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RESPIRATOR

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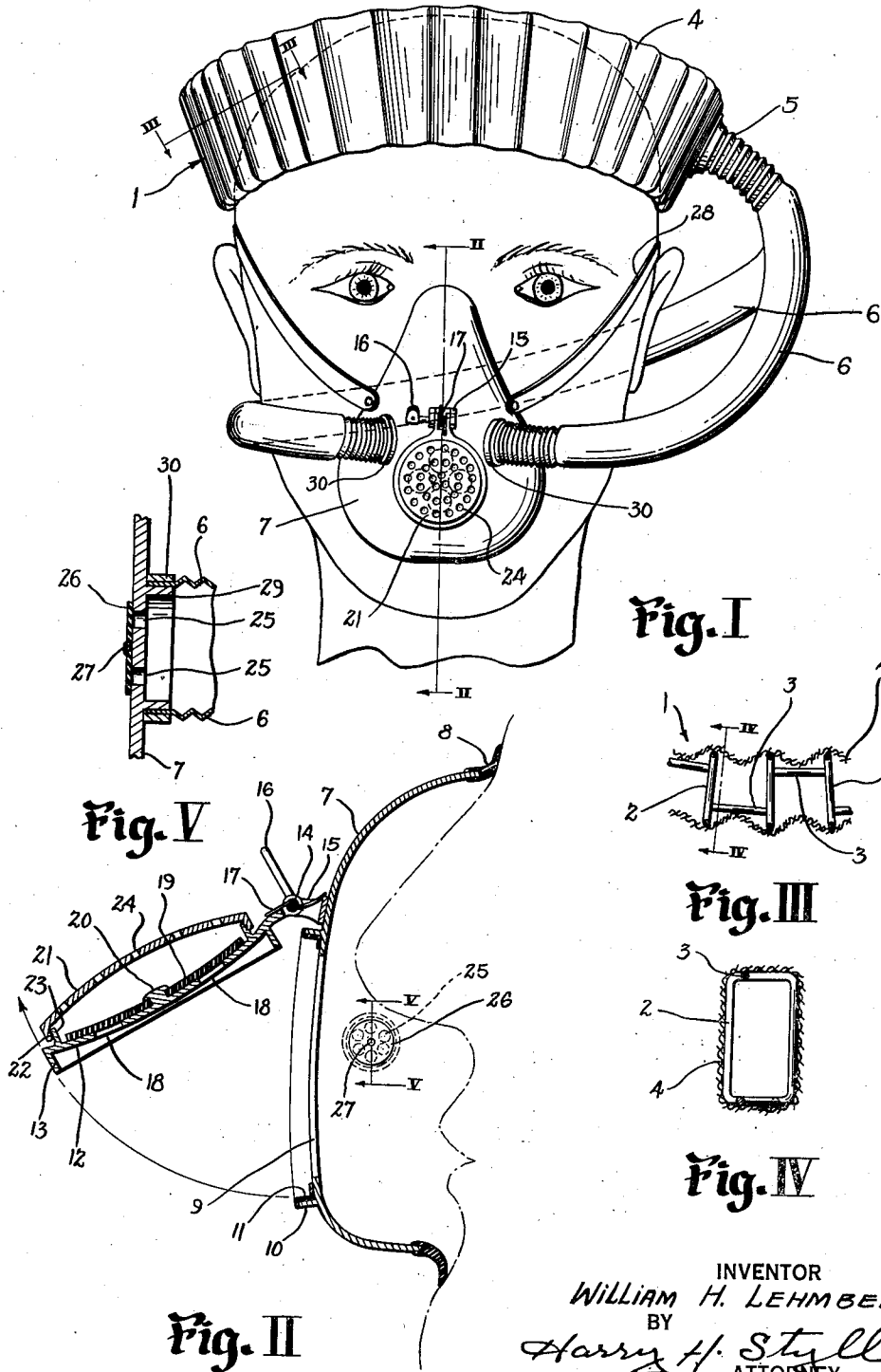


Fig. I

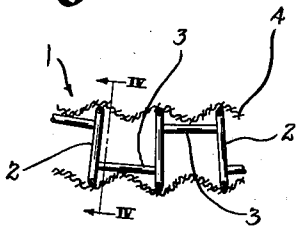


Fig. III

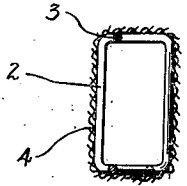


Fig. IV

Fig. II

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RESPIRATOR

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8 Claims. (Cl. 128—146)

This invention relates to improvements in respirators and has particular reference to novel means and method of making the same.

One of the principal objects of the invention is to provide a simple, comfortable and efficient respirator for protecting the user from dust, smoke and noxious or asphyxiating gases, etc.

Another object of the invention is to provide a respirator having a comparatively small face piece adapted to fit over the mouth and nostrils of the wearer and so constructed that a portion thereof may be opened to enable the wearer to expectorate or to carry on a conversation, or in general gain access to the mouth without disturbing the fitted relation of the face piece with the face of the wearer and which has a comparatively large filter unit so constructed as to be supported with a maximum of convenience and comfort without obstructing the vision of the wearer.

Another object is to provide a filter unit which may be adjusted to and carried by the head of the wearer and which will provide a high magnitude of filtration with a minimum resistance to inhalation.

Another object of the invention is to provide a respirator which will be light in weight and which will provide relatively free inhalation and exhalation.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing. It will be apparent that many changes may be made in the details of construction, arrangement of parts and method shown and described without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details of construction, arrangement of parts and method shown, as the preferred form only has been shown by way of illustration.

Referring to the drawing:

Fig. I is a front elevation of the device embodying the invention showing it in the approximate position of use;

Fig. II is an enlarged sectional view taken on line II—II of Fig. I and looking in the direction indicated by the arrows;

Fig. III is a fragmentary sectional view taken as on line III—III of Fig. I;

Fig. IV is a sectional view taken as on line IV—IV of Fig. III; and

Fig. V is a fragmentary sectional view taken as on line V—V of Fig. II.

It has been usual in most instances in the past after the respirator has been positioned on the

face and prior to exposure to injurious fumes, gases, dust, smoke, etc., to test the respirator to insure that there is no leakage throughout the face engaging portion thereof. This procedure proved quite satisfactory as long as the face piece of the respirator was not disturbed during use. It has been found, however, that during the use of respirators, most individuals lift the respirator from the face to expectorate or during the course of conversation, and merely allow the respirator to reseal itself on the face with no insurance that there is no leakage, with the result that in many instances in the past, severe injuries to health have been suffered through the accidental inhaling of injurious gases, fumes, etc.

Another disadvantage of many prior art respirators is that in most instances the filter elements were small and of short duration and in many instances the respirators were exceptionally heavy and uncomfortable and, therefore, forced the wearer at different intervals during their use to remove them for short periods for relief.

One of the prime objects, therefore, of the present invention is to overcome or eliminate the above disadvantages by providing a respirator which is so constructed as to provide a filter unit of extremely large area and long life in high concentration and which is so arranged that the major portion of its weight is carried by the head of the wearer and the part overlying the nostrils and mouth of the wearer is provided with a portion which may be opened without disturbing the face engaging portion thereof to enable the wearer to expectorate or to carry on a conversation.

The device embodying the invention comprises a relatively large filter unit formed, as shown in Figs. I, III and IV, of a wire framing which comprises a plurality of rectangular shaped members 2 connected by a plurality of connecting members 3. The connecting members 3 are arranged in staggered relation so that the framing may be expanded or contracted to fit the head of the wearer. The wire framing is covered with sheet-like porous filter material 4, such as felt or other desirable filter material, which is pleated to provide for the expanding and contracting of the wire framing and to provide large filter area and thus allow a more dense and effective filter to be used. This expanding or contracting is brought about by closing in or separating the sides of the rectangular shaped members opposite the connecting members 3. The filter material completely surrounds the framing and is provided with a flexible and extensible

tubular portion 5 to which flexible pipe lines 6 are connected adjacent one end thereof and which communicate with a face piece 7 to which they are attached adjacent their opposite ends, as shown in Fig. I. The face piece 7 is preferably formed of relatively thin, stiff material shaped to cover the nostrils and the mouth of the wearer. It is provided adjacent its inner contour edge with flexible face engaging means 8 which is so constructed as to be self adjusting to the irregularities of the contour of the face of the wearer and to provide a comfortable fit. The front of the face piece is provided with an opening 9 surrounded by a flange 10 forming a shoulder in which is placed a resilient angled lining 11.

A suitable flap-like member 12 having a peripheral flanged portion 13 adapted to fit within the flange 10 and engage the angled resilient lining 11 is hinged at 14 to a bracket 15 carried by the front of the face piece. The flap-like member may be swung on its pivotal support by means of a handle 16 and is adapted to be constantly urged toward the face piece 7 by a spring member 17 which normally holds the flange 13 in sealed relation with the resilient lining 11.

The flap-like member 12 is preferably formed to a meniscus shape and with a plurality of openings 18 therein, as shown in Fig. II. A disk 19 of rubber or other suitable resilient means is carried by a headed pin member 20 is adapted to overlie the openings 18 and, due to the cupping thereof brought about by the meniscus shape of the flap-like member 12 and to its inherent tendency to return to its initial set, will constantly tend to remain in engagement with the flap-like member 12 over the openings 18, that is, a positively sealed valve. The member 19 is protected by a cover member 21 which is threadedly connected at 22 to an opposed flange-like member 23 formed on the side of the flap-like member 12 opposite the flange 13. The cover member is provided with a plurality of openings 24 to allow free passage of air therethrough. This arrangement provides an exhalation valve which may be moved bodily toward or away from the opening 9 in the front of the face piece 7.

The sides of the face piece 7 to which the ends of the flexible pipe lines 6 are attached are provided with inhalation valves formed as shown in Fig. V by providing a plurality of openings 25 within the confines of the ends of the pipe line attachments. A disk-like member 26 of rubber or other suitable flexible material is secured to the inner wall of the face piece 7 and in superimposed relation with the openings 25 by means of a pin member 27. This provides a valve arrangement which during inhalation will permit the air drawn through the filter unit 1 to pass through the pipe lines 6 into the face piece 7. During exhalation, the members 26, which due to their normal tendency to return to their initial set, will close the openings 25 whereupon continued exhalation will cause the disk-shaped member 19 to move away from the openings 18 and permit the passage of air outwardly of the face piece. During inhalation, the disk 19 is adapted to close the openings 18 in a manner similar to the disk 26, to permit only air coming through the filter unit 1 to enter the face piece.

The face piece is held in engagement with the face by means of a suitable resilient head band or the like 28.

Although for ease of illustration, the connection 5 in Fig. I is shown to be at the side of the

head it is to be understood that this connection is preferably in the rear. Connections similar to 5 may be provided, one on each side of the filter unit, or a single connection 5 and pipe line may be provided directly in front if desired.

The ends of the pipe lines 6 are secured to the filter unit 1 and face piece 7 by clamping the said ends between a protuberance 29 and clamp ring 30 such as shown in Fig. V.

From the foregoing description it will be seen that a respirator has been provided whereby the excess weight usually introduced by the filter means has been obviated by constructing the said filter in the form of a cap to be worn on the head, whereby a large filtering area is provided without discomfort to the wearer and simple means has been provided whereby the wearer may gain access to his mouth or carry on conversation, etc., without having to disarrange the face piece.

The filter unit, although of a relatively large area type, is exceptionally light in weight and permits free inhalation. It is also readily adjustable to heads of varying sizes.

With the above arrangement the face piece of the respirator may be fitted and tested for leakage and during use need not be disturbed. This arrangement, therefore, greatly improves devices of this nature.

Having described my invention, I claim:

1. A respirator comprising a face piece to fit about the nostrils and mouth of the wearer and having an opening therein adapted to assume a position before the mouth, said portion of the face piece surrounding said opening having an angled lip with an outwardly flared portion, a flaplike member hinged to the face piece for movement toward and away from said opening and having a peripheral angled lip shaped to fit over the outwardly flared portion of the lip on the face piece and means between said lips when positioned in overlapped relation with each other for sealing the said lips against the entrance of air.

2. A respirator comprising a face piece to fit in continuous air tight peripheral relation with the face about and adjacent the nostrils and mouth of the wearer, said face piece having an opening on each side thereof containing an inhalation valve and an opening in the front thereof provided with a shouldered peripheral portion, filter means separate from said face piece and joined therewith by means attached about said side openings, means separate from said filter means for holding said face piece on the face, a flap-like member having an angled lip adapted to fit in close relation with the shouldered portion of the face piece, cushion-like means between said shouldered portions for sealing the same, said flap-like member having an opening therein and resilient means fitting over said opening, and being so arranged as to prevent inhalation through said opening and yet permit exhalation.

3. A respirator comprising a cap-like filter unit of filter material and an adjustable frame support internally of said material and completely surrounded thereby, a separate face piece shaped to fit about the nose and mouth of the wearer and supported therein by supporting means separate from said filter unit and a pipe like air passage-way connecting said filter unit and face piece, said face piece having an opening in the front thereof and a spring operated flap-like member pivotally secured to said face piece for movement, through the function of the spring, toward and, 75

by manual operation against the spring, away from said opening to open and close said opening, said flap-like member having a plurality of openings therethrough and an exhalation valve there-
5 in.

4. A respirator comprising a cap-like filter unit of filter material and an adjustable frame support internally of said material and completely surrounded thereby, a separate face piece shaped to fit about the nose and mouth of the wearer and supported thereon by supporting means separate from said filter unit and having a pair of spaced relatively small openings and another relatively large opening therein, a pipe-like air passageway connecting the said filter unit to said
10 relatively small openings, a flap-like member having a plurality of small openings therein secured to said face for movement toward and away from the large opening to open and close said opening and an exhalation valve member on said flap-like
15 member and rubber-like cushion means surrounding said large opening for sealing said flap-like member in fitted relation about the said opening so as to allow exhalation through said
20 openings in said flap-like member while the periphery thereof is in air tight relation with the face piece.

5. A respirator comprising a face piece to fit about the nostrils and mouth of the wearer and having an opening therein adapted to assume a position before the mouth, said portion of the face piece surrounding said opening having an outwardly flared lip portion, a flap-like member hinged to said face piece for movement toward
30 and away from said opening, said flap-like member having outwardly flared lip portions on the opposed sides thereof, one of said outwardly flared lip portions being shaped to fit with the outwardly flared lip portion of the face piece and the opposed outwardly flared lip portion provid-
35 ing means to which a cap-like member is detachably secured and a valve member on said flap-like member between said member and cap.

6. A respirator comprising a face piece to fit about the nostrils and mouth of the wearer and having an opening therein adapted to assume a position before the mouth, said portion of the face piece surrounding said opening having an outwardly flared lip portion, a flap-like member hinged to said face piece for movement toward
40 and away from said opening, said flap-like member having outwardly flared lip portions on the opposed sides thereof, one of said outwardly flared lip portions being shaped to fit with the

outwardly flared lip portion of the face piece and the opposed outwardly flared lip portion providing means to which a cap-like member is detachably secured, a valve member on said flap-like member between said member and cap and means
5 associated with the outwardly flared lip portion of said face piece or with the associated lip portion of the flap-like member for sealing said members with each other when in fitted relation.

7. A respirator comprising a face piece to fit about the nostrils and mouth of the wearer and having an opening therein adapted to assume a position before the mouth, said portion of the face piece surrounding said opening having an outwardly flared lip portion, a flap-like member hinged to said face piece for movement toward
10 and away from said opening, said flap-like member having outwardly flared lip portions on the opposed sides thereof, one of said outwardly flared lip portions being shaped to fit with the outwardly flared lip portion of the face piece and the opposed outwardly flared lip portion provid-
15 ing means to which a cap-like member is detachably secured, a valve member on said flap-like member between said member and cap, means associated with the outwardly flared lip
20 portion of said face piece or with the associated lip portion of the flap-like member for sealing said members with each other when in fitted relation and resilient means for urging said lip portions in sealed relation with each other.

8. A respirator comprising a face piece to fit in continuous air tight peripheral relation with the face about and adjacent the nostrils and mouth of the wearer and having an opening on
35 each side thereof containing an inhalation valve and a front opening therein adapted to assume a position before the mouth said portion of the face piece surrounding said front opening having an angled lip with an outwardly flared portion
40 filter means separate from said face piece and joined therewith by means attached about said side openings, means separate from said filter means for holding said face piece on the face, a flap-like member hinged to the face piece for
45 movement toward and away from said opening and having a peripheral angled lip shaped to fit over the outwardly flared portion of the lip on the face piece and means between said lips when positioned in overlapped relation with each other
50 for sealing the said lips against the entrance of air.

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