April 4, 1939. N. SCHWARTZ 2,153,437

RESPIRATOR

Filed June 16, 1937 2 Sheets-Sheet 1

Fig. 1.

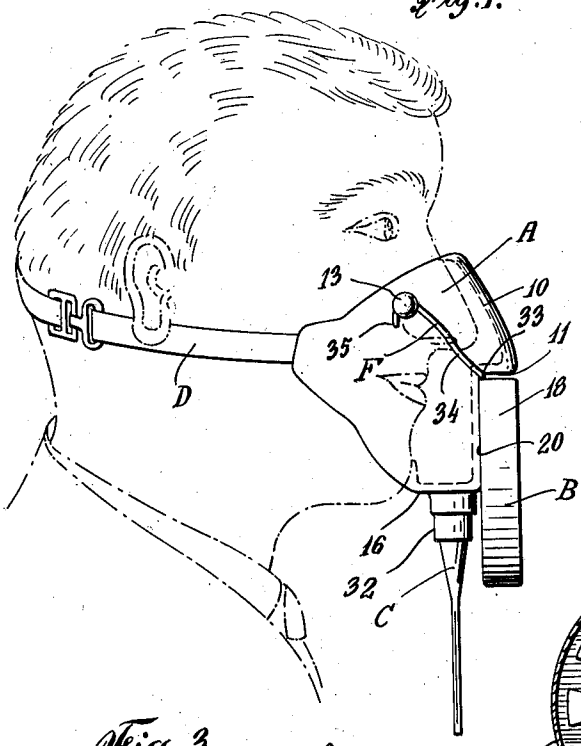


Fig. 2.

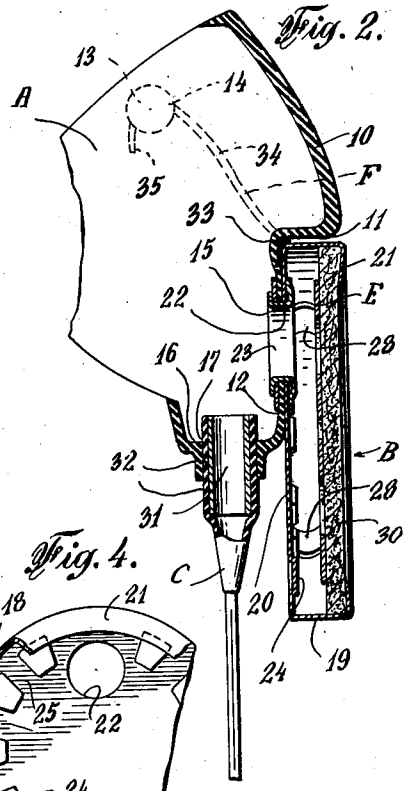


Fig. 4.

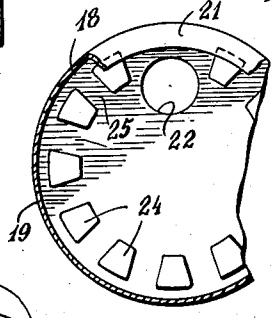
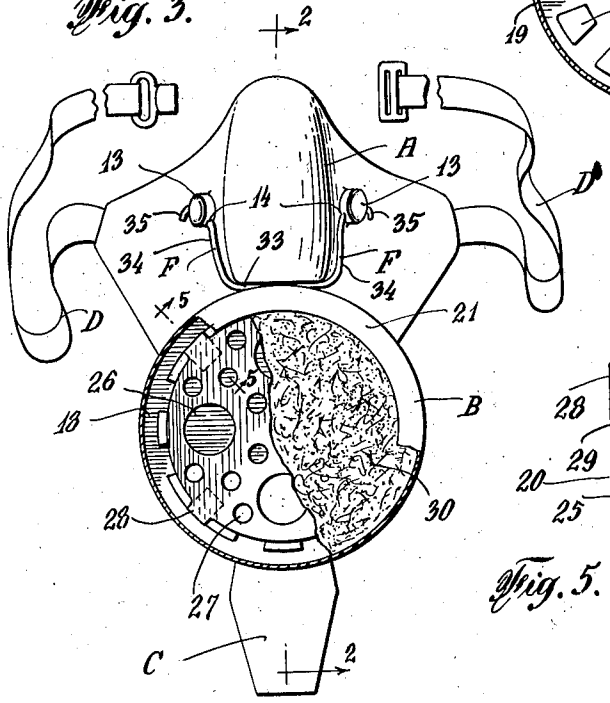


Fig. 3.



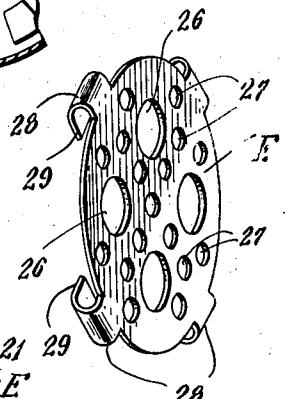


Fig. 6.

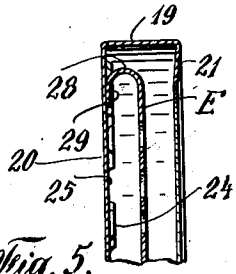


Fig. 5.

INVENTOR

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RESPIRATOR

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Fig. 7.

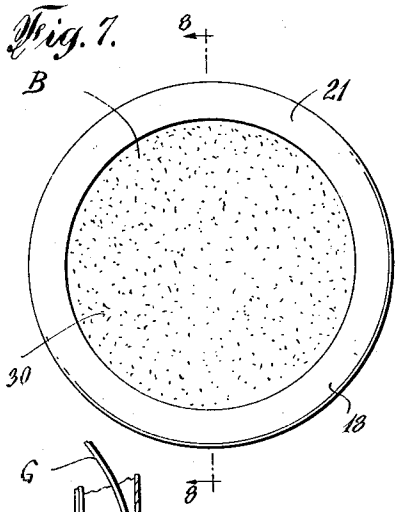


Fig. 8.

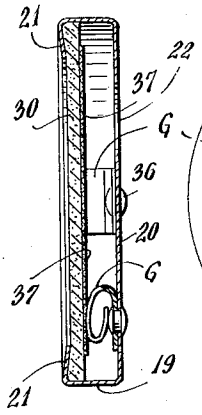
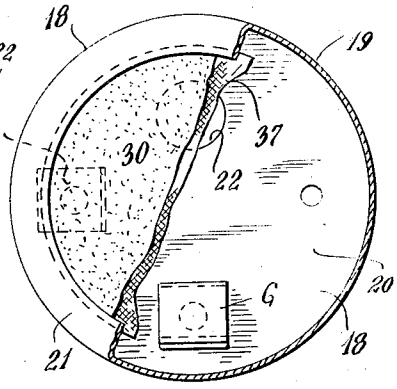


Fig. 9.



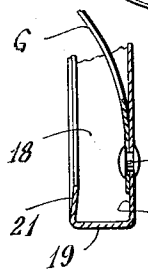


Fig. 10.

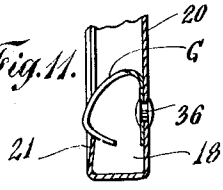


Fig. 11.

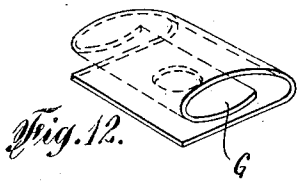


Fig. 12.

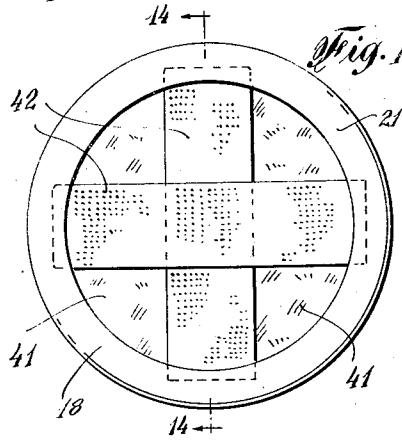


Fig. 13.

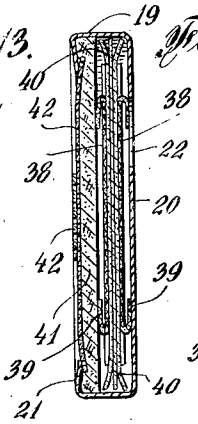


Fig. 14.

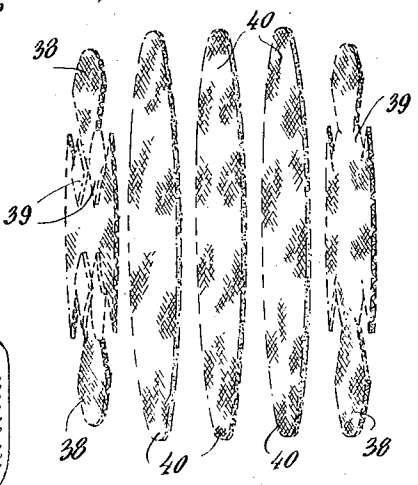


Fig. 15.

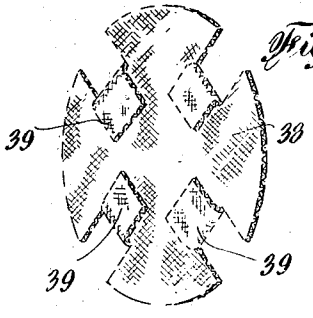


Fig. 16.

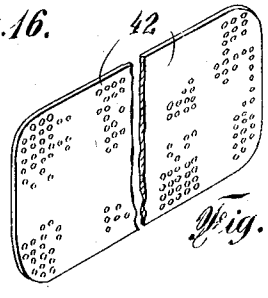


Fig. 17.

INVENTOR

Nathan Schwartz

Patented Apr. 4, 1939

2,153,437

UNITED STATES PATENT OFFICE

2,153,437

RESPIRATOR

Nathan Schwartz, New York, N. Y.

Application June 16, 1937, Serial No. 148,437

5 Claims. (Cl. 128—146)

This invention relates to filter type respirators adapted to cover the nose and mouth of the wearer for the purpose of protection against dust fumes and gases and is a modification of my co-pending application for Letters Patent, Serial No. 124,851, filing date February 9, 1937.

The invention broadly aims to improve on the construction of the filter unit by providing an inlet port with an arrangement to accommodate removable filter materials of varying thicknesses and also to space the said material from its supporting frame wall or plate, and another feature is to provide a leak proof engagement of the face of the wearer and the face piece of the respirator.

More particularly the invention resides in the construction of a casing with a circumferential wall, having a side wall with an aperture for connection with the face piece of the respirator, and at the forward end the said circumferential wall has an inturned flange. A resilient foraminous supporting element is provided for the filter material. Also resilient spacing means are provided which may be attached to the supporting element or to the frame wall or plate. The said spacing means, being resilient, have the properties of contracting or expanding and thereby provide larger or smaller space for the filter material insertion; that is, the filter material is removably attached between the said inturned flange and the marginal end of the supporting element, and, if the filter material is thick, the space between the filter material and the supporting element is widened by the act of the insertion of the said material. The reason for the said widening is that the spacer retracts upon pressure. On the other hand, the said spacer expands when thinner filter material is inserted. Therefore, the filter space is automatically narrowed or widened.

It is noted therefore that the resilient spacing means has a double usefulness; namely, it provides a space for the free flow of air behind the filter material thereby providing a large filter area to make breathing easy, and it provides accommodation for thicker or thinner filter material, making the respirator useful for heavy duty or for light duty. Three forms of spacing supports are illustrated herein.

Another feature is the provision of a deformable or resilient wire conveniently emplaced at a set back portion below the nose line, which extends from the said set back portion rearward and upward to provide pressure at the nasal part of the said face piece for the purpose of making an air tight contact between the face of the wearer and the face piece of the respirator.

With the above recited and other objects in view reference is had to the following description and accompanying drawings in which there is exhibited one example or embodiment of the invention, while the claims describe the actual scope of the same.

In the drawings:

Figure 1 is a side view of the improved respirator in applied position.

Figure 2 is a section on line 2—2 of Figure 3.

Figure 3 is a front view of the improved respirator, and the filter casing is broken in parts to illustrate the several layers.

Figure 4 is a broken part of the casing, illustrating interrupted elevations which define grooves at the marginal portion.

Figure 5 is a section on line 5—5 of Figure 3.

Figure 6 is a perspective view of the supporting foraminous plate.

Figure 7 is a front view of the casing in a modified form (second form).

Figure 8 is a section on line 8—8 of Figure 7, showing the resilient spacing means.

Figure 9 is a detailed view of the casing, partly broken.

Figure 10 illustrates the resilient spacer before it is folded.

Figure 11 shows the same spacer partly folded.

Figure 12 is a perspectiye view of spacer, in a folded position, and in applied form.

Figure 13 is a front view of the casing in another modified form, (third form).

Figure 14 is a section on line 14—14 of Figure 13.

Figure 15 is an exploded view of the gauze filter material and wire mesh spacer and support.

Figure 16 is a perspective view of wire mesh spacer support.

Figure 17 is an enlarged perspective view of the foraminous span support for the anterior portion of the sponge filter.

Referring to the drawings by characters of reference A designates the face piece of the respirator; B, the filter unit; C, the exhaust valve; D, the head bands; E, the foraminous supporting and spacing plate in the first form; F, the wire frame support for face piece; G, the spacing means in form two.

The face piece is preferably made of molded elastic rubber or its equivalent. It is adapted to cover the nose and mouth of the wearer, and is contoured to the shape of the nose and cheek and chin. It has a vertical nose covering portion 10 and a set back below the nose line, which set

back defines a horizontal nose covering portion 11, and a vertical mouth and chin covering portion 12. At the nasal area of said face piece, externally and sidewise, button elevations 13 are provided and the said elevations are perforated 14 for insertion of the wire terminals 35.

The wire frame support F is preferably resilient so that it automatically maintains a constant pressure against the face piece A at the nasal area. That is, it is shaped with an inward bend at the lateral part 34, and due to its resiliency, it exerts a constant inward pressure as per its contour and therefore it provides the said pressure, which causes a tight and leak proof engagement of the face piece A of the respirator and the face of the wearer. The said wire support F may be deformable instead of resilient and the said deformable quality may be used to maintain a similar pressure at the said nasal area. That is, the deformable wire is bent to a required contour and it has the quality to maintain the said contour and thereby it causes the necessary pressure at the said nasal area and thus provides the tight fit that is required at the said area. The central portion 33, of the said wire frame F, is emplaced at the set back portion below the nose line, preferably at the juncture of the horizontal nose covering portion 11 and the vertical mouth covering portion 12, and the said wire F extends to the extrusion 13 and is inserted in the perforation 14.

The face piece A is connected with the filter unit B by means of an aperture 15, located in the vertical mouth covering portion 12. The face piece A also has a set back 16 at the chin line, and the said set back 16 has an aperture 17 for connection with the exhaust valve C.

Head bands D are attached to the said face piece at the sides thereof. The said head bands have hooks and slides whereby the respirator is fastened to the head at the back of the neck.

The filter unit B has a casing 18, which has a circumferential wall 19, a vertical wall 20, and an inturned flange 21. The said inturned flange 21 is preferably disposed at an acute angle with relation to its base, which is the circumferential wall 19. The vertical wall 20 has an aperture 22 which connects with the aperture 17 of the face piece by means of an eyelet 23. The said vertical wall 20 also has a plurality of elevations 24, which are arranged symmetrically at the marginal end of the said wall 20 and extend circumferentially at the said area. The said casing 18 is preferably of a light aluminum construction, and the elevations are formed by means of indenting the aluminum wall 20. Symmetrical grooves 25 are formed between the said elevations. The function of these grooves will be explained later.

The resilient supporting and spacing plate E is constructed preferably of aluminum. It is provided with symmetrically disposed apertures 26, preferably 4 in number. The locations of these apertures are such that in assembling they may be caused to register with the apertures 15 and 22. Also perforations 27 are provided in the said plate E. The said plate E is also provided with arm supports 28, preferably four in number, symmetrically disposed at the marginal edges of the plate. The said arm supports 28 extend under the inturned flange 21 of the casing in a substantially arcuate shape. The rear portion 29 of the said arm 28 is made of fitting size; namely, that it is to fit the groove 25 of the wall 20. The main purpose of the emplacement of the arms 28 in the grooves 25 is to provide and maintain the apertures 26 in a confronting position with the aperture 22. Any one of the four apertures 26 may be adjusted to register with the aperture 22. The symmetrical arrangement in the construction provides for this feature. The need of having the said apertures 26 and 22 in a registering position is that thereby the filter material 30 may be easily displaced by means of the finger or a blunt instrument inserted into the said apertures.

The exhaust valve C has an aluminum tube 31 at its inlet. The said tube 31 maintains the said inlet patent. The inlet end 32 of the exhaust valve is inserted into the aperture 17 and adhesively attached thereat.

It is to be noted that the elevations 24 are inward. That is, indents are made from without. Also, the size of the plate E, is made substantially to approximate the diameter of the inturned flange circumferentially. That is the edges of the plate E extend circumferentially to the edges of inturned flange. The resiliency of the plate E makes it possible to insert and remove the same from the casing. Likewise, due to the said resiliency of the material used, the arms or extension 28 may be caused to contract or expand; that is, to lower on contraction and to rise on expansion. Therefore, when the filter material 30 is inserted, the plate E is lowered, and there is a constant outward pressure exerted by the arms 28, whereby the marginal edges of the filter material 30 is tightly impinged between the marginal edges of the plate E and the edges of the inturned flange 21. The arms 28 are constructed, so that the average thin filter material is tightly impinged, and its resiliency and yield must be such as to permit the use of the average thick filter material. The usefulness of this is obvious. The same respirator may be altered for light or for heavy duty. There is no need of a heavy duty filter for light work. The thin, lighter, filter pad permits easier breathing.

It is also to be noted that the wire frame support F is subdivided for description purposes into a central portion 33, side portions 34 and terminals 35.

In the second form of this invention, illustrated in Figures 7, 8, 9, 10, 11, and 12, a plurality of spacer elements F are provided and the material is preferably of a resilient and deformable aluminum metal. The said spacers F are riveted at 36 to the casing wall 20. Three such spacing elements F are usually preferred. A wire mesh support 37 is arranged over the spacing elements F, and a filter material 30 is placed over the wire mesh 37. The edges of the said filter material 30 are removably inserted into the space between the inturned flange 21 and the marginal portion of the wire mesh 37. The said wire mesh 37 is made of resilient and deformable metal wire material and extends in size to at least the edges of the inturned marginal flange 21. This form may be preferred by some users because the wire mesh 37 may be inserted when the filter material is inserted, and a new wire mesh support may be advisable every time the filter material is changed. This condition is preferred when there are exacting duties for the respirator. The wire mesh 37 is cheaper then the plate E.

In the third form of this invention a convenient arrangement is provided for a combination gauze and sponge filter unit. The wire mesh support 38 is slit at its edges at several places, preferably four, and the said slit edge 39 is folded inward.

The said wire mesh 38 is resilient and deformable. This form is illustrated in Figures 13, 14, 15, 16 and 17. Two such wire mesh supports 38 are used and they enclose gauze filter material 40. The inturned slit edges 39 confront the wall 20 of the casing 18, and provide a spacing at the said wall 20 for the free flow of filtered air. Thus it maintains a large filter area which makes breathing easy. The slit edges 39 in the second wire mesh 38 confront the sponge filter material 41. Foraminous span supports 42 are provided. These are deformable, and preferably two of them are inserted between the sponge filter 41 and the inturned flange 21 for the purpose of retaining the said sponge filter 41 in position. The advantage of this filter arrangement is the provision of a large filter area for a gauze and sponge filter arrangement. Gauze and sponge filter combination is useful when neutralizing solutions are needed for acid or for alkali fumes.

It is to be understood that due to the resiliency of the wire mesh supports in the second and third forms of this invention, they may be readily inserted and removed from the casing 18. The wire mesh support 38 also has a slight deformable quality which permits the slitting and the formation of the fold 39. It is also to be clearly understood that the edges of the supporting elements are to extend to the edges of the inturned flange as illustrated in Figures 2, 5, 8, and 13. The resilient spacing arms 28 extend slightly beyond the edges of the flange 21, but due to its resiliency, it is removable from the casing.

It is also to be understood that the foraminous span supports 42 for the sponge filter material in the third form of this invention have their edges extend beyond the edges of the flange 21. Nevertheless, due to their deformable quality, they are readily removed and reinserted.

Having thus described my invention, I claim as new and desire to secure by Letters Patent as follows:

1. A respirator, a hollow mask body of substantially flexible material, adapted to cover the nose and mouth of the wearer, having a set back portion below the nose line defining a horizontal nose covering portion and a vertical mouth covering portion, a supporting element having a central portion as well as sides and terminal ends, with the said central portion emplaced in the said set back portion, the sides extending to the nasal area of the said body, and the terminal ends arranged thereat to cause pressure to the said body at the said nasal area, thereby providing a leak proof engagement between the face of the wearer and the said body at the said area.

2. A respirator, a hollow mask body of semi-flexible material, adapted to cover the nose and mouth of the wearer, having a set back portion below the nose line, a supporting element having a central portion and terminal ends, with the said central portion located at the said set back portion, and the terminal ends arranged at the lateral nasal area of the said body causing pressure thereat, whereby a leak proof engagement is provided between the face of the wearer and the said body at the said area.

3. A respirator, a face piece adapted to engage the face of the wearer having an inlet port, a filter unit having a wall with an aperture, filter material, foraminous supporting element for the said material, and resilient folded means interposed between the said element and the said wall, the said material being mounted in the said filter unit in confronting relation to the said element, and the said element spaced from the said wall by the said resilient folded means, thereby providing for the free flow of air thereat, and the said inlet port connected with the said aperture whereby communication is established between the said face piece and the said filter unit.

4. A respirator, a face piece adapted to engage the face of the wearer, having an inlet port, a filter unit having a wall with an aperture, filter material and a foraminous supporting element with a plurality of resilient marginal inturned extensions, the said material being mounted in the said filter unit in confronting relation with the said supporting element, with the said element spaced from the said wall by means of the said inturned extensions, thereby providing for the free flow air thereat, and the said inlet port being connected with the said aperture thereby establishing communication therebetween.

5. A separator, for filter type respirators, having an inlet port with a rigid marginal inturned flange, filter material, supporting element for the said material and resilient spacing means, with the said material removably inserted at its edges, between the said flange and the said element, the resilient spacing means mounted abuttingly with relation to the said element causing pressure thereat, which pressure is directed towards the said flange, whereby the space for the insertion of the edges of the filter material is automatically accommodating in size for the reception of varied thicknesses of filter material.

NATHAN SCHWARTZ.

CERTIFICATE OF CORRECTION.

Patent No. 2,153,437. April 4, 1939.

NATHAN SCHWARTZ.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 41, claim 5, for the syllable "hav-" read having; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of July, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.