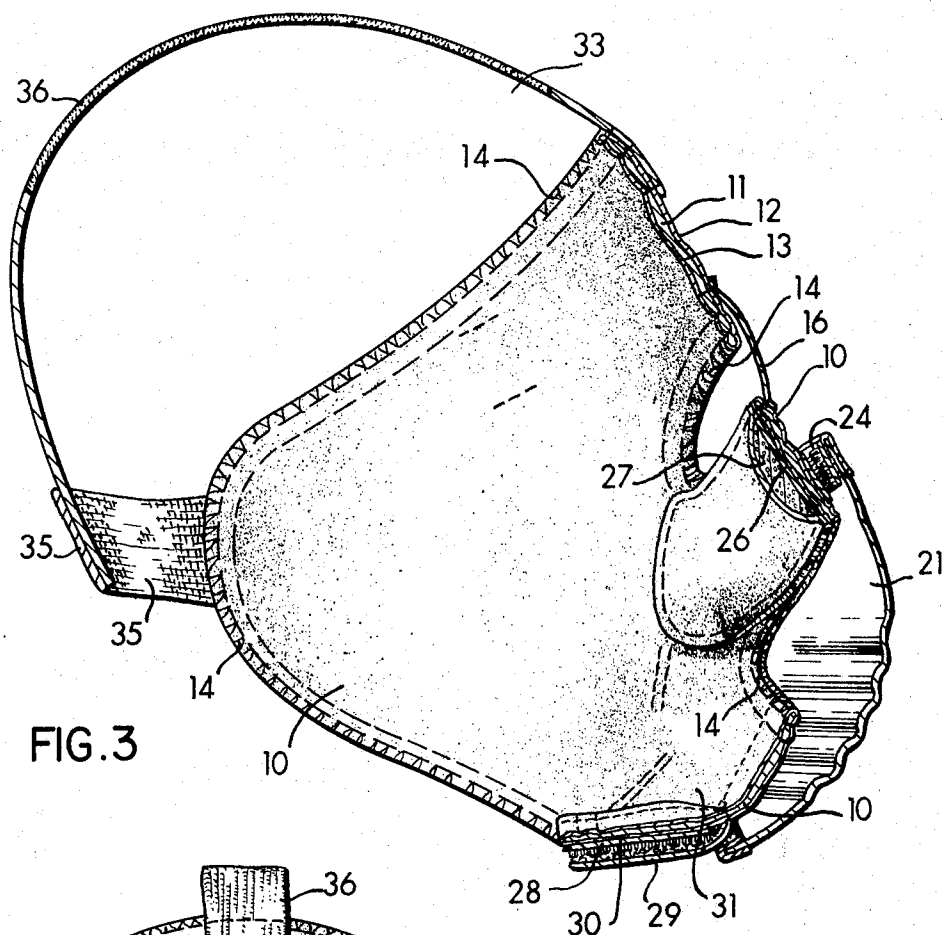


FIG. 3

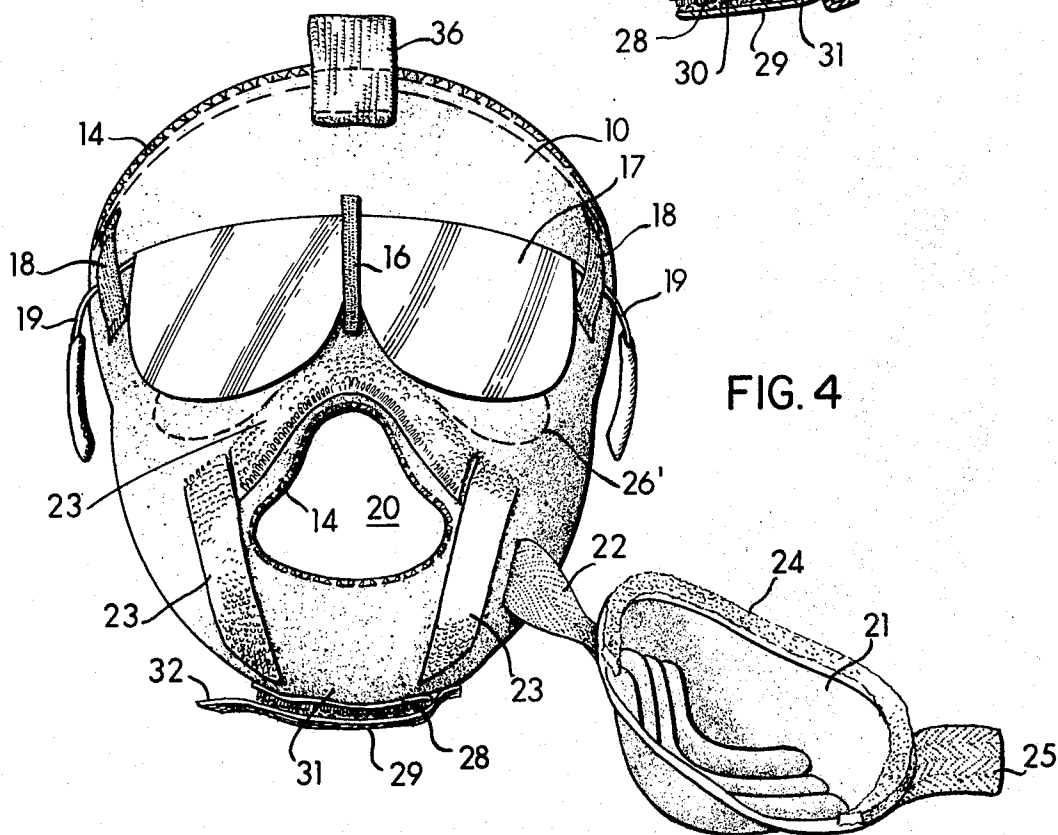


FIG. 4

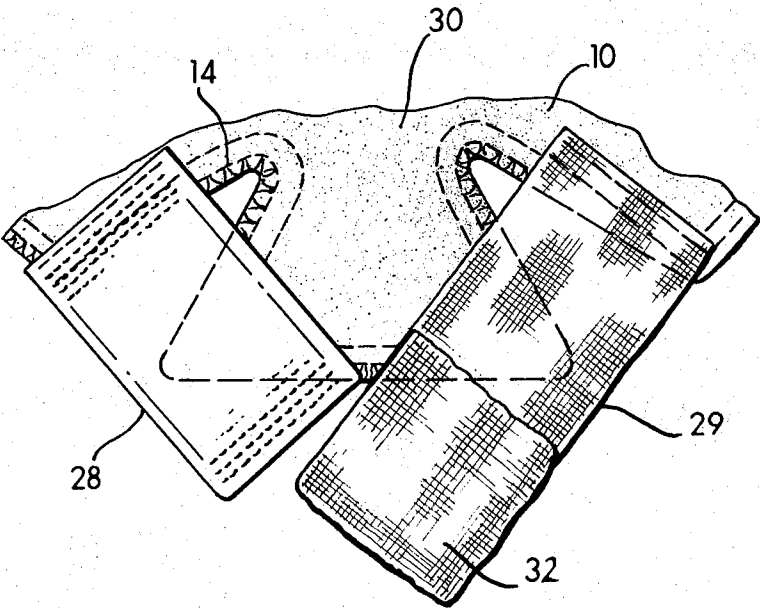


FIG. 5

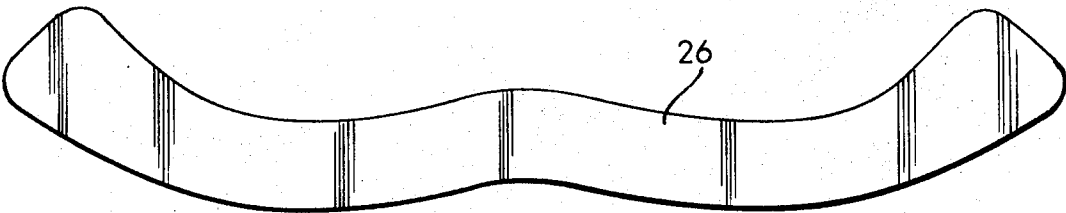


FIG. 6

COLD WEATHER FACE MASK

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

This invention relates to a cold weather face mask for protection of faces against extremes of low temperature and high wind velocity.

Face masks have been heretofore proposed for protection of the face under cold environmental conditions. However, these masks have been characterized by the lack of adjustability to fit faces of widely varying sizes and shapes, thus requiring the manufacture of a large number of different sized masks in order to fit substantially all of the faces in the population. This has constituted a serious problem for the Armed Forces since logistically it is very costly and difficult to provide a large variety of sizes of any garment at the widely scattered points throughout the world where such garments will be required. Another problem that has caused failure or inadequacy of protection by the face masks of the prior art has been the inability of the insulation materials used therein to breathe and thus prevent the condensation of moisture in the interiors of the masks with attendant loss of insulation values.

An object of the invention is to provide a new and improved cold weather face mask designed to protect the wearer thereof 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 adjustable to fit 90 percent or more of the human faces from a given population and to conform closely to all such human faces so as to provide good protection against low temperatures and high wind velocities.

A further object of the invention is to provide an improved cold weather face mask which remains free from the formation of frost on the inside surfaces thereof while providing for ease of access to the mouth for the purposes of eating and drinking and to the nasal orifices for the purpose of clearing the nose of waste products.

A still further object of the invention is to provide an improved cold weather face mask with which glasses may be worn without fogging up at low temperatures.

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 line 3—3 of FIG. 2;

FIG. 4 is a front elevation view of the face mask with glasses in operative position and with the oronasal barrier partially detached from the face mask to uncover the oronasal port;

FIG. 5 is a bottom plan view of the face length adjustment portion of the face mask broken away from the rest of the mask; and

FIG. 6 is a plan view of the nose bridge stiffener.

In order to provide adequate protection for the human face in extremely cold climates, such as the arctic or

antarctic regions, a face mask possessing outstanding insulating ability is essential. Furthermore, it is highly desirable for the mask to be sufficiently flexible and adjustable to conform closely to the contours and size of the face of the person wearing it in order to provide for maximum mobility and visibility. The mask should provide for ease of access to the mouth for eating and drinking purposes even at sub-zero temperatures and to the nose for the purpose of clearing the nostrils of waste products. The mask should also provide for good vision at all times, even when glasses are worn, and should, therefore, essentially preclude the accumulation of moisture and frost on the interior surfaces of the mask and the lenses of glasses being worn in conjunction with the mask. The mask should be free of 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.

In the fabrication of a mask embodying the invention, a flexible, laminated, thermally insulating facepiece 10 conformed to cover the major portion of the face and ears of the wearer, as shown in FIGS. 1-4, is constructed of a laminate comprising an interlayer 11 of insulating material, which is preferably an open cell polyurethane foam of about 0.25 inch thickness, a knit outer layer 12 having low moisture regain properties, as for example stretch type nylon, and an inner layer 13 having high moisture regain properties and stretchability, as for example cotton jersey. The materials of which facepiece 10 is constructed are of such nature and are laminated in such a manner as to permit sound to be conducted through the side portions of the facepiece extending over the ears of the wearer, thus permitting the wearer to hear well when wearing the face mask. The layers of material are preferably bonded together by a flame bonding process. The edges 14 of the facepiece are seamed and stitched with an overlock safety stitch (Seam Type S5a-2 and Stitch Type 516 of Federal Standard 751a). The seams are joined using a standard zig-zag stitch, and then bar-tacked to prevent unraveling or fraying. Sewing is accomplished with a polyester/cotton wrapped thread conforming to Military Specification MIL-T-43548.

As illustrated in FIG. 2, a single visual port 15 is provided in the facepiece for registry with both eyes of the wearer. An elastic strap 16 connects the upper and lower edges of the visual port to assist in preserving the dimensions of the opening of the visual port and also to assist in maintaining a pair of eyeglasses 17 in place in registry with the eyes of the wearer when eyeglasses are being worn in conjunction with the mask. The mask also is provided with an eyeglass temple holder loop 18 on the exterior surface on each side of the facepiece so as to overlie the temple area of the head of the wearer, through each of which one of the temples 19 of the pair of eyeglasses passes and is supported.

As illustrated in FIG. 4, a single oronasal port 20 is provided in the facepiece for registry with the mouth and lower portion of the nose of the wearer to facilitate access to the mouth and nostrils without removal of the mask from the face whenever it is desirable for the wearer to eat or drink or to clear his mouth or nostrils of waste products. For protection of the mouth and nose against cold, wind, and blowing snow during most of the time the mask is being worn, and oronasal barrier 21 is provided. The oronasal barrier is air permeable

and is preferably in the form of a nose cup type respirator, several types of which are commercially available, and is permanently attached to the facepiece adjacent to one side of the oronasal port by means of a non-elastic nylon tab 22, one end of which is stitched to one edge of the oronasal barrier and the other end of which is stitched to the facepiece adjacent to one edge of the oronasal port. The oronasal barrier is attachable to and detachable from the facepiece by means of hook and pile fastener tapes provided on the exterior surface of the facepiece and on the interior surface of the oronasal barrier. Approximately one-inch wide strips of hook fastener tapes 23 are stitched to the facepiece along both side edges and the upper edge of the oronasal port. Approximately ¼-inch wide strips of the pile fastener tapes 24 are stitched to the oronasal barrier on the inner surface along approximately the upper three-quarters of the circumference of the oronasal barrier in such a manner and positioned so as to cooperate with the hook fastener tapes 23 on the facepiece to maintain the oronasal barrier in registry with and covering the oronasal port whenever maximum protection of the entire face is desired by the wearer. The oronasal barrier assists in maintaining inhaled air at well above the ambient temperature without interfering with exhalation. The oronasal barrier is provided with a tab 25, preferably made of cotton, which is stitched at one end thereof to the side edge of the oronasal barrier opposite the side edge to which non-elastic nylon tab 22 is attached, the other end thereof being free and extending beyond the side edge of the oronasal barrier. Tab 25 is made sufficiently long and wide to facilitate detachment or attachment of the oronasal barrier with respect to the facepiece and the oronasal port therein even when cold weather handgear is being worn.

The mask is provided with a nose bridge stiffener 26 or 26', which is malleable and is preferably made of thin sheet aluminum, and which is enclosed between padding 27 and the nose bridge portion of the facepiece which overlies the bridge of the nose of the wearer. The padding is stitched to the inner surface of the facepiece to assist in conforming the nose bridge portion of the facepiece to the nose bridge of the wearer. The nose bridge stiffener and padding extend under the visual port on each side of the nose to assist in molding the facepiece, with the assistance of the fingers, to fit snugly against the cheeks as well as the nose of the wearer. The padding, in cooperation with the nose bridge stiffener, helps to prevent moist, warm, exhaled air from penetrating upwardly into the visual port area and producing fogging of glasses or goggles when they are worn with the mask.

Adjustability of the length of the face mask to make the mask fit a wide range of face lengths is provided by a trifurcated lower portion of the mask comprising two cooperating underchin adjustment straps 28 and 29 and a trapezoidally shaped underchin fork 30, as shown in FIG. 5. Adjustment strap 28 comprises a hook type fastener and adjustment strap 29 comprises a pile type fastener each of which cooperates with the other in effecting adjustment of the length of the facepiece. Adjustment strap 29 overlaps adjustment strap 28 to a greater or lesser degree when the mask is being worn. Underchin fork 30 is folded over the front of the chin and back under the chin and is held in place by the cooperating adjustment straps 28 and 29. The degree of overlapping of adjustment strap 29 over adjustment

strap 28 in cooperation with underchin fork 30 determines the length of the facepiece. Thus the trifurcated lower portion of the facepiece of the mask provides a chin pocket 31 in which the chin of the wearer fits snugly. Adjustment strap 29 is provided with a tab 32 for ease of adjustment of strap 29 with respect to strap 28.

The cold weather face mask is held on the head 33 of the wearer by means of a flexible retention harness 34, which comprises a back strap 35 and an overhead strap 36, both of which are made of cotton elastic webbing. Back strap 35 is stitched to the edge of the facepiece on one side thereof, preferably the left side with respect to the wearer of the mask. The other end of the back strap is provided with a pile type fastener 37 which cooperates with a hook type fastener 38 attached to the right side of the facepiece, which is sufficiently long to provide adjustability of the length of the back strap so that a substantial variability in head circumferences may be accommodated. The back strap is provided with a tab 39 to facilitate adjustment of the length of the back strap through cooperation of the pile type fastener 37 with the hook type fastener 38. The overhead strap 36 is stitched at one end thereof to the upper edge of the facepiece approximately midway between the sides of the facepiece and at the other end thereof to the back strap at approximately its midpoint. This arrangement provides for adequate adjustability to effect a satisfactory fit on approximately 90 percent of the human heads found in the Armed Forces and produces good stability of the face mask on all such heads. The elastic nature of back strap 35 provides freedom for jaw movements of the wearer while still maintaining a snug fit of the face mask over the face of the wearer once it has been properly fitted in place with the visual port in registry with the eyes, the adjustment straps 28 and 29 have been adjusted to provide a snug fit about the chin, and the back strap 35 has been properly adjusted in length by means of pile type fastener 37 in cooperation with hook type fastener 38 to accomplish stabilization of the facepiece with respect to sudden movements of the head of the wearer.

It is to be understood that other materials than those described above may be employed in constructing the cold weather face mask of the invention. It is desirable that the facepiece be made of materials which have some ability to stretch so as to conform well to the facial contours of the wearer. It is also desirable that the facepiece materials of construction permit breathing and, therefore, migration of moisture therethrough. The inner layer of the facepiece should be of a material which will be comfortable to the face, while the outer layer should be strong and not easily subject to snagging or tearing.

A primary feature of the cold weather face mask embodying the invention is its relatively light weight of less than 2½ ounces. Protection against frostbite is provided for the forehead, cheeks, nose, ears, chin, and mouth of 90 percent of the population with a single size of face mask of such a low weight. Protection is good even in environments as low as -65°F. and at wind velocities of up to about 35 m.p.h. while provision is made for eating, drinking, smoking, elimination of oral and nasal waste products, relief from excess moisture accumulation and hearing is maintained at an acceptable level. The mask also makes possible the wearing of eyeglasses under sub-zero and high wind velocity

conditions without the lenses becoming fogged. A further feature, and also an advantage, of the cold weather face mask of the invention is its durability compared with vinyl and other plastic materials which have heretofore been used in face masks, but which fail in all too many cases because of stiffening and cracking at such low temperatures as -65°F . A still further feature, and also advantage, of the cold weather face mask of the invention is its ability to be folded and stored in a pocket even at relatively low temperatures without losing its capability of being quickly and easily restored to an operative condition protecting the face against extremes of climatic conditions. The cold weather face mask of the invention is also very weather resistant, particularly with respect to low temperatures, snow, ice and high wind velocities.

As is readily apparent from the foregoing description of the invention, the cold weather face mask of the invention is useful for protecting human faces against extremely low temperatures and high wind velocities which are so often encountered in arctic and antarctic areas.

We wish it to be understood that we do not desire to be limited to the exact details described herein for obvious modifications will occur to a person skilled in the art.

We claim:

1. A cold weather face mask comprising a flexible, thermally insulating facepiece adapted to cover and closely engage the face of the wearer of said face mask, said facepiece having a visual port and an oronasal port therein, means for forming a chin pocket of adjustable size, said chin pocket-forming means comprising a trifurcated lower portion of said facepiece, the middle fork of said trifurcated lower portion being adapted to fold over the front and underneath portions of the chin of said wearer, the two outer forks of said trifurcated lower portion being adapted to fold over said middle fork after it is folded and to be attached to each other in an adjustable overlapping relationship, a detachable air permeable oronasal barrier adapted to cover said oronasal port, and a flexible, adjustable retention har-

ness for maintaining said facepiece in position over the face of the wearer, said chin pocket-forming means and said retention harness cooperating to provide close fitting of said face mask on a wide range of face sizes and shapes while maintaining said visual port in register with the eyes of said wearer and said oronasal port in register with the mouth and nasal apertures of said wearer.

2. A cold weather face mask in accordance with claim 1, wherein said face mask is provided with a malleable nose bridge stiffener in thin sheet form sandwiched between flexible padding and the inner surface of said facepiece and extending horizontally under said visual port, said stiffener being adapted for hand-molding the nose bridge portion of said facepiece to fit closely to the nose bridge and adjacent cheek portions of the face of said wearer, whereby moist, warm, exhaled air is prevented from penetrating upwardly to said visual port.

3. A cold weather face mask in accordance with claim 1, wherein one of said outer forks of said trifurcated lower portion of said facepiece comprises a fabric hook fastener tape attached to one surface thereof and the other of said outer forks of said trifurcated lower portion of said facepiece comprises a fabric pile fastener tape attached to one surface thereof, said fabric hook fastener tape contacting and cooperating with said fabric pile fastener tape to make said outer forks adjustably attachable to each other, whereby said chin pocket-forming means and said face mask are made adjustable in size.

4. A cold weather face mask in accordance with claim 1, wherein said facepiece comprises a stretchable knit fabric inner layer which has high moisture regain properties and is comfortable when in contact with the face of the wearer, a stretchable knit fabric outer layer which has low moisture regain properties, and an open cell type polyurethane foam interlayer having sufficient thickness to thermally insulate the face of the wearer against extremely cold climates, said inner and outer layers being bonded to said interlayer.

* * * * *

45

50

55

60

65