Oct. 6, 1953 W. L. CHRISTENSEN ET AL 2,654,090

LENS VENTILATION IN GOGGLES STRUCTURE

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Fig. 1

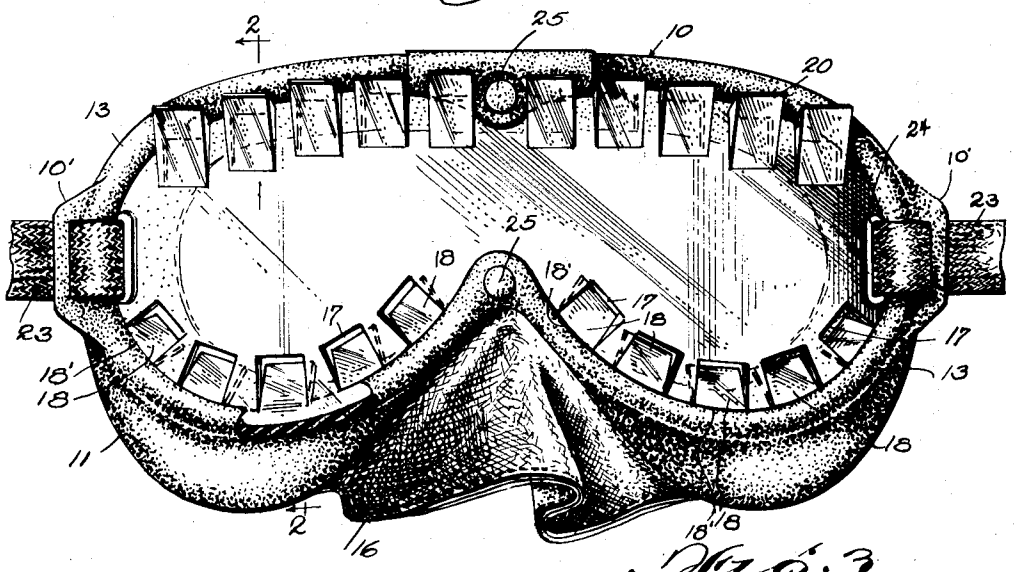


Fig. 3

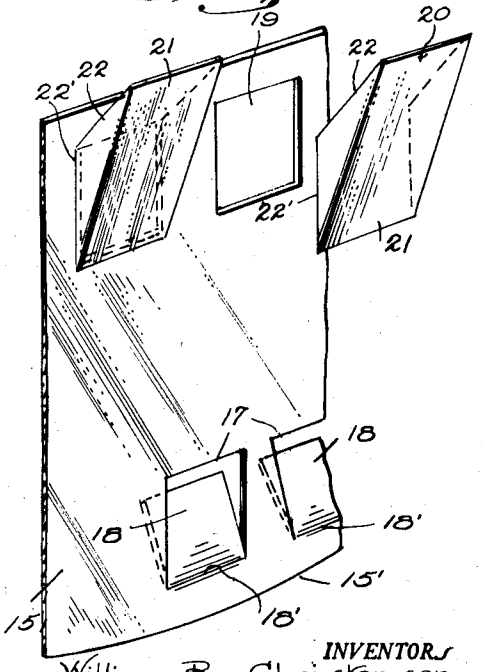
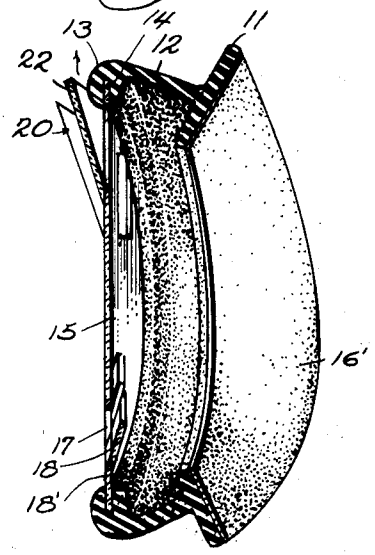


Fig. 2



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LENS VENTILATION IN GOGGLES STRUCTURE

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4 Claims. (Cl. 2—14)

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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 improved goggle lenses, and more particularly to the provision of anti-fogging or anti-frosting goggle lens for use in low ambient temperatures.

In the field of goggles-making, developments and improvements are constantly being made in both lens and frame structures. From actual testing under low ambient temperature conditions, however, it has been discovered that goggles heretofore available are subject to such fogging and frosting as to cause detrimental obstruction to vision. Particularly is this true under conditions of temperatures within the range of minus 20° to minus 40° F. and lower. Generally, it may be stated that, in all the structures heretofore known, improper ventilation is primarily the cause of frost formation at low temperatures.

Accordingly, it is an object of this invention to provide a new and improved goggles ventilating means for protecting the lens of a goggles from fogging and frosting.

It is another object of this invention to provide an improved goggles lens and goggles structure through which a constant flow of air is maintained against the inner surface of the lens to afford a rapid removal of any moisture tending to collect thereon.

It is a further object of this invention to provide a new and improved goggles having a lens incorporating inlet and outlet means thereon for inducing a flow of fresh ventilating air through the eye-cups of the goggles along the inner side of the lens which entrains air in the eye-cup cavities warmed by contact with the wearer's face and also designed to promote convectional flow of air out of the eye-cup cavities.

Further objects, advantages and adaptations of this provision in improved goggles lens will be readily apparent in the following description and the accompanying drawing, wherein:

Fig. 1 is a front elevational view of goggles and lens embodying the invention;

Fig. 2, a cross sectional view on line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary perspective view of the improved lens structure.

Referring to the drawings, the goggles frame 10 comprises a conventional, rubber-type, integral flexible structure, having a resilient curved face-contacting part 11, a non-perforated web 12 and a beaded edge 13, which includes a lens-holding groove 14.

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The bead 13 and groove 14 are interconnected by the web 12, and are adapted to afford a flexible mounting within which a lens 15 of cellulose acetate, or other plastic or transparent material, is adapted to be fitted. The general structure of the goggles frame 10, as heretofore indicated, is of a conventional character, and has secured thereto, by use of a rubber adhesive, or the like, a nose protector 16, formed of suitable cloth or chamois material, which may have integral therewith a coating 15' for the face-contacting part 11 that is adhesively joined to the face contacting part 11.

As illustrated in Fig. 1, the lens 15 has a plurality of uniformly spaced inlet ports 17 adjacent its lower marginal edge portion 15'. These ports may be on the order of 3/8-inch square and are formed by a series of inverted U-shaped cuts in the lens on each side of the bridge portion thereof adjacent its lower edge which form tongues 18 that may be inclined backwardly along their lower edge (Fig. 3) to provide upwardly and rearwardly inclined fins or baffles on the ports 17.

Across the upper margin of the lens 15 there is provided a series of equally-spaced rectangular outlet apertures or ports 19 in the lens 15 provided with chute-like baffles 20. These apertures or ports 19 are disposed in substantially uniformly spaced relation in the upper margin of lens 15 and in substantially opposed relation to the parts 17 along the lower margin of the lens. The baffles 20 are formed of transparent cellulose acetate, or other material having the same index of refraction as the lens 15, and comprise a generally rectangular front wall 21 and triangular side walls 22 the edges 22' of which are secured to the surface of the lens 15 along the vertical edge of the ports 19 by a suitable transparent adhesive in the nature of cellulose acetate or the like preferably of equivalent transparency.

From the above description of the invention, it will be understood that a flow of fresh ventilating air over the inner surface of lens 15 is maintained by virtue of the fact that the inclination of the vanes or baffles 18 on the lower or inlet ports 17 induces a flow of fresh air into the space behind the lens and upwardly along the inner side of the lens, while the inclination of the baffles 20 on the outlet ports 19 induces a flow of air upwardly and outwardly from the space behind the lens. This outward flow consists in part of fresh ventilating air from inlet ports 17 and in part of air warmed by contact with the face of the wearer. Part of this latter

component of the discharging air stream is entrained in the outwardly flowing ventilating air and part of it consists of air passing outwardly by convection. It will be observed that the lower edges of outlet ports and upper edges of inlet ports 17 preferably are sufficiently distant from each other so that they are beyond the normal line or range of vision of the wearer of the goggles and thus do not interfere with visibility.

As heretofore described, the lens 15 is adapted to be positioned into the groove 14 by reason of the assembly's flexibility. As is conventional, the lens 15 is further secured within the frame 10 by means of head straps 23, threaded through loops 13' on frame 10 and provided with suitable ends adapted to be fitted within the T-cut slots 24 and anchored in a conventional manner. The lens 15 is likewise provided with suitable apertures or eyelets through which snap fasteners 25 are adapted to be secured. In certain goggles structure the head straps 23, or other holding means may be secured to the goggles frame 10 in a conventional manner, if desired.

With the assembly arranged in the manner described and illustrated, and the surface portions of the air guideways 18 and 21 positioned at an angle of approximately 70° to 85° with respect to the normal or axis of lens 15, there is provided, under conditions of low ambient temperatures, a definite flow of air over substantially the entire interior visual surface area of lens 15. This constant flow affords means for ready removal of moisture which tends to collect on the lens within the area of the eye cup and also rapidly removes any condensation which may occur due to sudden change of temperature conditions. Further, under conditions of excessively low temperatures, −40° F. and lower, and strong winds, this type of goggles produces in some instances an unfavorably chilling effect about the eyes, and it is, therefore, to be understood that it is more suitable for use under conditions where low temperatures exist without excessive wind velocities.

As an illustration of the improvements herein provided for protecting lens from fogging and frosting, the results in preventative time relationships between this structure and standard conventional lenses under conditions of tests for periods of one hour are indicated in the following table.

Comparison of standard and improved goggles

[Exposure temperature—Minus 20° F. Values in minutes of frost freedom.]

Subject	Standard	Improved
1	5	60
2	3	60
3	4	60
4	10	60
5	2	60
6	2	60
7	7	60
8	1	60
9	5	60
Mean	4.3	60

These tests were conducted in standard climatic zone test chambers, under temperature conditions, as indicated, with the subjects undergoing alternate periods of simulated work sufficient to produce normal and abnormal moisture conditions. The final results represent mean averages of innumerable determinations made over a two-day period of time.

Further tests with the same subjects, with the exception that "6" was replaced by "'10," at a temperature of minus 40° F., under similar conditions of exposure, gave the following results.

Comparison of standard and improved goggles

[Exposure temperature—minus 40° F. Values in minutes of frost freedom.]

Subject	Standard	Improved
1	6	60
2	5	35
3	7	60
4	31	60
5	6	55
6	6	60
7	4	13
8	5	60
9	11	60
Mean	9.0	51.4

As will be noted, the frost-freedom time for subjects 2, 5 and 8 are somewhat less for the improved goggles under this temperature condition, reducing the mean time for frost-freedom, which is still considerably in excess of the mean frosting time of the standard goggle.

From the above description it will be apparent that, with the improvement provided herein, a lens structure for goggles or the like may be made from suitable plastic or other lens materials of a character known to the trade and with or without polarization and suitable coloring agents, if desired. Further, that the air flow guide means may be formed integral with the lens or added in other suitable manner to eliminate fogging and frosting of the lenses, and it will be apparent that such adaptations, alterations and modifications may be made as would fall within the scope of the appended claims.

We claim:

1. An anti-fogging and anti-frosting goggles comprising a flexible frame including a flexible part to contact the face of a wearer in substantially sealed relation thereto, transparent lens forming means in the forward side of said frame cooperating therewith to define a substantially sealed chamber behind the lens when the goggles are being worn, ventilating air inlet and outlet ports in said lens forming means respectively along the bottom and top margins thereof, and baffles at said ports for directing a flow of ventilating air upwardly along the inner side of the lens forming means from the lower margin thereof to the upper, said baffles being formed of a transparent material having the same index of refraction as the material of the lens forming means.

2. An anti-fogging and anti-frosting goggles comprising a flexible frame including a flexible part to contact the face of a wearer in substantially sealed relation thereto, transparent lens forming means in the forward end of said frame cooperating therewith to define a substantially sealed chamber behind the lens when the goggles are worn, said lens forming means having a plurality of inlet and outlet ports in the bottom and top margins thereof respectively, inwardly and upwardly directed baffles on the ports in the lower margin of said lens forming means, and outwardly and upwardly directed baffles on the ports in the upper margin of said lens forming means, said baffles being constructed from material having the same index of refraction as the material of which the lens forming means is made and cooperating to effect a flow of fresh ventilating air through the space behind said lens

forming means in close proximity to the inner side thereof.

3. An anti-fogging and anti-frosting goggles comprising a flexible frame including a flexible face contacting part to contact the face of a wearer in substantially sealed relation thereto, transparent flexible lens forming means in the forward end of said frame cooperating therewith to define a substantially sealed chamber behind the lens when the goggles are worn, and means for producing a flow of fresh ventilating air through the space behind said lens forming means in close proximity to the inner side thereof including ports in the lower margin of the same formed by severing and bending portions of the lens forming means to form generally rectangular shaped upwardly and inwardly inclined fins on the inner side of said lens forming means, generally rectangular ports in the upper margin of said lens forming means, and upwardly and outwardly inclined baffles for the ports in the upper margin of said lens forming means, said baffles being of transparent material having the same index of refraction as the material of which the lens forming means is made.

4. A goggles lens comprising a sheet of transparent flexible material conforming in shape to the frame in which the lens is to be supported,

a plurality of inlet ports adjacent the lower margin of the lens formed by severing and bending portions of the lens to form generally rectangular shaped openings and correspondingly shaped upwardly and inwardly inclined baffles on the inwardly facing side of said lens, generally rectangular outlet ports adjacent the upper margin of the lens, and upwardly and outwardly inclined chute shaped baffles on the outwardly facing side of said lens for said outlets, said baffles being made of a transparent material having the same index of refraction as the material of which the lens is made.

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