April 28, 1936. R. MALCOM 2,039,234

RESPIRATORY MASK

Filed Jan. 29, 1934 2 Sheets-Sheet 1

Fig. 1.

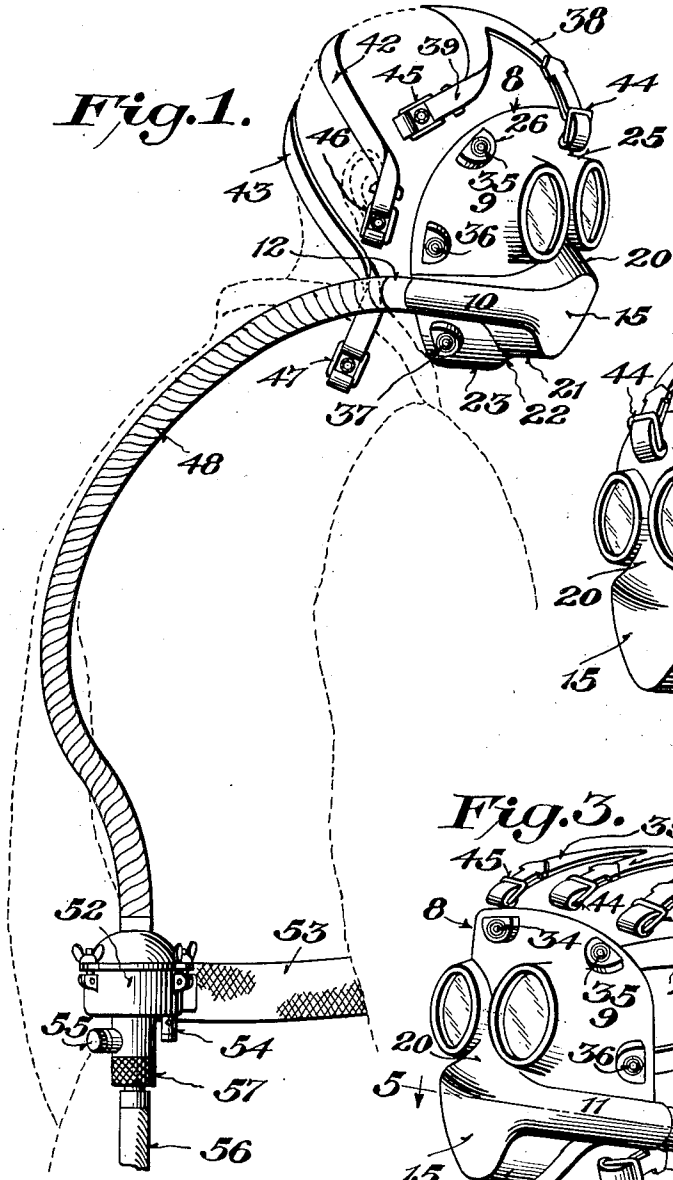


Fig. 2.

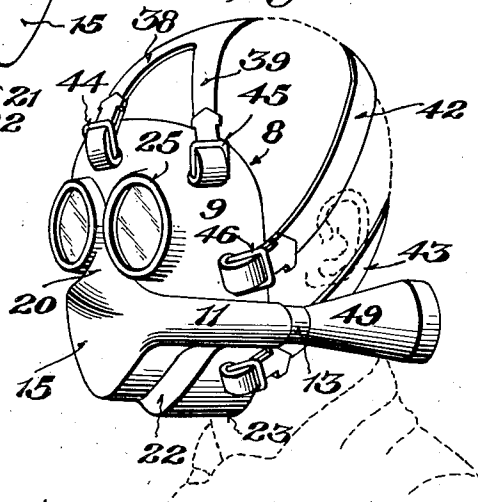
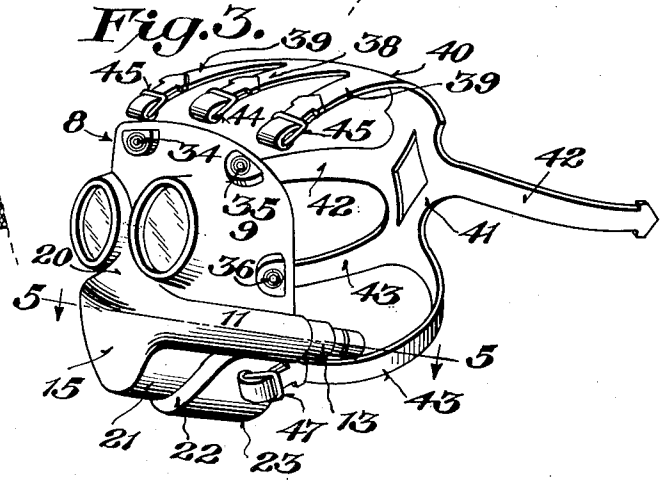


Fig. 3.



Inventor

Robert Malcom,

By Royal E. Burnham,

Attorney

April 28, 1936. R. MALCOM 2,039,234

RESPIRATORY MASK

Filed Jan. 29, 1934 2 Sheets-Sheet 2

Fig.4.

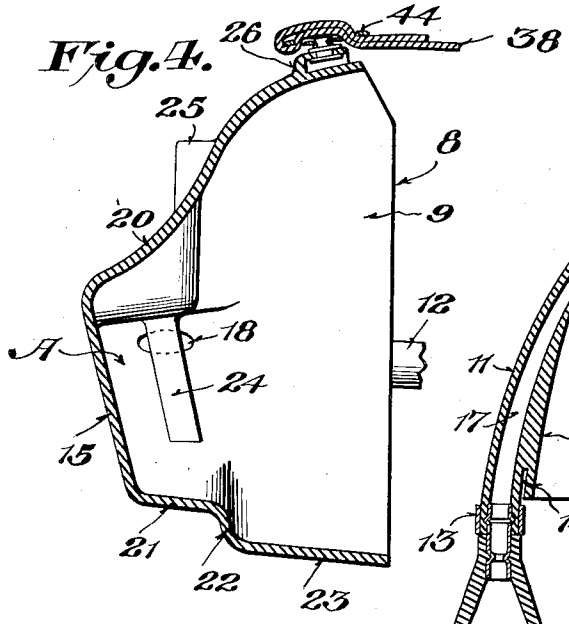


Fig.5.

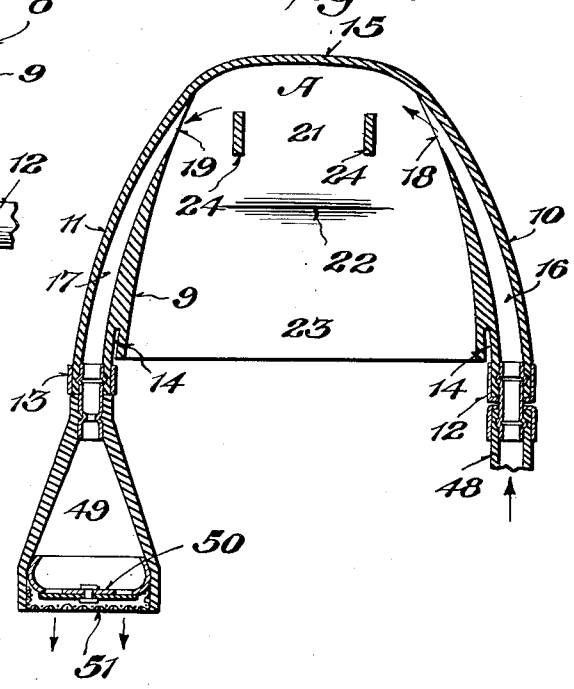


Fig.6.

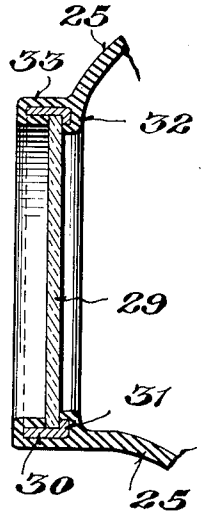
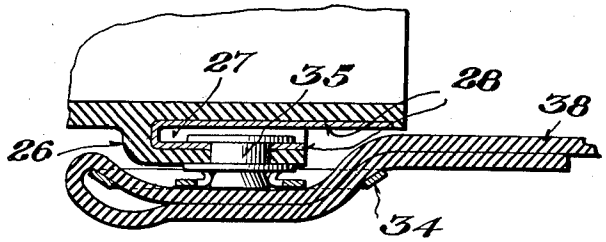


Fig.7.



Inventor

Robert Malcom,

By Royal E. Burnham,

Attorney

Patented Apr. 28, 1936 2,039,234

UNITED STATES PATENT OFFICE

2,039,234

RESPIRATORY MASK

Robert Malcom, Chicago, Ill.

Application January 29, 1934, Serial No. 708,900

4 Claims. (Cl. 128—141)

This invention relates particularly to the type of protective masks to which breathing air is supplied under pressure from any suitable source while being used in sand blasting and other occupations where harmful dusts and toxic fumes and gases are present, but it also is applicable to masks of other types.

It is an object of the invention to provide a soft moulded rubber mask-facepiece with its essential parts integrally formed as an article complete in itself and ready for use.

Among other objects of the invention are to provide improved lens mounting, head-harness, and means for connecting the harness to the facepiece.

When considered with the description herein, the characteristics of the invention are apparent in the accompanying drawings, forming part hereof, wherein embodiments of the invention are disclosed, for purposes of illustration.

Although the disclosure herein exemplify what now are considered to be preferable embodiments of the invention, it is to be understood that it is not the intention to be limited necessarily thereto in interpretation of the claims, as modifications and adaptations within the limits of the claims can be made without departing from the nature of the invention.

Like reference-characters refer to corresponding parts in the views of the drawings, of which—

Fig. 1 is a view of the mask and associated parts in place on a user;

Fig. 2 is a view of the other side of the mask;

Fig. 3 is a view illustrative more particularly of the disposition of the head-harness with respect to the facepiece;

Fig. 4 is a vertical section of the facepiece;

Fig. 5 is a horizontal section thereof;

Fig. 6 is a section illustrative of a lens mounting;

Fig. 7 is a section illustrative of the mounting on the facepiece of a member of a head-harness fastener.

The facepiece 8 is of soft moulded rubber capable of adapting itself to practically any facial contour and with substantially all of its essential parts integrally formed on its main wall 9.

This wall has on each side substantially horizontal elongated protuberances 10 and 11, which begin at the rear with pipe-sections 12 and 13, respectively, slightly separated from the main wall as shown at 14, and which continue forwardly and merge laterally into a forwardly-protruding central front wall 15 behind which is the breathing space A. The protuberances 10 and 11 contain air-passages 16 and 17, which afford communication between the pipe-sections and orifices 18 and 19 at the sides of the space A.

At the top, the front protruding wall gradually recedes and narrows into a nose-cover 20. The lower part of the front protruding wall merges into a lower receding wall 21 of the space A, and the material of the facepiece thence continues as a depending wall 22 and a substantially horizontal wall 23 extending to the rear edge. The walls 21, 22, and 23 extend upwardly at the sides and merge into the side protuberances 10 and 11. The wall 23 is adapted, when the facepiece is on a face, to conform to the under side of the chin, the point of which contacts with the wall 22, whereby too much protrusion of the face into the breathing space is prevented.

A baffle 24 in the breathing space, fixed to upper and lower walls thereof, may be positioned opposite either or both of the orifices 18—19.

Forwardly-protruding eyepieces 25 are positioned above the upper wall of the breathing space.

For the mounting of separable-fastener members on the facepiece, its material at requisite places near the edge is thickened to afford approximately dome-like outwardly-protruding parts 26, the bases of which merge into the material except on the side toward the edge, and under each of these parts there is a recess 27 open toward the edge of the facepiece. At these places, strong reenforcement fabric 28 is secured to the facepiece material proper and the under side of the parts 26, as shown by Fig. 7.

The facepiece and its parts so far described are of flexible material, such as rubber for example, moulded as an integral article, which is complete in itself and ready for use when harness-fastener members, window structures, and an exhaling device are fixed permanently therein and thereto.

Each of the eyepieces is fitted with a lens 29 or other suitable transparent sheet, which is surrounded by a ring 30 having an annular abutment 31 overlapping an edge of the lens. This window structure of the eyepieces is moulded into the surrounding material thereof in the following manner, as shown by Fig. 6.

The material is thick at the rear to afford an annular portion 32 that envelopes the abutment 31 and abuts at its front edge the adjacent marginal portion of the lens, and there is a forward extension 33 of the material that covers the outer periphery of the ring 30 and extends inwardly and backwardly over the outer edge and against

the inner periphery with its edge abutting the front marginal portion of the lens opposite to the abutment edges of the portion 32. In this way, the window structure is embodied securely in the facepiece material.

Members 34, 35, 36, and 37 of separable fasteners for attachment of straps of the head-harness are fixed permanently into the parts 26, the recess 27 of which is provided to permit the opposing clamping parts of the fastener members to be pressed to holding position against the outer and inner sides of the parts 26. The reenforcing fabric 28 prevents the fastener members from pulling out.

The facepiece is maintained on the face of the user by a head-harness of special formation, which is arranged for quick placement and displacement, easy adjustment, and for connection with the facepiece at such places as will afford direct support for the heavier parts thereof, and which may be formed as a single piece by cutting flat from sheet rubber or other suitable flexible fabric.

The harness includes as top members a central strap 38 and straps 39 on each side thereof, which converge rearwardly to a central crown part 40 arranged to rest on the top of the head. Continuing rearwardly and downwardly from the crown part (when the harness is on the head) there is a lower central part 41 arranged to rest against the upper portion of the back of the head. Lower or mid side straps 42 and therebelow under straps 43 diverge oppositely from the lower central part. These straps have, respectively, at their ends longitudinally-adjustable separable-fastener members 44, 45, 46, and 47 for connection, respectively, with the corresponding members 34, 35, 36, and 37 on the facepiece.

The top central strap 38 is connected with the fastener member 34 at the center of the upper part of the facepiece, and the top side straps 39 to the fastener members 35 approximately over the eyepieces. This disposition of the parts gives direct support for the relatively heavy eyepieces and their windows and for the protruding parts therebelow. The lower side straps 42 extend forwardly and downwardly above the ears of the wearer to connection with fastener members 36 directly or approximately above the pipe-sections 12—13, and thus these give direct support to the protuberances 10—11 and the hose and exhaling device extending backwardly therefrom. The under straps 43 extend forwardly and downwardly from the back of the head to connection with fastener members 37 at the rear of the chin part of the facepiece. The top straps 38 and 39 keep the upper part of the facepiece against the forehead, the lower side straps 42 keep the nose part in place, and the under straps 43 keep the chin part in place; and all straps operate to maintain the facepiece in sealed relation to the head of the wearer.

An air-supply hose 48 is coupled to pipe-section 12, and to pipe-section 13 is coupled an exhaling device 49 containing a valve 50 arranged to permit emission of air and to prevent its entrance from outside of the mask, the valve being protected by a screen 51 at the end of the device.

Ordinarily, the air-supply hose is connected to the right pipe-section 12 and the exhaling device to the left pipe-section 13. However, as the facepiece is uniform on each side, the hose and exhaling device may be coupled to the left and right pipe-sections, respectively, if desired. In facepieces intended for interchangeable connection of these parts there may be a baffle 24 opposite each orifice 18—19 to function for the one that happens to be the air-entrance.

The hose 48 is coupled to a filter-body 52 containing material to prevent passage of oil and foreign particles, fumes, and odors to the breathing space, this body being carried by a belt 53.

A relief-valve 54 on the filter-body automatically prevents too great air pressure in the hose 48 and the mask, and an adjustable pressure-regulating valve 55 also is provided so that the user may regulate air pressure to a point below that automatically maintained by the relief-valve, if he so desires.

Air is supplied from a compressor or blower (not shown) by a flexible hose 56 connected to the filter-body by a quick-acting coupling 57 that permits the user of the mask easily to disconnect himself when he wishes to leave his place of work where the air contains injurious dust or toxic gas or fumes. If he disconnects the air supply before he leaves such a place, the material in the filter-body and the valve in the exhaling device will prevent the breathing in of deleterious air-carried substances for the time, at least, required for him to get into normal atmosphere.

When in position on the face of the user, the soft moulded facepiece adapts itself to any facial contour and is sealed against outside air, and the entrance of dust particles prevented. As fresh clean air enters the breathing space through the inlet-orifice, it is diffused therein by the baffle and becomes available for normal respiration. Exhaled air is swept out through the exit-orifice by incoming fresh air and out of the mask from the exhaling device.

What I claim as new, and desire to secure by Letters Patent, is—

1. A mask-facepiece having moldably formed on the outside adjacent its edge reenforcements for accommodation of head-harness fasteners, one of said reenforcements being a flap-like part overlapping and spaced from the facepiece material proper, and reenforcing fabric secured to said latter material and to the under side of said part whereby fastener members clamped against opposite sides thereof are kept from displacement.

2. A mask-facepiece having moldably formed on the outside adjacent its edge reenforcements for accommodation of head-harness fasteners, one of said reenforcements being a flap-like part overlapping and spaced from the facepiece material proper and the material thereof merging at the sides and one end into the facepiece material, and reenforcing fabric secured inside of and to said part whereby fastener members clamped against opposite sides thereof are kept from displacement.

3. A mask facepiece having an eyepiece of molded flexible material such as rubber, and molded in said eyepiece a window structure comprising a rigid metallic protective ring having an annular inwardly-extending flange, and a lens in said ring against said flange and said ring protectively extending forwardly beyond the lens, annular portions of said molded material covering said ring and its flange outside and inside and abutting both sides of said lens adjacent to the inner periphery of the ring, whereby said structure is held securely in the eyepiece and the lens securely in the ring.

4. In a mask facepiece of molded flexible material such as rubber, the combination of protrusive

eyepieces of the same material as and integral with the facepiece material, each of said eyepieces having molded therein a window structure comprising a rigid metallic protective ring having an annular inwardly-extending flange, and a lens in said ring against said flange and said ring protectively extending forwardly beyond the lens, annular portions of said molded material covering said ring and its flange outside and inside and abutting both sides of the lens adjacent to the inner periphery of the ring, whereby said structure is held securely in the eyepiece and the lens held securely in the ring, and above said eyepieces reenforcements moldably formed on the facepiece material for accommodation of head-harness fasteners, one of said reenforcements being a flap-like part overlapping and spaced from the facepiece material proper, and reenforcing fabric secured to said latter material and to the under side of said part whereby fastener members clamped against opposite sides thereof are kept from displacement.

ROBERT MALCOM.