

June 23, 1953

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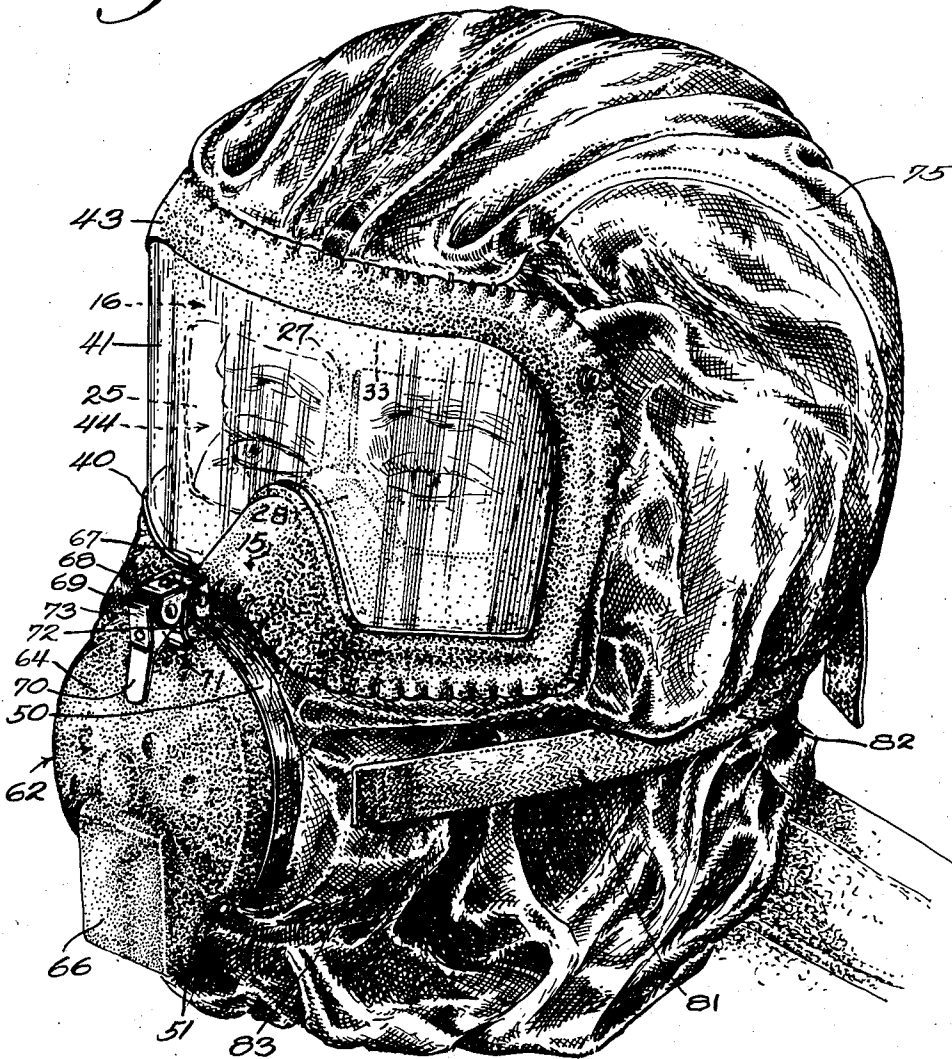
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HELMET FOR PROTECTION AGAINST LOW-TEMPERATURES

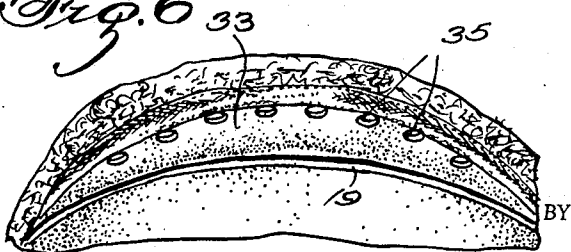
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4 Sheets-Sheet 1

*Fig. 1*



*Fig. 6*



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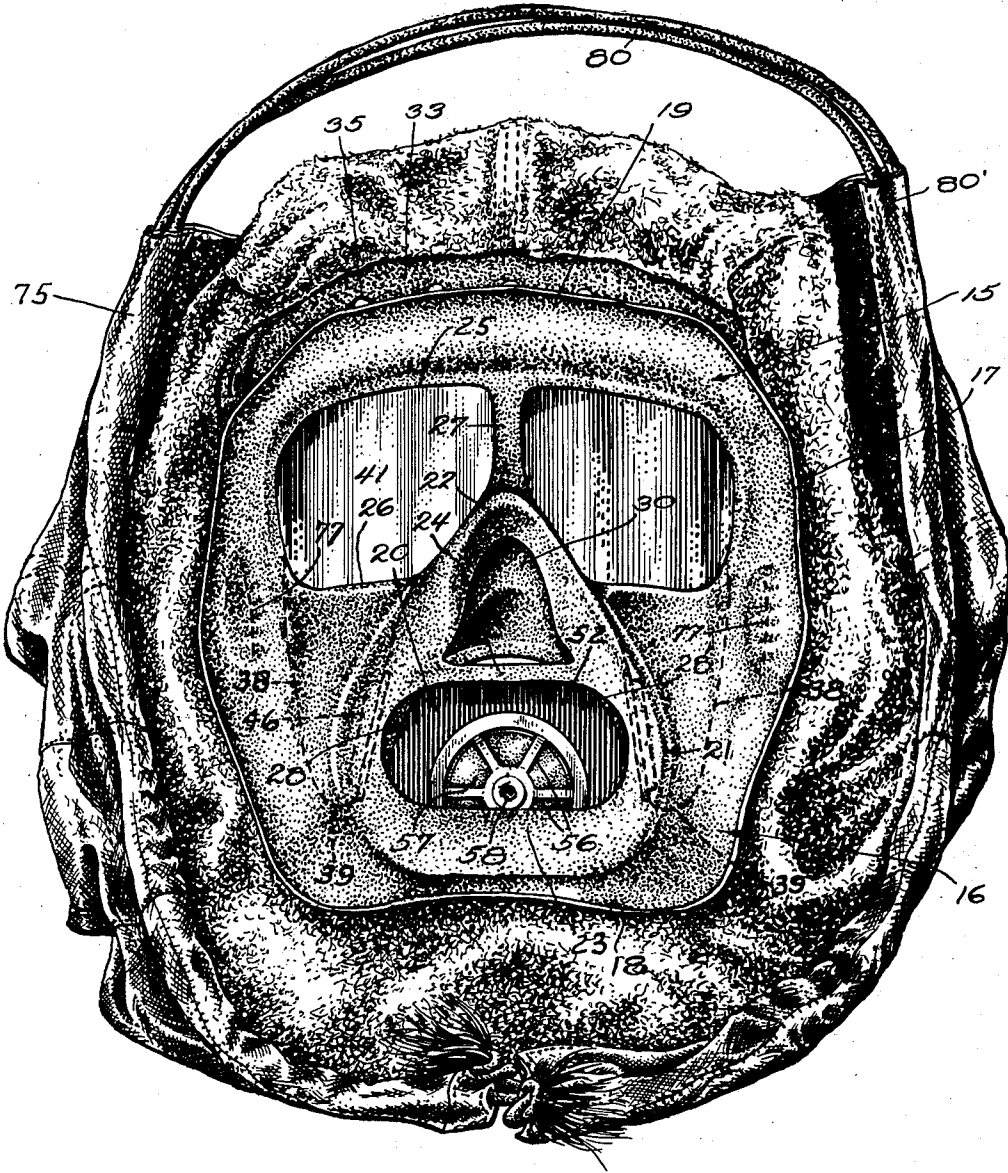
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4 Sheets-Sheet 2



*Fig. 2*

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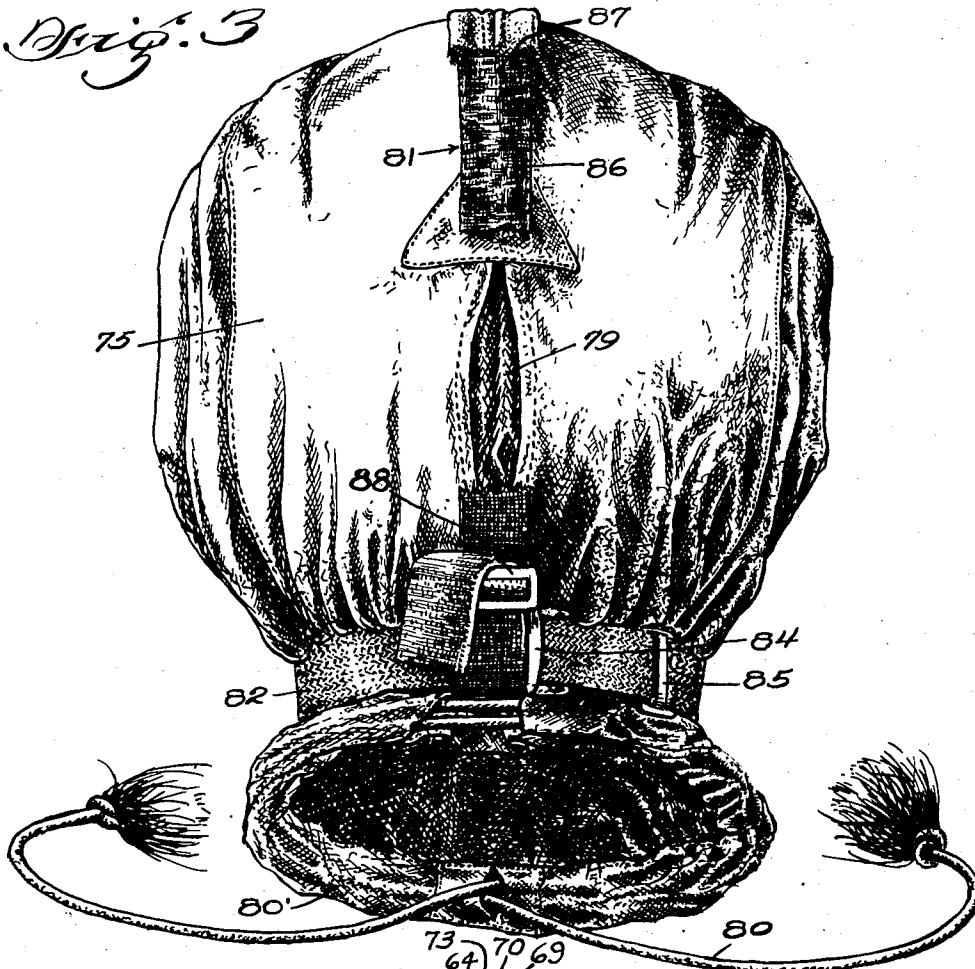
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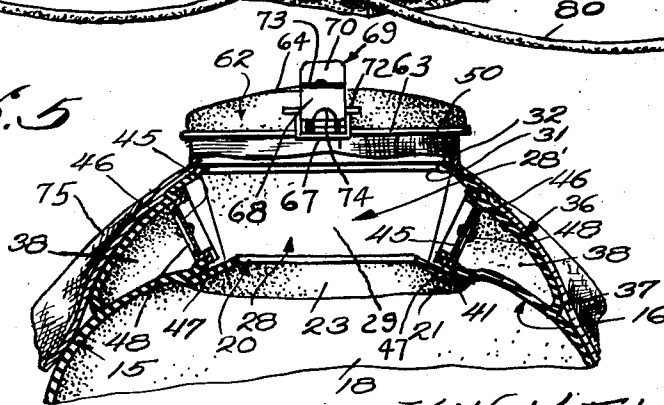
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4 Sheets-Sheet 3

*Fig. 3*



*Fig. 5*



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# UNITED STATES PATENT OFFICE

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## HELMET FOR PROTECTION AGAINST LOW-TEMPERATURES

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Application February 7, 1952, Serial No. 270,307

5 Claims. (Cl. 2—205)

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My invention relates to a protective face and head covering for use in low temperature regions.

A primary object of the invention is to provide a protective helmet suitable for use by military personnel in Artic regions or the like.

A further object is to provide a helmet of the above type which is easy to don and doff, and which will not interfere with use by the wearer of a rifle or the like.

A further object is to provide a helmet of the mentioned character embodying novel means to direct fresh air across the goggle of the helmet to prevent fogging or frosting of the same.

A further object is to provide a helmet of the above-mentioned character including a face mask which is comfortable and effectively protects the face from the elements.

A further object is to provide a face mask having novel means to facilitate breathing and adequately ventilate the goggle of the mask.

A further object is to provide a face and head protecting helmet having simplified adjustable means for securing the device to the head of the wearer.

A still further object of the invention is to provide a helmet which has a large goggle to afford maximum visibility.

A further object is to provide a helmet of the above-mentioned character having a closure near the mouth which may be opened to facilitate eating, talking, and the like.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a perspective view of a helmet embodying my invention,

Figure 2 is a rear elevation of the same with the hood rolled back to show the inner side of the face mask, part broken away.

Figure 3 is a rear elevation of the helmet with the hood in the donned position,

Figure 4 is a central vertical section through the helmet, parts broken away.

Figure 5 is a horizontal cross-section taken on line 5—5 of Figure 4, part in elevation, and

Figure 6 is a fragmentary plan view of the helmet with the hood rolled back to expose the top of the face mask, parts broken away.

In the drawings, where for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 15 designates gen-

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erally a moulded face mask. The face mask 15 comprises an inner moulded rubber sheet or wall 16, shaped to fit the average face, and including a continuous flexible marginal flange 17 which contacts the face and preferably has substantially an airtight fit thereagainst. Flexibility of the sheet 16 and its flange 17 permits the sheet to conform to the natural contours of a given face when the mask is applied thereto and held firmly against the face by means to be described hereinafter.

The lowermost transverse portion 18 of the continuous flange 17 engages under the chin of the wearer, while the top transverse portion 19 of the flange bears against the forehead below the hairline. The generally vertical side portions of the flange 17 contact the sides of the cheeks, and the arrangement is such that the inner rubber sheet 16 covers substantially the entire area of the face forwardly of the ears and between the top of the forehead and chin.

The inner sheet 16 has a generally central oral-nasal opening 20 which is generally triangular and tapers upwardly as shown in Figure 2. A continuous bead or gasket 21 is formed upon the inner sheet 16 about the margin of the opening 20 and bears against the bridge of the nose and the portion of the face surrounding the mouth. The uppermost portion 22 of the bead 21 engages the bridge of the nose, while the lowermost transverse portion 23 engages the chin below the lower lip.

A narrow transverse elastic band 24 is preferably provided for integrally connecting the sides of the bead 21 at a point near the longitudinal center of the oral nasal opening 20. When the mask is donned, this band 24 bears against the upper lip directly below the nose and aids in positioning the mask upon the face and maintaining the bead 21 in airtight contact with the face.

Near the top of the oral nasal opening 20, the inner sheet 16 is further provided with a large generally rectangular, transversely elongated eye opening 25, and the uppermost portion 22 of the bead 21 projects above the lower transverse edge 26 of the eye opening 25, Figure 2. A narrow elastic band 27, like the band 24, is preferably provided at the transverse center of the eye opening 25, and this band has its lower end integrally secured to the upper bead portion 22 and its upper end integrally secured to the uppermost portion 19 of the rubber sheet 16. The band 27 is disposed at the transverse center of the mask, midway between the eyes, and is so

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narrow that it does not interfere with vision. The band 27 aids in maintaining the proper shape of the mask when the same is applied to the face.

The mask 15 further comprises a forwardly projecting wall or sleeve 28, formed integral with the inner sheet 16 and surrounding the oral nasal opening 20 and forming an oral nasal passage 28' leading forwardly from the oral nasal opening 20. As best shown in Figure 4 the forwardly projecting wall 28 has a lower transverse portion 29 and an upper inclined portion 30. The side portions of the wall 28 preferably converge upwardly and are substantially parallel to the sides of the oral nasal opening 20. The forward end of the wall 28 defines a circular opening 31, Figures 4 and 5. A short annular sleeve 32 is formed integral with the wall 28 and projects forwardly of the same, as shown.

A generally horizontal transverse top wall 33 is formed integral with the inner sheet 16 and extends forwardly of and substantially entirely across the same. As viewed from above, Figure 6, the top wall 33 is curved longitudinally to follow the transverse curvature of the upper sheet portion 19, which in turn is curved to fit the forehead. The top wall 33 is spaced above the forwardly projecting wall 28 in superposed relation thereto, but the forward edge 34 of the top wall terminates rearwardly of the forward end of the wall 28 defining the passage 28'. The top wall 33 has a longitudinal row of spaced air inlet apertures 35, as shown.

A forward rubber sheet or wall 36 is integrally secured about its marginal edge 37 to the inner wall 16, and the forward wall is spaced forwardly of the inner wall 16 and also integrally joined to the forwardly projecting wall or sleeve 28. The forward wall 36 defines with the inner wall 16 and forwardly projecting wall 28, deep downwardly tapering recesses 38, at the sides of the forwardly projecting wall 28 and laterally outwardly thereof. The recesses 38 also taper transversely outwardly, toward the junctions 37 of the inner and outer walls, Figure 5. The lower ends 39 of the deep recesses 38 are closed, and their upper ends are open.

The forward wall 36 is provided adjacent to the eye opening 25 with a companion eye opening 40, somewhat larger than the eye opening 25 but having the general shape as the same. A transparent goggle lens 41 of a suitable somewhat flexible plastic material is mounted within the forward eye opening 40 and has its marginal edge secured in a groove 42, formed in a marginal rubber flange 43 surrounding the opening 40. The goggle lens 41 is formed of material which possesses the optical qualities necessary for good visibility.

A goggle chamber 44 is formed between the goggle lens 41 and inner wall 16, and the top of this chamber is defined by the top wall 33, while its bottom is defined by the forwardly projecting wall 28. The tops of the deep recesses 38 are in open communication with the goggle chamber 44, and lead downwardly from the ends of the same, upon opposite sides of the passage 28'. When the mask is donned, the goggle chamber 44 is sealed from the oral nasal passage 28' by the bead or gasket 21, which prevents the exhaled breath from entering the goggle chamber 44, through the eye opening 25.

Check valve means are provided to prevent exhaled air from reentering the goggle chamber 44 via the recesses 38. Such means comprises mem-

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brane flutter valves 45, carried by small plates 46, which are fixedly secured within openings 47 formed in the sides of the forwardly projecting wall 28. The plates 46 have openings 48 beneath the membrane valves 45, and the membranes 45 are adapted to be raised from the plates 46 to admit inhaled air passing downwardly through the recesses 38 to the oral nasal passage 28'. When the wearer of the mask exhales, the membranes 45 are seated upon the plates 46 and cover the openings 48 so that exhaled air cannot enter the recesses 38. During inhaling, fresh air is drawn in from above the head through the apertures 35, and this fresh air passes downwardly through the goggle chamber 44, and ventilates the inner surface of the goggle 41, to prevent fogging or frosting of the same.

A rigid metal sleeve or ring 49 is mounted within the annular flange 32, and an outer binding strip 50 of friction tape or the like surrounds the flange 32 and binds the same tightly to the sleeve 49. The sleeve 49 is equipped at its bottom with hinge knuckles 51, coacting with companion hinge knuckles formed at the bottom of a pivoted closure or door 52 of sheet metal or the like. This door 52 has an annular flat marginal flange 53 for engagement with the outer end of the sleeve 49, and the door 52 has a hollow central body portion, including spaced inner and outer walls 54 and 55. The hollow body portion of the door 52 enters the sleeve 49 when the door is closed, and the door is swingable downwardly for opening the same to facilitate talking, eating, and the like, Figure 4.

The inner wall 54 of the door 52 has a plurality of openings 56 formed therein, and a forwardly opening membrane check valve 57 is secured at 58 to the outer surface of the wall 54 and covers the openings 56. The arrangement is such when the door 52 is closed, and the wearer of the mask exhales, the membrane valve 57 is raised and uncovers the openings 56 to permit passage of the breath through the openings, the check valves 45 being closed during exhaling, as previously explained.

The front wall 55 of the closure 52 has a forwardly projecting struck out web 59, having a downturned lip 60 formed at its forward end. A large opening 61 is thus formed in the forward wall 56, and the exhaled air passes through this opening when leaving the mask.

I provide an insulating cover 62 of moulded rubber or the like for the hollow sheet metal door 52, and such cover includes a marginal flange 63 which engages about the flange 53 and serves to secure the cover 62 to the door. The cover 62 has an outer side 64, spaced forwardly of the wall 55 by lugs or spacers 65, formed integral with the cover and bearing against the wall 55. At its lower end the cover 62 has a short depending spout 66, integral therewith, and the web 59 and depending lip 60 extend into the upper end of the spout 66 to support the same, and maintain the front wall 64 spaced from the wall 55. The spout 66 is in direct communication with the discharge opening 61, so that exhaled air may pass through the spout 66 to the atmosphere. A dead air insulating space is formed between the outer wall 64 and wall 55 of the closure 52.

An upstanding hinge plate 67 is rigidly secured to the top of the ring 49, and has pivotally connected therewith an inner section 68 of a two-position cam latch 69. The cam latch 69 further includes a forward handle portion 70, which has cam ears 71 formed thereon to engage an up-

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standing catch plate 72, rigidly secured to the top of the closure 52; there being a slit formed in the top of the rubber cover 62 to receive the catching plate 72. The handle section 70 carries a leaf spring 73 at its rear end for engagement upon the inner section 68 and serving to releasably lock the handle section 70 in the elevated or unlocked position shown in dotted lines in Figure 4. A small torsion spring 74 is mounted upon the hinge pin of the plate 67, and has an end engaging the inner section 68 of the cam latch 69 to urge the same downwardly into locking engagement with the catch plate 72. When the handle portion 70 is swung downwardly to the position shown in Figure 4, the cam ears 71 force the catch plate 72 rearwardly and the flange 53 is clamped tightly against the outer end of the sleeve 49, with the rubber flange 63 therebetween to form an airtight seal. The cam latch 69 is elevated above its position shown dotted in Figure 4 and against the force of the torsion spring 74, to entirely release the catch plate 72 and allow the closure 52 to be fully opened.

The protective face mask 15 is stitched into a lined poplin head covering or hood 75, adapted to cover the entire head and open at its lower end for receiving the head. The hood 75 is stitched to the mask 15 around the margin of the rubber flange 43. The flexible sides 17 of the inner sheet 16 may also be tacked to the hood 75 by lines of stitching 77, Figure 2. The hood has an opening in the mouth area, forming a sleeve 78 which extends over the rubber sleeve 32 and lies beneath the binding tape 50.

The hood 75 has a slit 79 through its lower edge, at the back thereof, Figure 3. A draw string 80 extends through a passage formed by a hem 80' at the bottom of the hood, and serves to draw the lower end of the hood about the neck of the wearer. The hood 75 extends over the top wall 33 of the mask and is spaced therefrom during the wearing of the helmet. Air is drawn through the top of the hood during breathing, the hood being porous and loose fitting enough to permit breathing without undue difficulty. The hood is, however, wind resistant and warm.

The hood 75 is further provided with an adjustable harness 81, including an elastic strap 82 having its forward ends stitched at 83 to the sides of the hood near the mouth area. This strap 82 is adjustable lengthwise by means of a slide clasp 84 and buckle 85, and the strap extends about the back of the head and is arranged substantially horizontally, as shown. A vertical adjustable strap 86 has its top end stitched at 87 to the top of the hood at the transverse center of the same. The strap 86 is looped about the elastic strap 82 for supporting the latter at the rear of the helmet, and the strap 86 has an adjusting buckle 88, as shown.

In use, the helmet is donned and adjusted by means of the harness 81 and draw string 80 and the helmet shields the entire head and face from the cold. When the closure 52 is in the closed position, the wearer can breathe normally, and this breathing ventilates the goggle chamber 44 and eliminates clouding of the goggle lens, as previously explained. The one-way check valves 45 prevent exhaled air from reentering the goggle chamber 44, and the one-way check valve 57 likewise prevents inhaled air from passing into the oral nasal passage 28' by way of the spout 66; the inhaled air being drawn in through the top of the hood and through the apertures 35 so

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that a continuous downdraft of air through the goggle chamber 44 is maintained.

It is to be noted that the construction of the moulded face mask 15 is such that substantially the entire area of the face is protected by a double-walled insulating construction. The inner and forward walls 16 and 36 are spaced apart and form an insulating air space therebetween, and the hollow construction of the door 52 and the space between the rubber cover 62 and closure 52 further insulates the face from the effects of low temperatures.

The helmet may constitute the entire covering for the head of the wearer if desired, or the helmet may be conveniently worn beneath a heavy outer hood such as the hood of the standard army arctic parka. The helmet is compact, fits the head rather snugly, and is free from large projections. The helmet in no way interferes with the parka hood when the same is worn over the helmet.

It should further be pointed out that the construction of the helmet is such that there are no excessively large projections extending forwardly of the face. The projection caused by the closure 52 and associated elements is as small as possible and is not objectionable. Thus, the helmet does not interfere with the firing of a rifle or the like by military personnel, and the large goggle provides maximum visibility.

It is to be understood that the form of this invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A mask for protecting the face against low temperatures comprising an inner wall for engagement with the face and covering the major portion of the face and having a first opening in the region of the eyes and a second opening below the first opening for receiving the nose and mouth, an outer wall spaced forwardly of said inner wall and forming an insulating air space between the walls, the outer wall having a first opening in the region of the eyes and a second opening adjacent to the second opening of the inner wall, a transparent pane mounted within the first opening of the outer wall, a closure member carried by the mask and covering the second opening of the outer wall, a forwardly extending sleeve connecting the inner and outer walls between the second openings, a top perforated wall connecting the inner and outer walls above the first openings and allowing air to pass into the space between the inner and outer walls, a check valve mounted upon said forwardly extending sleeve to permit air from the space between the inner and outer walls to enter the sleeve, and a check valve mounted upon the closure member to permit exhaling when the closure member is closed.

2. A mask for protecting the face against low temperatures comprising an inner flexible sheet to engage the face and shaped to cover the major portion of the area of the face and adapted to conform to the natural contours of the face, the inner sheet having a first opening in the region of the eyes and a second opening below the first opening to receive the nose and mouth of the wearer, a substantially tubular wall secured to the inner sheet adjacent to the second opening of the inner sheet and extending forwardly of the



inner sheet and having a forward opening, a closure element for said forward opening, a forward wall spaced forwardly of the inner sheet and secured to the substantially tubular wall near the forward end of the latter, a top generally horizontal apertured wall arranged above the first opening of the inner sheet and connecting the inner sheet and forward wall, the forward wall having an opening adjacent to the first opening of the inner sheet, a transparent goggle pane mounted within the last-named opening of the forward wall, one-way check valves carried by the opposite sides of the substantially tubular wall for admitting air to the interior of the substantially tubular wall, and a one-way exhaust check valve carried by the closure element.

3. A mask for protecting the face from the elements comprising an inner flexible sheet for engagement with the face and covering a major portion of the area of the face and having a first opening adjacent to the eyes and a second opening for receiving the nose and mouth, there being a bead formed about the second opening for sealing engagement with the face to prevent exhaled air from entering the first opening of the inner sheet, a forwardly extending substantially tubular wall integrally secured to the inner sheet about said second opening and defining an oral-nasal passage leading forwardly of said second opening and having a forward opening to facilitate talking and the like, a closure member mounted upon the mask adjacent to the forward opening for covering the same, a one-way check valve carried by the closure member to permit exhaling through the closure member, a forward wall spaced forwardly of the inner sheet and integrally secured to the forwardly extending tubular wall and defining an insulating space between the inner sheet and forward wall, the forward wall also being integrally secured to the inner sheet near the side margins of the forward wall, a generally horizontal apertured partition arranged above the first opening of the inner sheet and extending between and integrally secured to the inner sheet and forward wall, there being an opening in the forward wall adjacent to the first opening of the inner sheet, a transparent goggle pane mounted within the last-named opening of the forward wall, there being deep recesses formed between the inner sheet and forward wall on opposite sides of the substantially tubular wall, and one-way check valves mounted upon the sides of the substantially tubular wall near the bottoms of the deep recesses to permit inhaling into the oral-nasal passage from said deep recesses.

4. A mask for protecting the face from the elements comprising an inner sheet to bear against the face and substantially covering the face and having a first opening in the region of the eyes and a second opening below the first opening for receiving the nose and mouth of the wearer, a forwardly projecting sleeve secured to the inner sheet around the second opening and forming an oral-nasal passage forwardly of the inner sheet, the forward end of the oral-nasal passage having an opening, a closure member hingedly connected to the mask adjacent to the last-named opening for covering the same, exhaust valve means carried by the closure member to permit exhaling through the closure member, a forward wall spaced forwardly of the inner sheet and secured to the inner sheet near the side marginal portions of the forward wall, the forward wall being secured to the forwardly projecting sleeve

for defining deep passages on opposite sides of the sleeve which have their lower ends closed, the forwardly projecting sleeve having opposite side openings leading from the deep passages into the oral-nasal passage, membrane check valve units mounted within said side openings and permitting air from the deep passages to enter the oral-nasal passage, a top generally horizontal apertured wall spaced above the forwardly projecting sleeve in superposed relation therewith and connecting the inner sheet and forward wall and forming therewith an air chamber above said forwardly projecting sleeve which leads into the deep passages at the sides of the sleeve, and a transparent window in said outer wall forwardly of the first opening of said inner sheet.

5. A mask for protecting the face from the elements comprising an inner sheet to bear against the face and substantially covering the face and having a first opening in the region of the eyes and a second opening below the first opening for receiving the nose and mouth of the wearer, a forwardly projecting sleeve secured to the inner sheet around the second opening and forming an oral-nasal passage forwardly of the inner sheet, a substantially rigid ring secured to the forward end of said sleeve, a closure member hingedly secured to the ring for movement to open and closed positions, latch means carried by the ring for engagement with the closure member to releasably hold the same in the closed position, the closure member having an exhaust passage leading from the oral-nasal passage, a membrane check valve carried by the closure member and disposed within the exhaust passage of the closure member to permit exhaling through the exhaust passage and preventing inhaling through the same, a forward wall spaced forwardly of the inner sheet and secured to the inner sheet near the sides of the forward wall, the forward wall being secured to said sleeve and defining deep recesses on opposite sides of the sleeve which have their lower ends closed, the sleeve having openings in its opposite sides for connecting the oral-nasal passage and deep recesses, membrane check valves mounted within the said openings of the sleeve and permitting air from the deep recesses to be drawn into the oral nasal passage during breathing and preventing exhaling from the oral-nasal passage into the deep recesses, a generally horizontal perforated wall arranged above the first opening of the inner sheet in spaced superposed relation to the forwardly projecting sleeve and connecting the inner sheet and forward wall, said perforated wall forming with the inner sheet, forward wall and sleeve an air chamber above the deep recesses and leading into the deep recesses, whereby inhaled air is drawn downwardly through said air chamber, and a transparent element mounted within said outer wall adjacent to the first opening of the inner sheet.

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