

Jan. 19, 1943.

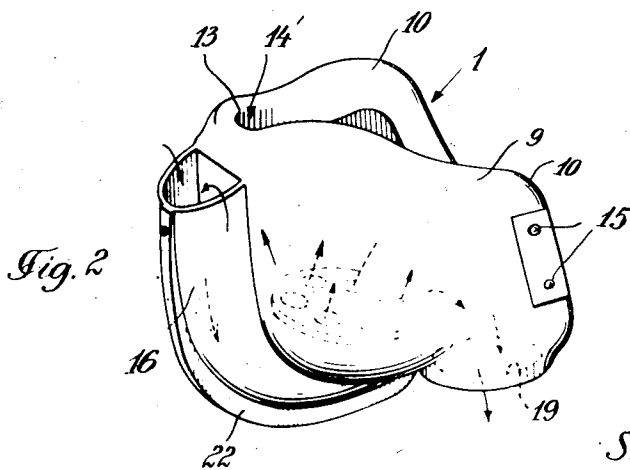
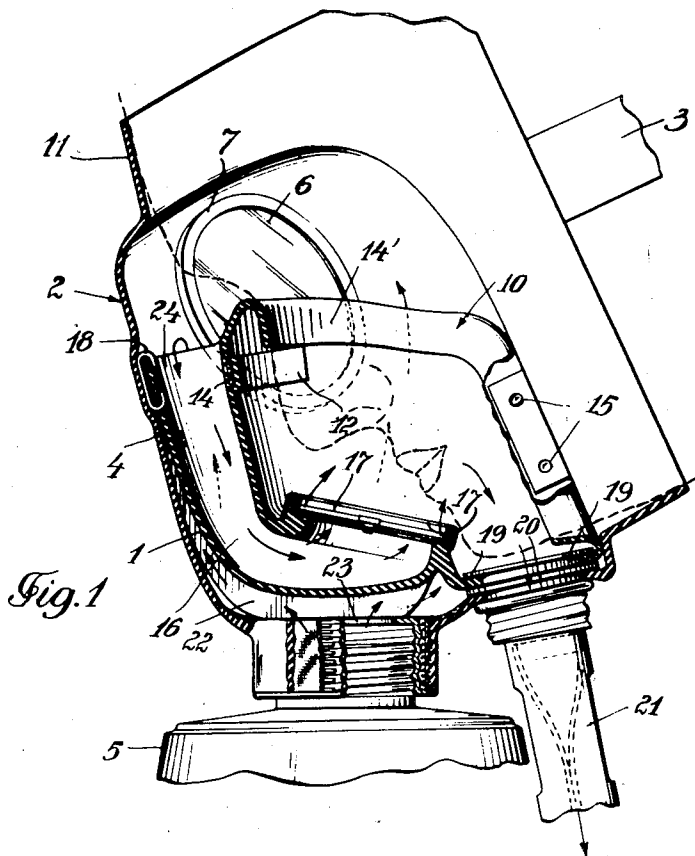
S. MELUP

2,308,991

GAS MASK

Filed Nov. 27, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

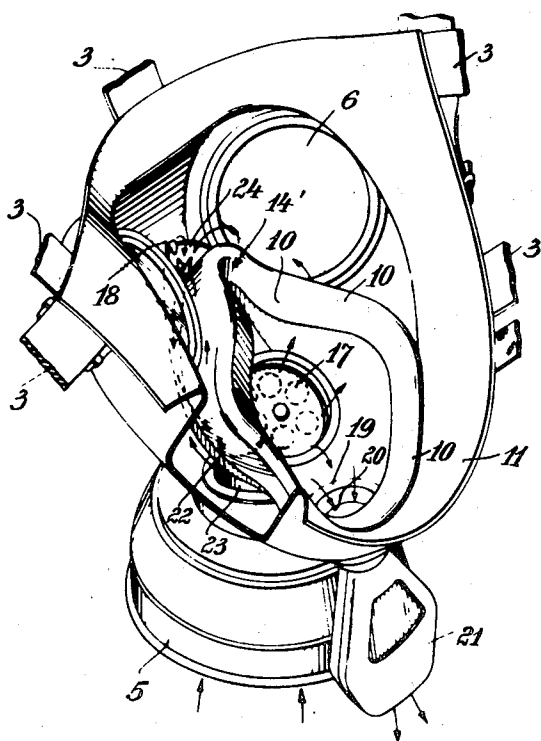


Fig. 3

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UNITED STATES PATENT OFFICE

2,308,991

GAS MASK

Solomon Melup, New York, N. Y.

Application November 27, 1940, Serial No. 367,371

11 Claims. (Cl. 128—141)

The present application is a continuation in part of my prior U. S. patent application, Serial No. 358,353, filed September 25, 1940; the invention described in this application relates to gas masks comprising an outer mask and an inner mask, completely surrounded by this outer mask.

The main object of my present invention is a new construction for an inner mask, which provides a continuous and complete sealing along the contacting edge of this inner mask when pressed against the face of the gas mask wearer.

It is a further object of my invention to provide a gas mask being adapted to be used for different head sizes.

Still a further object of my present invention consists in an inner mask being built in such a manner as to enable its use in gas masks for different face sizes.

Another object of my invention consists in shaping this inner mask in such a way as to provide satisfactory circulation of air in order to keep the eye windows of the mask clear of damp air, and to prevent moisture accumulation on these windows.

Still another object consists in arranging the main elements of my new inner mask in such a manner as to enable free vision for the gas mask wearer, especially forward and downward.

In accordance with my present invention I attain the main object of the invention, i. e., complete seal between the inner mask and the face by arranging the inner mask within said outer mask in such a manner as to be adapted to press with its contour edge against the face of the mask wearer.

Maximal sealing effect can be attained if the edge portion is formed in such a way that it is substantially normal to the face of the gas mask wearer; in accordance with a preferred embodiment of my invention I provide the inner mask with a relatively broad contour edge portion and shape the mask in such a manner as to be adapted to press with this broad contour edge portion as sealing surface against the front part of the face of the mask wearer.

To form such a broad contour edge portion I propose to turn the edge portion of the inner mask inward, forming thereby a tube-like contacting edge portion having a deep resiliency. It is evident that such a sealing surface ensures an excellent contact between the inner mask and the face; neither increase nor decrease in the pressure by which the inner mask is pressed against the face is able to influence materially the contact between inner mask and face: Only by com-

pletely lifting off the mask from the face could the seal between the resilient broad contour edge portion of the mask and the face be interrupted.

As set forth above, substantially the entire contour edge of the inner mask is always in good contact with the face; there is, however, one part of the mask contour which often needs separate adjustment: this part is the nose portion of the contour edge which needs adjustment in accordance with the different shapes of the noses of the gas mask wearers. For this purpose, adjustable means are provided for to adjust the shape of this part of the contour edge of the inner mask, i. e., the edge part of the contour edge pressing against both sides of the nose to the individual shape of the respective nose. This adjusting means may consist of an adjustable plastic, e. g., metallic strap connected to the inner mask near the edge portion surrounding and pressing against the nose, said strap extending substantially parallel to this edge and substantially normal to the longitudinal direction of the nose of the gas mask wearer. In accordance with an especially preferred embodiment of my present invention, this strap is vulcanized within a rubber reinforcement of the inner mask in the position indicated above.

The inner mask, according to my invention, has to be secured to the outer mask in such a manner as to be able to adapt itself to the elevations and depressions of the face. Therefore, I provide no continuous connection between the inner and outer mask, but the inner mask is attached to the outer mask at a few points only.

I have found that it is especially advantageous to secure the inner mask to the outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer. These means are preferably detachably securing the two masks to each other and consist, for instance, of clips, buttons or similar attaching means.

The novel features which I consider as characteristic for my invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments, when read in connection with the accompanying drawings, in which:

Fig. 1 is a cross-section of the outer and inner mask,

Fig. 2 is a perspective view of the inner mask,

55 and

Fig. 3 is a perspective view of the inner and outer mask, attached to each other.

As shown in the drawings, the inner mask 1 is arranged within the outer mask 2; the latter is secured by a harness 3, shown only partially, to the head of the gas mask wearer.

In the drawings a specific embodiment of an outer mask is shown. As, however, I intend to claim in the present application, mainly the inner mask and its specific features only, in the following description the outer mask will not be described in detail. It should be emphasized that, although the specific outer mask shown in the drawings is especially well adapted to be used in combination with my new inner mask, I claim this inner mask and its new features also separately, i. e., not only in combination with this specific outer mask.

Nevertheless, in order to describe fully the drawings, I want to mention that the outer mask comprises, besides the outer mask body 4, a canister 5, and eye windows 6; these eye windows are secured by rims 7 in the usual way to the molded rubber body 4 of the outer mask. An outlet opening 20 is also arranged in the outer mask.

The inner mask, which is subject of the present invention, consists of an inner mask body 9. The contour edge of this inner mask is turned inward, forming thereby a sealing surface 10, being adapted to be pressed against the face of the gas mask wearer. Thus, the inner mask presses with its contacting contour edge against the nose, cheeks, and chin and surrounds the nostrils and mouth of the gas mask wearer completely.

As shown in the drawings, especially in Fig. 3, the contour edge 11 of the outer mask is flat, being thereby adapted to slide along the contour of the face. Although the outer mask slides along the face differently, i. e., the head is enveloped in the outer mask to a greater or smaller extent in accordance with the size of the head to which it has to be fitted, no substantial change occurs in the continuous and complete seal between the inner mask and the face: the contacting edge 10 and the face remain always in contact, only the pressure between them changes. As, however, the edge portion of the inner mask has a deep resiliency, this pressure change is substantially unimportant and does not influence the usefulness of the mask.

As further shown in the drawings, the inner mask comprises a rubber reinforcement 12 arranged near the edge portion 13 surrounding the nose; this reinforcement 12 extends substantially parallel to edge 13 and normally to the longitudinal direction of the nose of the gas mask wearer. Within this reinforcement a metallic strap 14 enveloped in textile fabric is arranged. This metallic strap is flexible and its shape can be adjusted in accordance with the shape of the nose, as needed. Thereby the curvature of the upper portion of the edge 13 and the nose opening 14' can be formed as needed for each face shape separately.

For securing the inner mask to the outer mask clasp fasteners 15 or the like are provided for near the edge portions contacting the cheeks of the gas mask wearer, attaching thus the outer and inner mask to each other.

As shown in the drawings the inner mask furthermore comprises a communicating duct 16 secured to the outer surface of the inner mask body 9 along the central plane of the face of

the gas mask wearer; this duct is connected at its lower end with the space within the inner mask and at its upper end with the space outside this inner, but within the outer mask, forming thereby an air passage between the space in the inner and the space in the outer mask. In this duct an inlet valve 17 is provided for; it should be noted that this valve may be arranged not only at the lower end of the duct, as shown, but that it is also possible to arrange it at any other place of the duct, e. g., at its upper end. A clip 18, or the like, is provided for at the upper end of the duct 16, securing this duct, and therewith the inner mask, to the outer mask.

As shown in Fig. 3, in the bottom part of the inner mask an outlet opening 19 is provided for. This opening corresponds with another opening 20 in the outer mask. Means are provided for connecting the edge portion around opening 19 in the inner mask to the edge portion around the corresponding opening 20 in the outer mask, thereby enabling direct connection between the space within the inner mask and the outlet valve 21 outside the outer mask; this arrangement simultaneously provides an attaching connection between the bottom of the inner mask and the bottom of the outer mask. In order to enable free vision for the gas mask wearer it is of importance to provide the communicating duct 16, the inlet valve 17, the attaching means 18, the outlet valve opening 19 along and within the central plane of the face of the gas mask wearer.

In order to form an open space, being necessary for the air circulation, between the outer surface of the bottom of the inner mask and the inner surface of the bottom of the outer mask, projecting means are provided for on said inner mask at the lower part of the communicating duct. These means consist preferably in one or more longitudinal rubber projections 22 being integral with said duct; these projections are preferably also arranged along the central plane of the face of the gas mask wearer.

The arrows in the drawings clearly indicate the flow of the air inside the mask. The air breathed in during inhaling passes through canister 5 where it becomes purified, and thereafter enters the mask through the inlet opening 23. Within the mask, the air first flows upwards along the cheeks of the gas mask wearer, then along the eye windows 6; thereafter it enters duct 16 at its upper opening 24, passes through duct 16 and enters the inner mask by the inlet valve 17; after having been in- and exhaled by the wearer of the gas mask it leaves the inner mask by the outlet valve 21.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of gas masks differing from the types described above.

While I have illustrated and described the invention as embodied in gas masks, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are

intended to be comprehended within the meaning and range of equivalency of the following claims.

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

1. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, forming thus a continuous and complete sealing along this contacting contour edge, and means securing said inner mask to said outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer.

2. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, forming thus a continuous and complete sealing along this contacting contour edge, and clips or buttons for detachably securing said inner mask to said outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer.

3. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contour edge against the face of the gas mask wearer, a communicating duct secured to the outer surface of said inner mask along the central plane of the face of the gas mask wearer, said duct being connected at its lower end with the space within said inner mask and at its upper end with the space outside said inner, but within said outer mask, forming thereby an air passage between the space in said inner and the space in said outer mask, and means for detachably attaching to the outer mask the upper end of said communicating duct and the edge portions of said inner mask contacting the cheeks of the gas mask wearer.

4. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, forming thus a continuous and complete sealing along this contacting contour edge, means detachably securing said inner mask to said outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer, an outlet valve opening in the bottom portion of said inner mask, a corresponding opening in the bottom portion of the outer mask, means for connecting the edge portion around said opening in the inner mask to the edge portion around said opening in said outer mask, a communicating duct secured to the outer surface of said inner mask along said central plane of the face of the gas mask wearer, said duct being connected at its lower end with the space within said inner mask and at its upper end with the space outside said inner, but within said outer mask, forming thereby an air pas-

sage between the space in said inner and the space in said outer mask, and at least one rubber projection at the lower part of said communicating duct, said projection acting as spacer between the outer surface of the bottom of the inner mask and the inner surface of the bottom of the outer mask, said communicating duct, said projection on the lower part of said duct, said inlet valve in said duct, said means for detachably securing the upper end of said communicating duct to said outer mask, and said outlet valve opening, being arranged along the central plane of the face of the gas mask wearer.

5. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contour edge against the face of the gas mask wearer, a communicating duct secured to the outer surface of said inner mask along the central plane of the face of the gas mask wearer, said duct being connected at its lower end with the space within said inner mask and at its upper end with the space outside said inner, but within said outer mask, forming thereby an air passage between the space in said inner and the space in said outer mask, and projecting means on said inner mask being arranged at the lower part of said communicating duct, these projecting means acting as spacer between the outer surface of the bottom of the inner mask and the inner surface of the bottom of the outer mask.

6. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contour edge against the face of the gas mask wearer, a communicating duct secured to the outer surface of said inner mask along the central plane of the face of the gas mask wearer, said duct being connected at its lower end with the space within said inner mask and at its upper end with the space outside said inner, but within said outer mask, forming thereby an air passage between the space in said inner and the space in said outer mask, and a longitudinal rubber rib at the lower part of said communicating duct, said rib being arranged along the central plane of the face of the gas mask wearer, acting as spacer between the outer surface of the bottom of the inner mask and the inner surface of the bottom of the outer mask.

7. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, forming thus a continuous and complete sealing along this contacting contour edge, an outlet valve opening in the bottom portion of said inner mask, a corresponding opening in the bottom portion of the outer mask, means for connecting the edge portion around said opening in the inner mask to the edge portion around said opening in said outer mask, a communicating duct secured to the outer surface of said inner mask along the central plane of the face of the gas mask wearer, said duct being connected at its lower end with the space within said inner mask and at its upper end with the space outside said

inner, but within said outer mask, forming thereby an air passage between the space in said inner and the space in said outer mask, and at least one rubber projection at the lower part of said communicating duct acting as a spacer between the outer surface of the bottom of the inner mask and the inner surface of the bottom of the outer mask.

8. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, thus forming a continuous and complete sealing along this contacting contour edge, means detachably securing said inner mask to said outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer, an outlet valve opening in the bottom portion of said inner mask, a corresponding opening in the bottom portion of the outer mask, and means for connecting the edge portion around said opening in the inner mask to the edge portion around said opening in said outer mask.

9. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, forming thus a continuous and complete sealing along this contacting contour edge, means securing said inner mask to said outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer, an outlet valve opening in the bottom portion of said inner mask, a corresponding opening in the bottom portion of the outer mask, and means for connecting the edge portion

around said opening in the inner mask to the edge portion around said opening in said outer mask.

10. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contacting contour edge against the nose, cheeks and chin of the gas mask wearer, forming thus a continuous and complete sealing along this contacting contour edge, clips or buttons for detachably securing said inner mask to said outer mask at its nose portion and near its edge portions contacting and pressing against the cheeks of the gas mask wearer, an outlet valve opening in the bottom portion of said inner mask, a corresponding opening in the bottom portion of the outer mask, and means for connecting the edge portion around said opening in the inner mask to the edge portion around said opening in said outer mask.

11. In a gas mask an outer mask, an inner mask adapted to surround completely the nostrils and mouth of the gas mask wearer, said inner mask being arranged within said outer mask in such a manner as to be adapted to press with its contour edge against the face of the gas mask wearer, a communicating duct secured to the outer surface of said inner mask along the central plane of the face of the gas mask wearer, said duct being connected at its lower end with the space within said inner mask and at its upper end with the space outside said inner, but within said outer mask, forming thereby an air passage between the space in said inner and the space in said outer mask, and spacing means arranged between the lower part of said communicating duct and said outer mask holding the outer surface of the lower part of said communicating duct at a certain distance from the inner surface of said outer mask.

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