GAS-MASK EYE PIECE MOUNTING

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This invention relates to gas mask eye-piece mountings.

Present-day gas masks make use of a face-piece which makes a gas-tight fit with the face and head. To be effective, therefore, it is not necessary that accessories, such as eye-pieces, shall likewise be perfectly gas-tight. In the construction of gas masks there have commonly been used flat eye-pieces, and various constructions are available for suitably sealing such eye-pieces against leakage. However, the eye-piece is one of the most important elements of the gas mask because its utility is impaired unless adequate vision is maintained. To increase the field of vision it would be desirable to use larger eye-pieces than can satisfactorily be provided in flat, or plane, form, such as those of the so-called aviation type, which are large eye-pieces of lenticular form and curvilinear from side to side.

Difficulties have been encountered in adequately and economically constructing such aviation-type eye-pieces in the face-piece. For instance, not only is it more difficult to secure the eye-piece by the procedures used with flat eye-pieces, but also those procedures result normally in rather high breakage and this is most objectionable in the case of aviation-type eye-pieces which in the most approved form are ground to provide distortionless vision, and may cost several dollars per pair.

It is among the objects of this invention to provide a gas mask having aviation-type eye-pieces which are adequately sealed against leakage, which are simple, sturdy, easily constructed, inexpensive, and do not add materially to the weight of the mask or render it cumbersome, which provide maximum angle of vision, which are retained firmly in place, and in the mounting of which breakage is eliminated or reduced to a negligible extent.

The invention may be described with reference to the accompanying drawing in which Fig. 1 is a vertical plane view of the front of a gas mask face-piece provided with eye-pieces in accordance with the preferred embodiment of the invention; Figs. 2 and 3 sectional views through the eye-piece taken on lines II—II and III—III, respectively; Fig. 4 an enlarged fragmentary view of a portion of Fig. 2; and Fig. 5 a view like Fig. 4 showing a modification.

In accordance with the invention the eye-piece is mounted within a groove annularly positioned in the eye-piece aperture, and the eye-piece is firmly held therein and sealed against leakage by an endless metallic grommet which is fitted without mechanical or die compression exteriorly of the opening in such manner as to continuously compress the material from which the face-piece is constructed against the eye-piece to form and maintain a gas-tight seal between it and the face-piece.

Having reference now to the drawing, Fig. 1 shows a face-piece of conventional form made from any suitable flexible material, such as rubber, in accordance with standard practice. The face-piece and its accessories, apart from the eye-pieces, may assume various forms, and they play no part in this invention. However, the form shown is provided with an opening 2 for receiving an intake fitting leading from a canister containing purifying material, or from a regenerating device, and with an extension 3 for receiving a flutter valve or the like exhalation device.

The face-piece is provided with apertures 4 for receiving aviation-type eye-pieces 5, which, as shown, are of generally lenticular outline and continuously curvilinear from side to side, as appears particularly from Figs. 1 and 3. In accordance with the invention the apertures are defined by flanges 6 which are molded integrally with the face-piece. Each flange is provided interiorly with an annular groove 7 in which the eye-piece is mounted. The flanges 6 are suitably constructed such that apertures 4 conform initially rather closely to the contour of the eye-pieces 5, and groove 7 in each aperture is preferably of such size as to receive the eye-piece with little or no expansion of the flange so that the rubber of the flange is not placed under tension when the eye-piece is inserted.

With this construction the face-piece is not distorted when the eye-pieces are inserted. Since, however, the insertion of the eye-piece does not place the rubber of the flange under tension, means must be used not only to seal the eye-piece against leakage of gas, but also to positively and satisfactorily retain the eye-piece in position. To this end a grommet member 8 is applied, after the eye-piece has been positioned within groove 7, to compress the flange material around and against the eye-piece and to retain it firmly in position and form a satisfactory gas-tight seal to prevent ingress of untreated air into the face-piece.

Grommet 8 is in the form of a continuous ring corresponding generally to the contour of the eye-piece, as shown in Fig. 1. It is of U-shaped section, having an outer leg 9 which overlies the 55
outer portion of flange 6 and presses it against that part of the eye-piece disposed within the groove, as seen in Figs. 2 to 4. The grommet at the outer end of leg 9 is bent rearwardly and 5 then downwardly around a bead 10 which projects peripherally from the outer end of the flange 6, thus forming an inner leg 9c which presses against flange 6 peripherally of eye-piece 5. The grommet thus compresses the rubber flange material rearwardly against the forward surface of the eye-piece about its edge, and also compresses the flange material peripherally of the eye-piece entirely about its edge.

15 In this embodiment the inner leg 9a of the grommet is so positioned that its outer surface lies in or inwardly from the general vertical plane of the inner surface of eye-piece 5. Fig. 4 shows a construction in which the outer surface of leg 20 9a of the grommet is substantially aligned with the inner surface of eye-piece 5, but as just indicated leg 9a may press flange 6 at a point farther inward, as shown in Fig. 5. The advantage of this is that the rubber of flange 6 is compressed by the end of leg 9a in such manner as to resist or prevent the grommet from snapping off the flange, thus insuring a firm and safe mounting of the eye-piece.

Most suitably flange 6 is also provided with a bead 11, Fig. 4, extending outwardly from and framing the eye-piece opening. The lower end of leg 9 of the grommet seats against this bead, as seen in Figs. 1 and 4. This bead acts to prevent tearing out of the rubber from around the eye-piece when the face-piece is pulled in the vicinity of the eye-pieces, as in placing the mask on the face.

The grommets are pre-shaped to the form shown in the drawing, and to final size, so that when applied they will effect the desired compression and sealing. The eye-piece having been inserted in groove 7, one end of the grommet is applied to one end of flange 6 and bead 10 is forced into the opening formed between the inner and outer legs of the grommet. The bead is then progressively tucked in toward the other end of the grommet, thus effecting the mounting shown in the drawing. In this manner the rubber of flange 6 is forced toward the edge of eye-piece 5 by the end of the inner leg 9a of the grommet. Likewise, leg 9 forces the outer wall of the groove inwardly against the eye-piece so that its surface adjacent its edge is peripherally pressed by the rubber of the flange.

The grommet, being continuous and being applied without being compressed, cramped, or otherwise acted upon mechanically, is made of such size as to achieve the foregoing action. The compression of the rubber by the grommet is desirable not only because it insures satisfactory sealing and firm retention of the eye-piece, but also because rubber under compression has longer life than that under tension.

These factors combine to afford a more satisfactory eye-piece mounting than heretofore. The large curved lenses provide a wide field of view, and the grommet does not reduce the angle of vision in any direction. The rubber does not deteriorate as rapidly as it does in mountings in which the eye-piece puts it under tension, which has been a common practice. Furthermore, the grommet is continuous and requires no mechanical treatment during or after application, in contrast to the prior practice of using split rings and the like requiring die compression.

Such fitting of the grommet to the flange, as contrasted with the prior practice of compression of the grommet itself, as by dies, is of material advantage. That is, in die compressing grommets about lenses in gas mask face-pieces there is the risk of the grommet breaking. That loss is not critical in the case of plane lenses, but it becomes of major consequence in the use of aviation-type lenses because the best specifications require these to be ground to avoid distorted vision, wherefore they are quite expensive. The simple fitting of the grommets in the practice of the present invention avoids such breakage of the eye-piece lenses.

While the invention has been described with particular reference to gas masks provided with two eye-pieces, it will be understood that it is equally applicable to face-pieces provided with a single eye-piece of width sufficient to give the desired angle of view. Also, while the invention is adapted particularly to the mounting of curvilinear lenses, it will be understood also that it is applicable to the mounting of plane lenses.

According to the provisions of the patent statutes, I have explained the principle and mode of construction of my invention and have illustrated and described what I consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. In a gas mask, goggle or the like, the combination of a flexible member adapted to engage in sealed relation with the face of the wearer, said member having an opening therethrough for an eye or the like of the wearer, an integrally molded upstanding flange bounding the eye opening on the side of the flexible member away from the face of the wearer, an integrally molded substantially annular body having substantially a U-shape in cross section secured at one side of the base of its U-shaped body to the upstanding flange and extending so that the legs of the U-shaped body are directed substantially radially inwardly of the opening, a transparent closure member received in the substantially annular groove provided between the legs of the U-shaped body, an endless one-piece grommet of stiff material secured to and forming a J-shape in cross section surrounding the U-shaped body and having the legs of the J-shaped grommet lies over the leg of the U-shaped body remote from the flexible member to force the leg into sealing relation with the closure member and the hook of the J-shaped grommet lies over and forces the base of the U-shaped body radially thereof into sealing relation with the periphery of the closure member, said inner periphery of the edge of the hook of the J-shaped grommet being of greater length than the outer periphery of the closure member, and an integrally molded flange on that leg of the U-shaped body which engages the leg of the J-shaped grommet, said flange extending over the leg of the J-shaped grommet and serving to hold the grommet and leg of the U-shaped body in proper assembly.

2. In a gas mask, goggle or the like, the combination of a flexible member adapted to engage with the face of the wearer, said member having an opening therethrough for an eye or the like of the wearer, an upstanding flange bounding the eye opening on the side of the flexible member away from the face of the wearer, a sub-
stantially a U-shape in cross section secured to the standing flange and extending so that the legs of the U-shaped body are directed substantially radially inwardly of the opening, a closure member received in the substantially annular groove provided between the legs of the U-shaped body, a grommet of stiff material, and of substantially a J-shape in cross section surrounding the U-shaped body and constructed and arranged so that the leg of the J-shaped grommet lies over the leg of the U-shaped body remote from the flexible member to force the leg into sealing relation with the closure member and the hook of the J-shaped grommet lies over and forces the base of the U-shaped body radially thereof into sealing relation with the periphery of the closure member, said inner periphery of the edge of the hook of the J-shaped grommet being of greater length than the outer periphery of the closure member, and a flange on that leg of the U-shaped body which engages the leg of the J-shaped grommet, said flange extending over the leg of the J-shaped grommet and serving to hold the grommet and leg of the U-shaped body in proper assembly.

3. In a gas mask, goggle or the like, the combination of a flexible member adapted to engage in sealed relation with the face of the wearer, said member having an opening therethrough for an eye or the like of the wearer, an integrally molded substantially annular body having substantially a U-shape in cross section secured to the edge of the opening in the flexible member and extending so that the legs of the U-shaped body are directed substantially radially inwardly of the opening, a closure member received in the substantially annular groove provided between the legs of the U-shaped body, and an endless one-piece grommet of stiff material, and of substantially a J-shape in cross section surrounding the U-shaped body and constructed and arranged so that the leg of the J-shaped grommet lies over the leg of the U-shaped body remote from the flexible member to force the leg into sealing relation with the closure member and the hook of the J-shaped grommet lies over and forces the base of the U-shaped body radially thereof into sealing relation with the periphery of the closure member, said inner periphery of the edge of the hook of the J-shaped grommet being of greater length than the outer periphery of the closure member.

4. In a gas mask, goggle or the like, a face-piece of flexible material having an opening therethrough, a forwardly projecting flange of compressible material surrounding the opening and having an annular groove formed interiorly thereof, a closure member set in the groove, and an endless grommet engaging with the flange to compress it radially against the outer periphery of the closure member, one edge of the grommet extending radially within the radially outer periphery of the closure member and the other edge of the grommet terminating radially outwardly of the radially outer periphery of the closure member so that the grommet can be removed by further compressing that portion of the flange positioned radially outside of the annular groove.

5. In a gas mask, goggle or the like, a face-piece of flexible material having an eye opening therethrough, a forwardly projecting flange surrounding the opening and having an annular groove formed interiorly thereof, an eye-piece set in the groove, a grommet engaging with the flange to compress it against the eye-piece, and a lip on the flange directed substantially radially outwardly of the opening and engaging with and extending over the grommet.