

May 1, 1945.

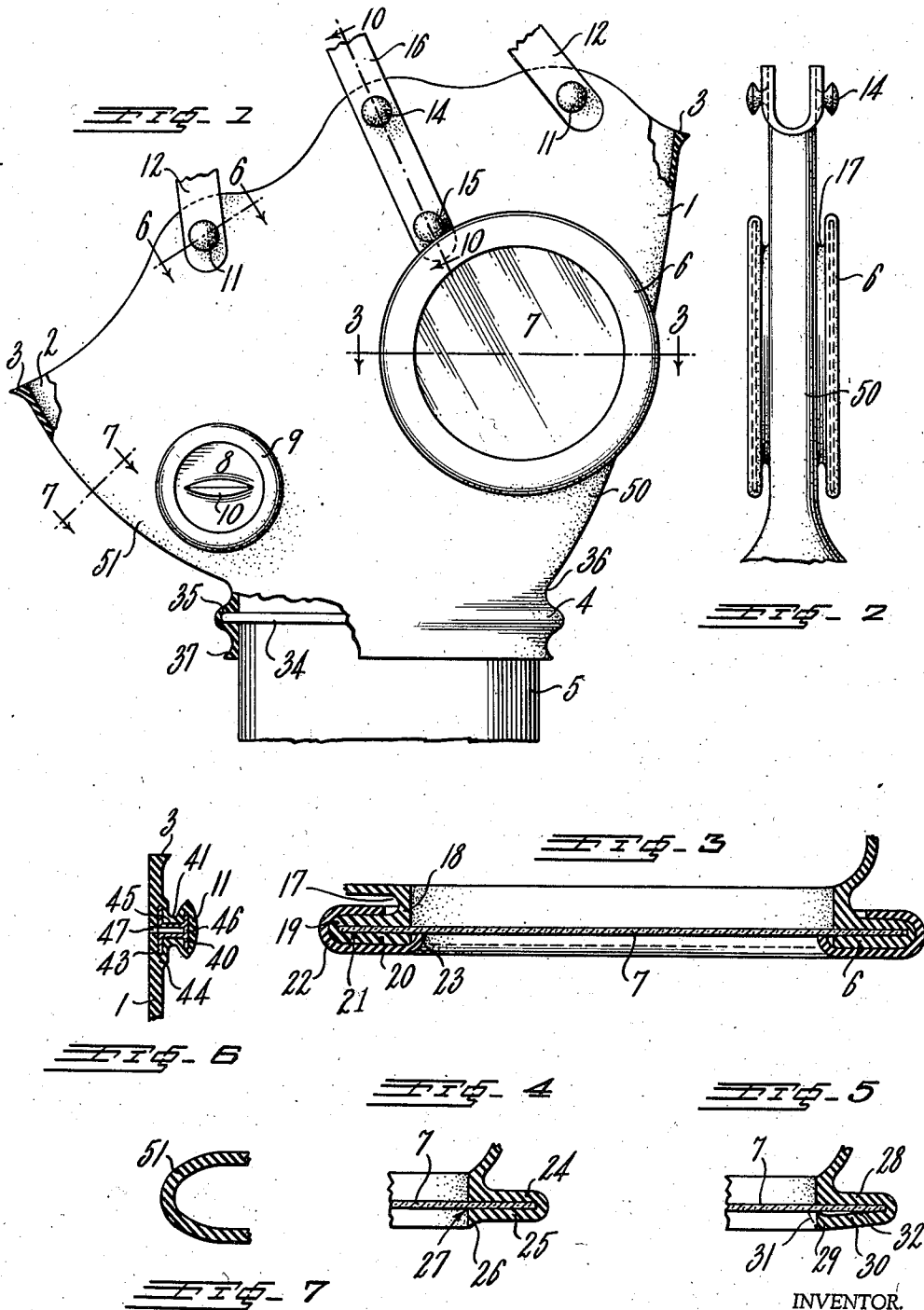
M. C. TEAGUE

2,375,147

GAS MASK

Filed Jan. 22, 1942

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 8

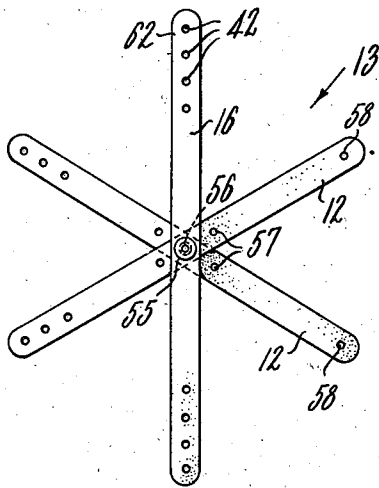


FIG. 9

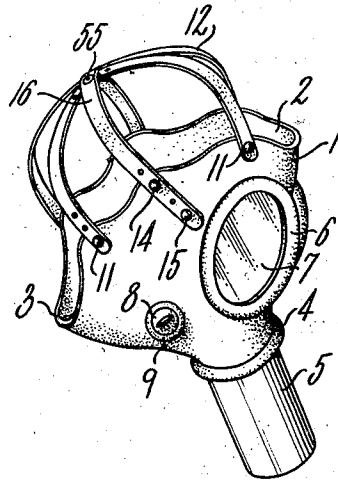


FIG. 10

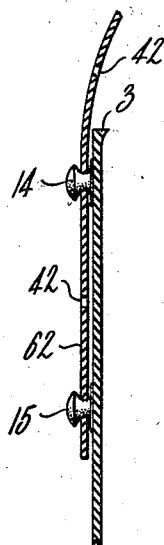


FIG. 11

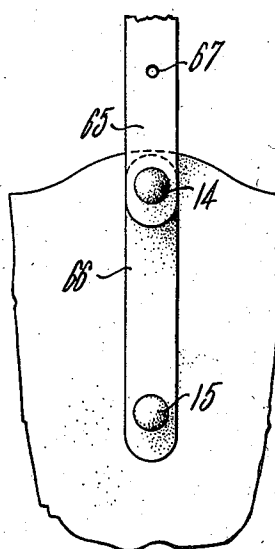


FIG. 12



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GAS MASK

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United States Rubber Company, New York,
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Application January 22, 1942, Serial No. 427,740

5 Claims. (Cl. 128—141)

This invention relates to gas masks, more particularly to a composite rubber gas mask for civilian or military purposes.

The usual previous gas mask generally comprises a face piece of sheet rubber or fabric in which the various portions are seamed together; an eye piece, for example, of glass or other transparent material secured by cementing and/or taping and a metal ring to the face piece; air intake means provided with a connection either directly or indirectly to a filtering device, known as a canister; exhaling or exhaust means, usually a valve; a web harness for fitting the face piece to the head, usually provided with buckle adjustments for varying the fit to suit the wearer; and attaching means for securing the harness to the face piece. In the past, such a mask has of necessity been composed of a large number of parts which are, with only a relative degree of permanence, secured together by a great number of seaming, adhering, sewing, inserting, and other operations. These operations increase the labor and material cost of the articles and result in undesirable properties in the finished mask. Furthermore, adjustment of the previous masks has required a series of relatively complicated operations, for example, loosening the tightening straps in order to achieve the desired fit.

The mask, according to the present invention, provides a simple, composite, unitary rubber face piece; integral means for resiliently retaining accessories, for example, an eye piece, and permitting ready and firm insertion; a tight socket for securing the intake canister, either directly or indirectly, and without the usual additional sealing and taping operations; integral means for tightly fitting and holding an exhaust valve; an easily adjustable harness which is quickly and readily removable, either partially or in its entirety, from integral reinforced securing means comprising parts of the face piece. The present mask is preferably made by dipping a pre-shaped dipping form into a latex bath and coagulating the latex with subsequent drying and vulcanizing operations. There is thus attained a unitary mask devoid of any seams and ready for immediate use by merely inserting the proper accessories in place: such as eye piece, canister or hose, valve, and harness, without the former necessity of a complicated series of sewing, adhering, molding, reinforcing and sealing operations. The mask also has, preferably, thickened edge portions permitted to be subjected to excessive distortion which is applied both in fitting the mask to the face and in packing the mask

into the usual compact case. The mask further resists damage, as by tearing, by reason of the grainless character of the latex-deposited rubber. Means are also provided in combination with the harness, to operate as a receptacle for temple-fitting elements.

The various features and advantages of the present mask may be clearly understood by the description of the invention together with reference to the appended drawings in which;

Fig. 1 is a side view of a mask with fragmentary portions broken away to reveal the cross sectional structure, showing the face piece with accessories attached;

Fig. 2 is an end view of the mask shown in Fig. 1, showing only some of the buttons and with the lower portion omitted, since the lower portion will be identical to that of Fig. 1 when the canister is cylindrical;

Fig. 3 is an enlarged cross-sectional view taken along the section line 3—3 of Fig. 1, showing details of one embodiment of means for retaining the eye piece in position;

Fig. 4 is a fragmentary cross section similar to the right end of Fig. 3, showing an alternative structure for retaining the eye piece in position;

Fig. 5 is a view similar to Fig. 4, showing a further alternative glass-fitting structure;

Fig. 6 is a cross section of a reinforcing button, taken along the section line 6—6 of Fig. 1;

Fig. 7 is a random fragmentary cross section taken along the section line 7—7 of Fig. 1, illustrating the curved and seamless character of the mask in relaxed position;

Fig. 8 is a plan view showing the structure and arrangement of the harness on a reduced scale;

Fig. 9 is a reduced perspective view of the mask with harness, glass, valve and canister attached, illustrating the integral characteristics of the various means for holding the accessories;

Fig. 10 is a cross-sectional view taken longitudinally along the end portion of the central strap of the harness, showing a combination temple adjustment and harness, buttoned in place;

Fig. 11 is a face view similar to Fig. 10, showing a modification;

Fig. 12 is a cross-sectional view similar to Fig. 10, showing the temple adjustment means in operation with a distorting member in position.

Referring now to Fig. 1, the face piece 1 is formed preferably of grainless latex rubber, although certain features of the combination may be incorporated with a face piece constructed of any usual gas mask material, such

as molded sheet rubber, treated fabrics, combinations of the same, or the like. The face piece is provided with a top opening 2 which preferably, although not necessarily, is thickened as shown at 3 for withstanding distortion and distention, as in putting the mask on, removing it, or packing it. When the mask is placed on the wearer's head, the face first enters the opening 2. A socket 4 holds a canister 5 in position; socket 6 holds an eye piece 7, herein referred to as a glass although it may be made of any relatively stiff, transparent material, usually in disk form, but it is to be understood that the socket 6 and glass 7 may assume other desired peripheral shapes. It is usual to provide a valve 8, either integrally with the mask, or, as shown in the drawings, held in position by valve socket 9. The valve 8 may be of the flutter valve type and may be provided with an aperture 10 which closes upon reduction of pressure within the mask and opens during exhalation. Buttons 11, preferably integrally formed on the mask, engage the end portions of the straps 12 of a harness 13 as will be further described below. The straps of the harness are preferably formed of strips of sheet rubber having an easy stretch to facilitate placement and removal of the mask, and for comfort during wear. Series of buttons 14 and 15 are provided in the vicinity of the temple portions of the face piece 1 to engage a center strap 16 of the harness 13 in alignment transverse of the edge.

As will be noted in Fig. 2, the eye-piece or glass socket 6 is provided with an integral neck portion 17 which imparts a yielding support for the glass to permit the glass to be moved or twisted relative to its opening. This yieldable relationship minimizes the danger of breakage of the eye-piece and enables the eye portions to better withstand blows, shocks, etc. Fig. 3 shows the structural details of the eye piece socket 6. An annular projection 18, which is an integral part of the mask, extends beyond the neck portion 17 to form a receptacle portion 19 and terminates in a flange 20. In relaxed position the socket 6 and particularly an annular groove 21 thereof formed between the portions 19 and 20, are of appreciably smaller diameter than the relatively rigid glass 7. In order to insert the glass, it is merely necessary to stretch the socket 6 and fit the glass into the annular groove 21, whereupon an air-tight seal is effected by virtue of the centripetal tension applied by the resilient socket in the direction of the center of the glass. The sealing effect of the socket proper may, if desired, be augmented by stretching a cylindrical rubber band 22 of relatively small diameter over the outer surface of the socket 6 whereupon it assumes the sealing position shown in Fig. 3. Since the rubber band 22 is under tension, all of its portions tend to seek their relaxed position which is of smaller diameter than illustrated in Fig. 3, thereby distorting the band into the shape shown, in which shape it acts as a tight seal, both to augment the centripetal pressure applied by the socket 6 and to press tightly at the outer edge 23 against the outer surface of the glass to provide an additional seal.

As shown in Fig. 4, an alternative socket 24 is provided with an outer flange 25 thickened on the exterior at 26 to increase the pressure of the edge portion 27 against the outer surface of the glass 7. The thicker portion 27 resists

stretching to a greater degree than the thinner portions. A still further alternative is shown in Fig. 5, in which an eye piece socket 28 has an interiorly thickened portion 29 on the outer flange 30 to provide another type of seal for the glass 7. The cross sectional view shown in Fig. 5 illustrates the position of the flange 30 immediately prior to seeking its tightest point, and when it is relaxed in operative position the rubber will flow to the position shown by the dotted line 31 and the interior surface 32 of the flange 30 will lie flat against the marginal outer edge of the glass 7.

Referring again to Fig. 1, the canister socket 4 may be employed to hold a canister directly as shown in the drawings, or may hold a flange of a hose leading to a canister. The canister 5 is provided with a flange 34 which fits into an annular recess or groove 35 extending around the interior of the socket 4. In normal relaxed position, the socket 4, is of smaller internal diameter than the overall diameter of the canister and flange. In operative position, the socket 4, being stretched, consequently exerts a pressure against the canister to hold it in position. The socket 4 may be in many respects similar to the socket 6, for example in the depressed neck portion 36, and in the thickened portion 37 on the edge, which provides a tighter seal against the canister. It is to be understood that the various sockets are produced by a latex dipping form which has external projections corresponding to the interior configuration of the sockets. The open portions of the sockets may be cut from the form after dipping into latex by any known trimming operation.

The buttons 11, 14 and 15 are likewise integrally formed during the dipping operation, for example, in the manner as described in a co-pending application of Teague and Sterrett Serial No. 427,739, filed January 22, 1942, of which I am one of the inventors. In order to increase the stiffness of the button and to facilitate fastening thereof to the straps of the harness, an insert 40 comprising, for example, a metallic button, is incorporated in the center of the button 11, as shown in Fig. 6. The reduced neck portion 41 of the button receives and retains small apertures or buttonholes 42 provided near the ends of the straps 12 and 16, as shown in Fig. 10. The width of the neck 41 is obviously considerably larger than the diameter of the apertures 42, so that when the buttonhole is stretched over the head of the button, the resilient material of the strap consequently presses against the neck to hold the strap in position. The buttonholes may be thickened or otherwise reinforced around the edge, if desired. The reinforcing button 40 has a base 43 corresponding to the thickened rubber portion 44, a neck portion 45 corresponding to the outer neck 41, and a head portion 46 corresponding to the head of the button. A minute hole 47 extends through the interior of the face piece 1 to the base of the head portion 46, but may be filled or omitted, as desired. The reinforcing button further serves to prevent excessive distortion or damage to the button 11.

The forward and rear portions, 50 and 51, respectively, are curved in their relaxed position in order to provide a better fit for the mask. The curved portion 50 corresponds to the nose portion of the mask. When the mask is adjusted on the face of the wearer, the edge 3 forms a tight fit around the entire periphery of the average head.

Auxiliary temple-fitting means are described below.

The general arrangement of the harness, as shown in Figs. 8 and 9, is such that a plurality of head-encircling straps 12 and 16 are connected at the center by a button 55 and at the ends to the buttons 11, 14 and 15 along the edge of the face piece 1 and bordering the opening 2. While three straps are shown in the drawings, it is obvious that a greater or smaller number of straps may be employed, depending upon the use to which the mask is to be put, although it has been found to be desirable to have the central strap 16 extending directly across the top of the head from the vicinity of the temple on one side to the other. The straps 12 extend diagonally in opposite directions cross-wise over the top of the head and are secured relative to each other and to the strap 16 by the connecting button 55. Each of these straps has one or more centrally located buttonholes 57 on either side of the central buttonhole to provide for adjusting the center of the harness to fit the needs of the wearer. A plurality of buttonholes 58 is provided near one end of the straps 12 for adjustment of the ends of the straps relative to the rear buttons 11.

The strap 16 is provided with a single central aperture 56 which engages the connecting button 55, and with at least two, but preferably four apertures or buttonholes 42 at each end. The buttonholes 42, together with the buttons 14 and 15 provide a receptacle as shown particularly in Fig. 12, for inserting a wad of material 60 or any object which will depress the interior wall portion 61 of the face piece. This projection is desirable in case of a wearer having depressions in the vicinity of the temple, in order to insure that the entire outer edge 3 of the mask closely hugs the face. The buttonholes 42 are arranged in pairs so that the distance between the various pairs will be the same as that between the buttons 14 and 15. In order to tighten the strap 16, the upper set of buttonholes 42 may be employed. It will be noted that the buttons 14 and 15 are generally disposed to receive the extension 62 of the strap 16 and are generally aligned with the strap in its normal position as shown in Fig. 9. As seen in Fig. 10, the strap extension 62 has no particular effect when it is not necessary to use it, lies parallel to the face piece and does not distort the temple portion of the mask.

As shown in Fig. 11, a strap 65 corresponding to the central strap 16 of the harness may be secured to the button 14, and a separate extension 66, in the form of a short strip, corresponding to the extension 62, is attached to both buttons 14 and 15 to provide a receptacle for the temple adjustment. The strip 66 may remain secured to the buttons 14 and 15 during adjustment of the strap 65, which may be tightened by moving a button hole 67 down over the button 14.

While I have shown and described certain

present embodiments in the invention, it is to be understood that the spirit of the invention may be otherwise employed as will occur to those skilled in the art and within the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A composite rubber gas mask comprising a continuous seamless face piece of resilient rubber material having a plurality of openings, at least one of said openings being integrally re-enforced by a thickened portion of the material around the periphery thereof, and a plurality of re-enforced integral buttons formed on opposite sides of the mask near an opening.

2. A composite rubber gas mask comprising a continuous seamless face piece of resilient rubber material having a plurality of accessory-retaining openings, at least one of said openings being integrally re-enforced by a thickened portion of the material around the periphery thereof, a plurality of re-enforced integral buttons formed on opposite sides of the mask, and a harness comprising resilient straps with button-receiving apertures near the ends thereof, said apertures being removably engageable with said buttons.

3. A composite rubber gas mask comprising a continuous seamless face piece of resilient rubber material having a plurality of openings, each of said openings being integrally re-enforced by a thickened portion of the material around the periphery thereof, a plurality of re-enforced integral buttons formed on opposite sides of the mask near an opening, and a harness comprising resilient straps with button-receiving apertures near the ends thereof, said apertures being removably engageable with said buttons, at least two of said buttons being substantially aligned on each side of the face piece with one of said harness straps.

4. A composite rubber gas mask comprising a continuous seamless face piece of resilient rubber material having a plurality of openings, and a plurality of re-enforced integral buttons formed on opposite sides of the mask near the edge thereof, at least two of said buttons being in alignment transverse of the edge, a harness comprising resilient straps with button-receiving apertures near the ends thereof, one of said harness straps having an extension at each end engaging both of said aligned buttons, thereby providing a receptacle for temple-fitting means.

5. A composite rubber gas mask comprising a continuous seamless face piece of resilient rubber material having a plurality of openings therein, at least one of said openings being integrally re-enforced by thickening of the material around the periphery thereof, and a plurality of re-enforced integral buttons formed on opposite sides of the mask near the face opening, each of said buttons having a stiffening element substantially surrounded by rubber.

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