

Feb. 15, 1944.

R. MONRO

2,341,566

NONCOMBATANT GAS MASK

Filed Aug. 22, 1942

3 Sheets-Sheet 1

FIG. 2

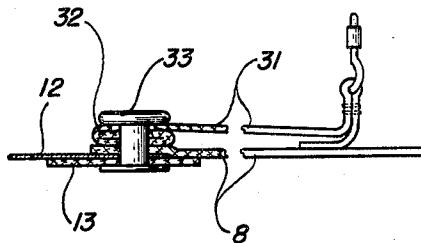


FIG. 1

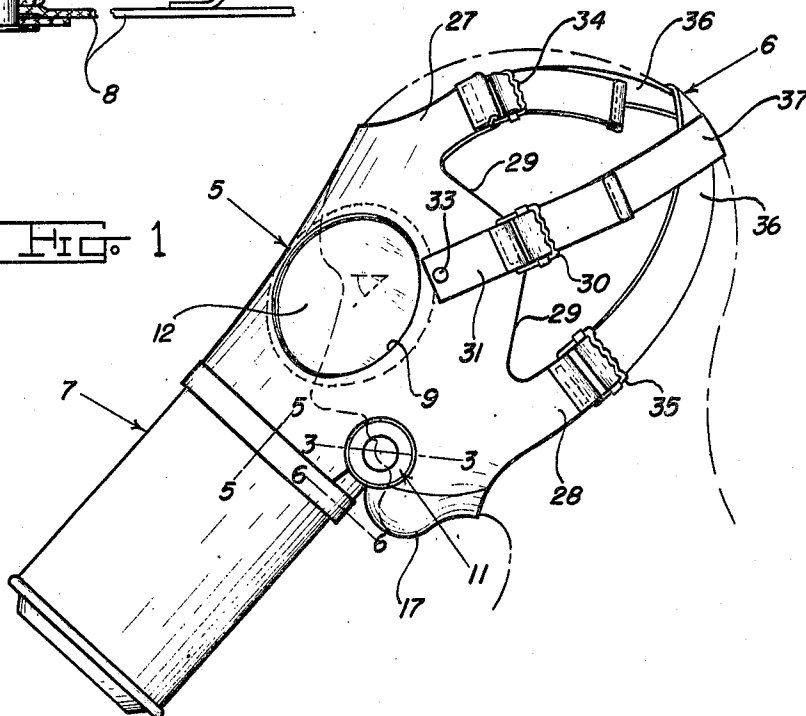
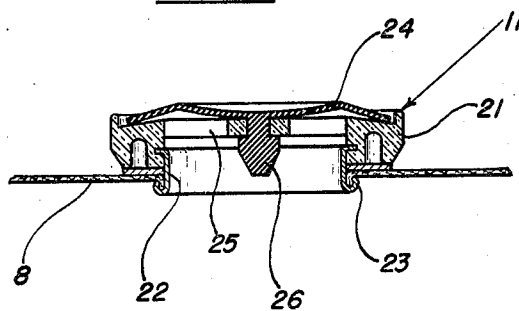


FIG. 3



Inventor

RANDOLPH MONRO

By *Joseph T. O'Connell and*
And S. Lockwood, Attorneys

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R. MONRO

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FIG. 4

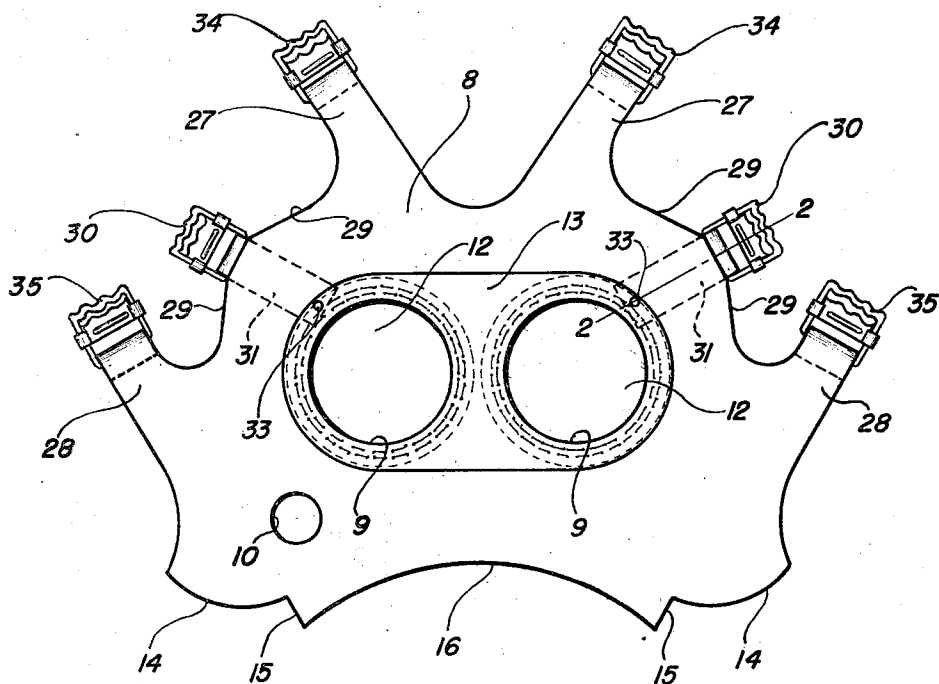


FIG. 5

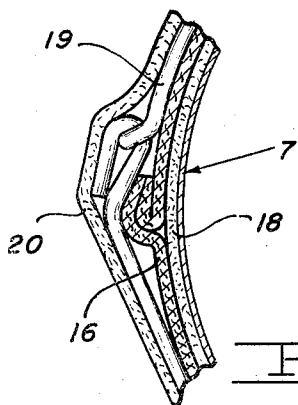
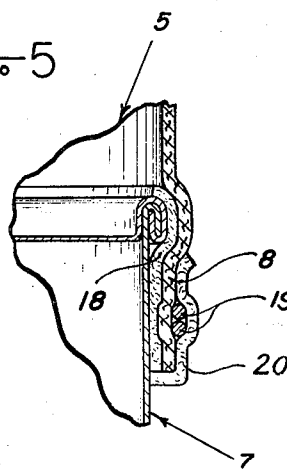


FIG. 6

Inventor

RANDOLPH MONRO

By *Joseph A. Connell*
And S. Lockwood, Attorneys

Feb. 15, 1944.

R. MONRO

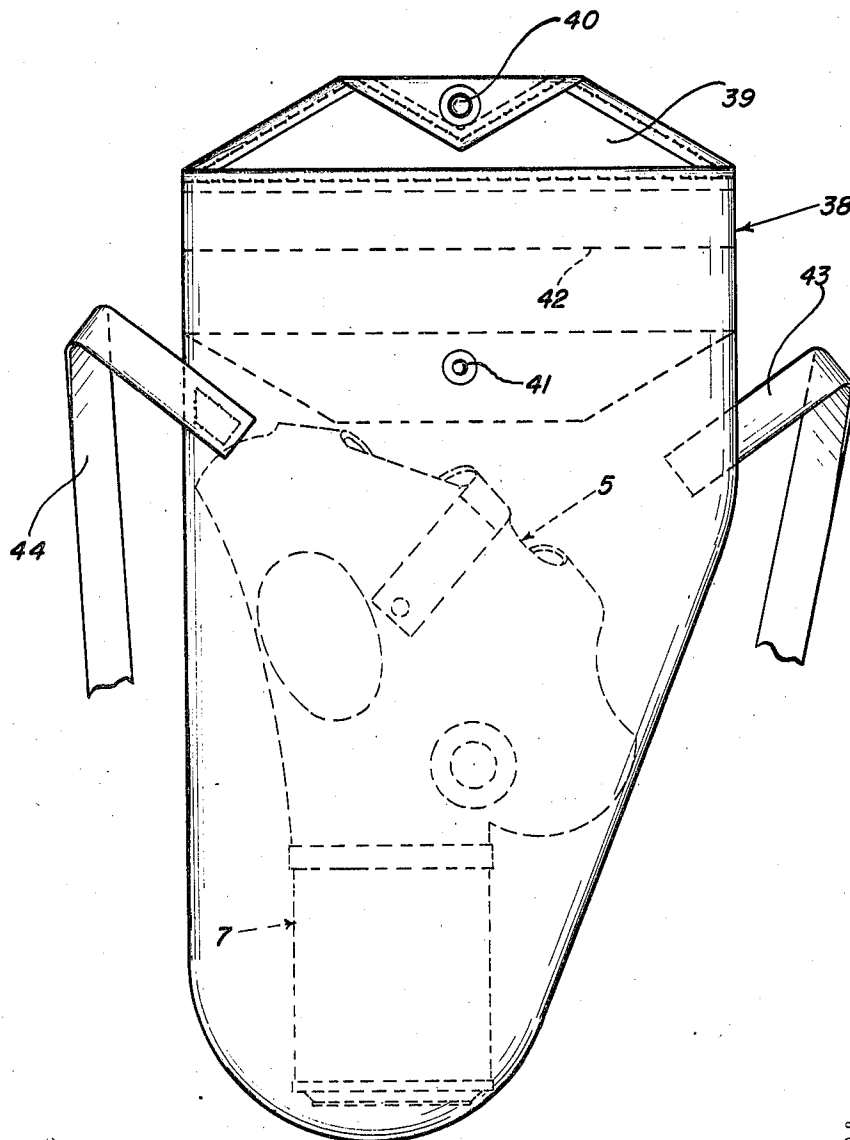
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FIG. 7



Inventor

RANDOLPH MONRO

By *Joseph A. O'Connell and*
And S. Lockwood, Attorneys

UNITED STATES PATENT OFFICE

2,341,566

NONCOMBATANT GAS MASK

Randolph Monro, Mountain, Md.

Application August 22, 1942, Serial No. 455,711

2 Claims. (Cl. 128—141)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

This invention relates to masks promotive of healthful breathing in atmospheres contaminated with either dust, chemicals, or poison gases. Particularly, the invention has reference to a gas mask designed especially for use by civilian personnel as a protective medium during chemical warfare.

An object of the invention is to provide a gas mask for the purpose specified characterized by compactness, lightness of weight, facility of manufacture in quantity production without requiring highly skilled labor.

Another object of the invention is to provide a self-contained mask having adequate drainage facilities for perspiration and saliva otherwise tending to accumulate within the facepiece of the mask; and also to prevent drainage of moisture into the canister. Still another object of the invention is to provide a gas mask which is substantially leak proof against the influx of noxious gases.

A further object of the invention is to provide a gas mask wherein the facepiece and head harness are so associated with one another and cooperate as to assure sealing contact of the facepiece with the face of the wearer for the exclusion of poisonous gases.

An additional object of the invention is to provide a self-contained gas mask which will not materially detract from the usefulness of the wearer when engaged in productive occupation and while wearing the mask when so engaged.

To the ends above enumerated, a gas mask embodying the features of the present invention is characterized by a facepiece and a canister connected directly to the facepiece, with the connection between such canister and facepiece being of such rigidity as to preclude free swinging movement of the canister relative to the facepiece. Also, in accordance with the invention an outlet valve for exhalation and drainage purposes is connected directly to the facepiece and so located thereon to afford maximum drainage facilities. Further, the facepiece of the mask is formed of a fabric material such as disclosed in Patent No. 2,201,198, the outstanding characteristic of which material is its non-elasticity, rendering it particularly advantageous for a gas mask designed as and for the purpose contemplated by this invention.

Further, the gas mask of this invention is characterized by improved means for connecting the

facepiece to the head harness whereby the tension exerted by the head harness is utilized for assuring the gastight seal between the facepiece and the head of the wearer at the temple channels of the latter.

Also in accordance with the present invention a carrier for the mask is provided, and the same is of simple construction and facilitates the carrying of the mask by noncombatant personnel while engaged in their daily occupations.

As will be appreciated as the description proceeds, the various components of the mask combine to present a complete gas mask for civilian personnel possessing to a higher degree the exacting requirements of a mask designed to protect against poisonous gases, with minimum discomfort to the wearer.

The invention together with its object and advantages will be best understood from a study of the following description taken in connection with the accompanying drawings, forming part of this application, and wherein:

Figure 1 is a side elevated view of a gas mask embodying the features of the present invention.

Figure 2 is a detail sectional view taken substantially on the line 2—2 of Figure 4.

Figure 3 is a fragmentary detail sectional view taken substantially on line 3—3 of Figure 1 and illustrating in detail the outlet valve;

Figure 4 is a plan view of the facepiece, the same being shown flattened and as viewed from the inside of the mask;

Figure 5 is a detail sectional view taken substantially on line 5—5 of Figure 1;

Figure 6 is a detail sectional view taken substantially on the line 6—6 of Figure 1; and

Figure 7 is an elevational view of a carrier for the gas mask; the carrier being shown open in full lines and closed in dotted lines, and the gas mask within the carrier being illustrated by dotted lines.

Referring more in detail to the drawings, it will be seen that generally the gas mask is composed of a facepiece 5, head harness 6, and air purifying canister 7.

The facepiece 5 is adapted to cover and protect the eyes, nose, and mouth of the wearer and is made up from a blank composed of a sheet of fabric that is impermeable to noxious gases and vapors and is sufficiently stiff to answer the purpose. Although any suitable fabric will do, it has been found that such fabric as described in the hereinabove mentioned Patent No. 2,201,198 may be employed to best advantage.

Referring specifically to Figure 4, the sheet of fabric is indicated at 8 and is suitably stamped up by a die or otherwise to include the openings 9-9 for eyepiece members and the opening 10 for an outlet or exhalation valve 11.

The facepiece 5 further includes transparent eyepieces 12-12 that in the present instance are illustrated as being in the form of discs. The eyepieces 12-12 are positioned over the openings 9 at the inside of the facepiece and adjacent their peripheral edges are stitched directly to the material of the facepiece by any suitable form of stitching. The eyepieces 12-12 are preferably formed of a plastic material, cellulose acetate having been found to be very satisfactory for this purpose.

To seal the openings formed by the stitching recourse is had to what may be termed a sealing patch 13 that is of any suitable edge configuration, and is preferably formed from the same material as that from which the facepiece is formed.

Patch 13 is provided with openings therein that substantially register with the openings 9 of the facepiece blank and is secured in position interiorly of the facepiece by being cemented or otherwise adhesively united with the facepiece material at the marginal edges of the patch and also at the portions of the patch contacting the facepiece intermediate the eyeports.

Further in the formation of the facepiece from the blank thus stamped out, the edges 14-14 are curved, and these convex edges extend inwardly from the peripheral edge of the mask at opposite sides of the blank to merge with relatively short, straight diagonal edges 15.

At the bottom of the blank, the same is formed with a central circular gore 16 and the concave edge of the blank at the gore 16 merges at opposite ends of the gore with the straight edges 15 as clearly shown in Figure 4.

As will be clear from Figures 1 and 4 of the drawings, the convex edge portions 14-14 of the blank provide a chin rest 17 and within the chin of the wearer fits so as to make a gastight seal between the mask at this portion thereof and the chin of the wearer.

The chin seam formed by drawing the edge portions 14-14 together as an initial step in the formation of such seam may be constructed in any one of several ways now well-known to those skilled in this art for constructing a flexible, airtight seam.

In connecting the edges 14-14 and 15-15 the curved gore 16 provides an opening for the attachment or fitting to the facepiece the air purifying canister 7.

The air purifying canister 7 may be any one of several constructions with which those skilled in the art are familiar and consequently it may here be noted merely that preferably the outer casing of the canister is cylindrical, and that the canister in the bottom thereof is provided in a well-known manner with an air inlet valve. At the air outlet end thereof the canister is fitted within the opening formed by the gore 16.

In securing the canister 7 on the facepiece, there is placed around the periphery of the canister at the outlet end thereof a band 18, after which said end of the canister is positioned in the opening formed by the gore 16. The material of the facepiece at the gore 16 is then secured in contracted condition about the band-equipped end of the canister through the medium of a wire clamp 19.

The wire clamp 19 in the present instance is illustrated as being formed of a single length of wire that is bent intermediate its ends. The wire is then given a turn around the gore section 16 of the facepiece and the terminals of the wire then passed through the loop formed by the aforementioned bending of the wire. Finally, the extremities of the wire rod are bent back upon themselves as shown in Figure 6 thus drawing the clamp tightly. The cover band 20 is then applied, thus completing the operation of securing the canister to the facepiece. In connection with the foregoing it will be understood that the invention is not to be limited to the herein described method of securing the canister to the facepiece as other methods and means may be employed to advantage without departing from the spirit of this invention. It will be noted, however, that by securing the canister directly to the facepiece, the canister is firmly secured against free swinging movement relative to the facepiece, while at the same time the use of the usual air hose and canister carrier is obviated.

Referring to Figure 1, it will be seen that the front of the facepiece makes a straight line from the forehead over the nose of the wearer and that the outlet end of the canister 7 is positioned just in front of the nose of the wearer and at such a depth in front of the mouth of the wearer that moisture and saliva are not likely to drain back into the air-purifying canister. To provide for adequate drainage the valve port 10 is located on the blank 8 so as to be positioned at one side of the mouth of the wearer when the mask is donned; with the port 10 being at such a depth as to insure the passage of moisture therethrough.

For controlling the port 10 there is provided a combination drain and exhalation valve 11.

While any suitable type of exhalation valve may be employed, there is preferably used that type of valve illustrated in Figure 3 and which is characterized by a seat 21 of plastic or other suitable material and having associated therewith a ferrule 22. One end of the ferrule is fitted within the port opening 10 and crimped onto the material of the blank 8 as indicated generally at 23 in Figure 3. The valve diaphragm or disc 24 seats on the body member 21 for controlling the opening and closing of the valve ports 25. Ports 25 are defined by the spokes of a spider formed integrally with the body 21; and disc 24 is releasably held in assembled position on seat 21 through the medium of a centrally positioned, headed stud 26 that is engaged in an opening provided therefor in the hub portion of the aforementioned spider.

Valve 11 remains closed during inhalation, but upon exhalation opens to allow the escape of exhaled air as well as moisture and saliva as would otherwise tend to collect within the mask.

Important considerations of this invention are the making of the joint between the peripheral edge of the face piece and the face of the wearer, particularly in the region of the temple channels of the wearer, gastight and the provision of such a seal with minimum discomfort to the user.

To attain the objects referred to in the preceding paragraph, the sheet 8 when stamped up includes tabs 27 at the top for attachment of the harness straps, and tabs 28 adjacent the bottom or cheek portions of the facepiece for the attachment thereto of the harness straps.

With reference to tabs 27 and 28, it will be noted that the same, respectively, gradually increase in width as they merge with the facepiece proper. Also, at each side of the facepiece and between tabs 27 and 28 the edges 29—29 are straight and at an angle to one another in a manner to present, intermediate the tabs 27 and 28, projections in the region of which are located buckles 30.

Buckles 30 are secured to the facepiece through the medium of strips 31 of suitable fabric. At one end thereof the strips 31 are folded into a plurality of folds 32, and at said folds are secured to the facepiece 5 through the medium of rivets 33 as shown in Figure 2. Buckles 30 are secured to the tabs 31 by passing the ends of such tabs or strips through the frames of the buckles and suitably stitching or otherwise securing adjacent portions of the respective tabs together to form loops in a manner suggested in Figure 2. At the buckle equipped ends thereof tabs or strips 31 are stitched or otherwise permanently united with the facepiece 5 in the region of the aforementioned projections formed at the angles between the straight edges 29—29 of the facepiece blank.

Buckles 34 are secured to the terminals of tabs 27, and buckles 35 are secured to the terminals of tabs 28 in any suitable well-known manner.

The terminals of harness straps 36—36 are secured respectively to tabs 27 and 28 in an adjustable manner through the medium of the aforementioned buckles 34—35, while harness strap 37 is secured at its respective opposite ends to tabs or strips 31, and in an adjustable manner, through the medium of the aforementioned buckles 30.

By such an arrangement of buckles 30, 34, and 35, complemented by the widening of the tabs 27, 28 at the points of merger with the faceblank proper, the edge formations 29—29, and the provision of the tabs 31 there is obtained a distribution of pull on the part of the harness straps over a maximum of the periphery of the facepiece in a manner to minimize wrinkling of the facepiece at the periphery thereof, and thus assure the formation of a gastight seal between the peripheral edge of the facepiece and the face of the wearer.

The rivets 33 securing one end of tabs 31 to the facepiece pierce the material of the faceblank and also the lenses or eyepieces 12 near the peripheral edges of the latter with the result that the pull exerted by the head harness through the tabs 31 causes the edges of the eyepieces 12 to be pressed into the temple channels of the wearer and consequently the possibility of leakage of the facepiece when worn by persons having hollow temple channels is reduced to the minimum. Also, the pull exerted through the tabs 31 on the eyepieces 12 tends to maintain the eyepieces in their desired curved configuration so that the curves of the lenses follow the curvature of the face and thus reduces pressure of the lenses against the eyebrows.

A salient feature of this invention also is in having the tabs 28 extend, as shown, in an upward direction as viewed from the bottom or chin portion of the mask, or in other words, at somewhat of an acute angle to the edges 29. An advantage of this particular arrangement of tabs 28 is that buckling of the faceblank immediately below the ears of the wearer is prevented.

In Figure 7 the mask illustrated therein by

broken line is shown in final position within a carrier 38.

The carrier 38 is formed of suitable material, preferably duck, and is characterized by a flap 39 integral with one wall of the carrier and equipped with a fastener element 40 cooperable with a fastener element 41 provided on the opposite wall of the carrier for securing the flap in closed position.

The carrier 38 is of material depth and the fastener element 41 is positioned materially inwardly or downwardly from the top or mouth of the carrier. Consequently when closing the carrier the opposing walls thereof fold upon one another on imaginary fold line 42 in order to bring the fastener 40 in position to engage fastener 41. This folding of the opposing walls of the carrier at the mouth thereof provides an effective seal against the entrance of dust and rain when the carrier is in fully closed condition.

For suspending the carrier from the shoulder of the wearer, there is provided a suitable shoulder strap one end 43 of which is secured to the carrier by having the terminal of said end extending into the carrier between the opposing walls of the carrier and stitched thereto by stitching employed for uniting said walls at one side edge of the carrier. The other end 44 of the strap is secured at its extremity to the front wall of the carrier and exteriorly of the carrier by stitching or in any other suitable manner, and as suggested in Figure 7.

It will thus be seen that there is provided a carrier of simple construction and which will permit of convenient carrying of the gas mask on the person, and with the mask, under such conditions, effectively safeguarded against the deleterious effects of dust, dirt, and rain.

When the mask is in final adjusted position on the wearer, air of inhalation passes through the canister 7, entering the canister through the valve provided in the bottom or free end of the canister so that purified air is delivered to the interior of the gas mask. Air of exhalation exhausts from the gas mask through the valve 11; it being apparent that on inhalation the valve in the bottom of canister 7 opens while valve 11 remains closed. Upon exhalation the valve associated with the canister 7 closes, and valve 11 opens to permit discharge of the exhaled air together with any condensation and saliva as might otherwise tend to collect within the mask.

While in use canister 7 remains relatively rigid with respect to the facepiece so as not to swing relative to the head of the wearer. Also as herein previously explained a constant seal is maintained between the periphery of the facepiece and the face of the wearer; and the entire arrangement is such that the mask possesses good balance and will not materially annoy the user while being worn.

When not in actual use, the gas mask, as an entirety, may be reduced to a neat compact and readily positioned within the carrier 38 as suggested in Figure 7 so as to be carried on the person conveniently and in a readily accessible position.

What is claimed as new is:

1. In a gas mask, a facepiece provided with a pair of sight lenses, a head harness, and a pair of flexible tabs each of which is secured at one end thereof to the material of the facepiece and in addition also secured at the same end to one of the lenses adjacent the peripheral edge thereof, and at an opposite end to the material of

the facepiece adjacent the peripheral edge of the latter, with parts of the harness attached to the last named ends of said tabs whereby when tension is applied to the tabs from the harness there is a pull exerted on the lenses to cause the edges of the latter to be pressed into the temple channels of the wearer with the lenses conforming in curved configuration to the curvature of the face to thereby reduce the possibility of leakage when the mask is worn by persons having hollow temple channels.

2. In a gas mask, a facepiece provided with a pair of sight lenses, a head harness, and means for adjustably connecting the head harness with

the facepiece; said means embodying a pair of flexible tabs each provided at one end thereof with a plurality of folds secured to the material of the facepiece and in addition also secured to one of the sight lenses adjacent to the peripheral edge of the latter, and at an opposite end secured to the material of the facepiece adjacent to the peripheral edge of the latter, and at said last-named end adapted to be attached to a strap of the harness so that when tension is applied from the harness, a pull is exerted to cause the edge of the lens to be pressed into the temple channel of the wearer.

RANDOLPH MONRO.