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(54) Title: RESPIRATOR MASK PARTICLE FILTER HOLDER DEVICE AND SYSTEM AND RESPIRATOR MASK

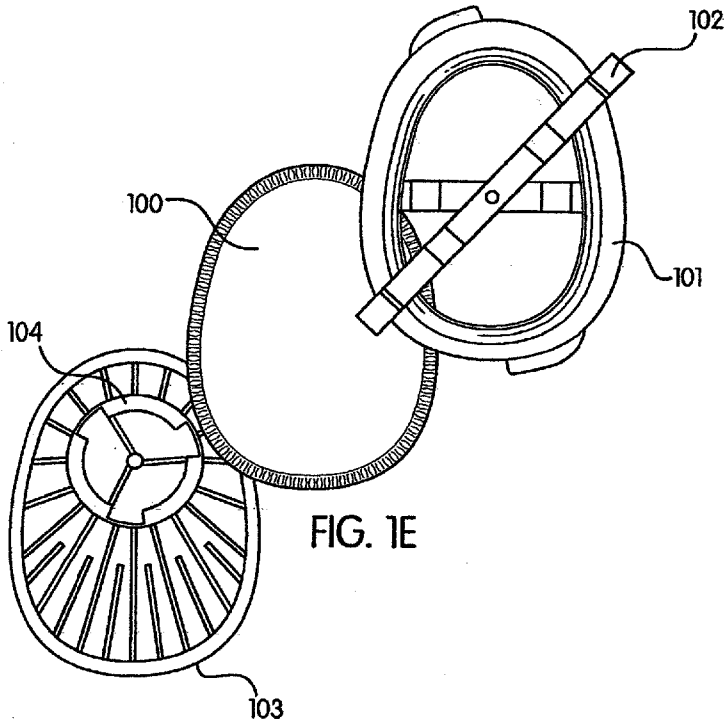

FIG. 1E

(57) Abstract: The present invention refers to a respirator mask particle filter holder device. The device comprises a cover for a base of a respirator mask particle filter holder, the cover including a particle filter retaining portion having one or more openings therein to direct airflow through a particle filter and one or more base engaging elements; said one or more base engaging elements being movable with respect to a main portion of the cover between at least two positions; wherein in a first position of the one or more base engaging elements the cover and the base are engaged and wherein in a second position of the one or more base engaging elements the cover and the base are disengaged.

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RESPIRATOR MASK PARTICLE FILTER HOLDER DEVICE AND SYSTEM AND RESPIRATOR MASK

Field of the Invention

The subject matter described herein relates generally to particle filter holders of respirator masks with bayonet ports, such as used in mining and other industrial applications.

Background of the Invention

Respirator filter cartridges (also referred to herein as "cartridges") are known. For example, twin cartridge respirators provide a mechanism for a user wearing the same to inhale air through two cartridges that include particle filters and/or chemical filters that remove undesirable material(s) within the air (hereinafter referred to as simply "particles"), and be provided with fresh, clean air. Conventional respirator masks include cartridge engaging portion(s) for securing a respirator cartridge in place. Once in place on the respirator mask, a particle filter holder is ready for use as a cartridge.

The cartridge may be fashioned in a base-cover arrangement because the particle filter retained therein is replaced periodically. Thus, cartridges may include snap-on type covers. The snap-on covers are made of a flexible material that may snap-onto a base in order to retain a particle filter within the cartridge, thus sandwiching the particle filter between the base and the snap-on cover. The snap-on cover may be snapped off to remove and replace the particle filter, thus making the cartridge reusable upon replacement of the particle filter.

Summary of the Invention

In summary, one aspect provides an apparatus, comprising: a cover for a base of a respirator mask particle filter holder, the cover comprising a particle filter retaining portion and one or more base engaging elements; the particle filter retaining portion having one or more openings therein directing airflow through a particle filter; the one or more base engaging elements being movable with respect to the cover to obtain at least two positions; wherein in a first position of the one or more base engaging elements, the cover and the base are engaged; and wherein in a second position of the one or more base engaging elements, the cover and the base are disengaged.

Another aspect provides a system, comprising: a base of a respirator mask particle filter holder, the base having a respirator mask engaging portion; a cover for the base; the cover comprising a particle filter retaining portion, the particle filter retaining portion having one or more openings therein directing airflow through a particle filter; and one or more engaging elements; the one or more engaging elements being movable with respect to the cover to obtain at least two positions; wherein in a first position of the one or more engaging elements, the cover and the base are engaged; and wherein in a second position of the one or more engaging elements, the cover and the base are disengaged.

A further aspect provides a respirator mask, comprising: a face seal that covers the nose and mouth of a user; a harness that attaches the face seal to the head of the user; at least one respirator cartridge, wherein the respirator cartridge has a particle filter therein, a base that can be attached to the face seal; a cover for the base; the cover comprising a particle filter retaining portion, the particle filter retaining portion having one or more openings therein directing airflow through the particle filter; and one or more engaging elements; the one or more engaging elements being movable with respect to the cover to obtain at least two positions; wherein in a first position of the one or more engaging elements, the cover and the base are engaged; and wherein in a second position of the one or more engaging elements, the cover and the base are disengaged.

The foregoing is a summary and thus may contain simplifications, generalizations, and omissions of detail; consequently, those skilled in the art will appreciate that the summary is illustrative only and is not intended to be in any way limiting.

For a better understanding of the embodiments, together with other and further features and advantages thereof, reference is made to the following description, taken in conjunction with the accompanying drawings. The scope of the invention will be pointed out in the appended claims.

Brief Description of the Drawings

FIG. 1(A-F) illustrates an example particle filter holder and parts thereof.

FIG. 2(A-C) illustrates an example particle filter holder with a chemical cartridge base.

FIG. 3(A-C) illustrates an example particle filter holder cover with a base engaging element.

FIG. 4(A-B) illustrates an example particle filter holder cover base engaging element.

FIG. 5(A-B) illustrates an example respirator mask with a particle filter holder.

FIG. 6(A-B) illustrates an example of engaging and disengaging a particle filter cover on a respirator mask.

Detailed Description of the Invention

It will be readily understood that the components of the embodiments, as generally described and illustrated in the figures herein, may be arranged and designed in a wide variety of different configurations in addition to the described example embodiments. Thus, the following more detailed description of the example embodiments, as represented in the figures, is not intended to limit the scope of the embodiments, as claimed, but is merely representative of example embodiments.

Reference throughout this specification to "one embodiment" or "an embodiment" or the like means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" or the like in various places throughout this specification are not necessarily referring to the same embodiment.

Furthermore, the described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided to give a thorough understanding of embodiments. One skilled in the relevant art will recognize, however, that the various embodiments may be practiced without one

or more specific details, or with other methods, components, materials, et cetera. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obfuscation.

Conventional snap-on covers used in connection with covering a particle filter base, and thus enclosing a particle filter, have a drawback in that under certain conditions, the snap-on covers may not perform as desired. For example, when used in high temperature environments, a snap-on particle filter cover may have a tendency to expand. Such expansion may lead to unintended loosening of the fit between the snap-on cover and the base portion of the cartridge. If the fit between the snap-on cover and the base portion loosens, the snap-on cover may fall off, and thus the particle filter may fall out.

Accordingly, an embodiment provides a securing mechanism that secures the cover to the base of the cartridge. Thus, the cover will be more securely attached to the particle filter holder base, even at temperature extremes, and thus the particle filter will be more assuredly retained therein. The securing or locking mechanism is easily releasable, and thus a user can engage/disengage the cover with one hand.

The description now turns to the figures to describe example embodiments. It should be noted that the following description, with reference to specific example embodiments illustrated in the figures, outlines non-limiting examples. Other embodiments may be used in addition to the example embodiments while still falling within the scope of this disclosure.

With reference to FIG. 1(A-F), example particle filter holders and components thereof are illustrated. A particle filter 100 fits into a particle filter cartridge/holder, which may be comprised of at least two main parts, namely a cover 101 and a base 103.

The base 103 provides a back support for the particle filter 100. The base 103 includes a respirator mask engaging portion 104, such as a bayonet type connector. The respirator mask engaging portion 104 provides a mechanism whereby the base 103 may

be secured to a respirator mask 115 (refer to FIG. 5(A-B) for example). The base 103 further includes one or more openings to allow passage of air that has passed through the particle filter 100 and through mask 115 to a user. The base 103 may be a simple backing portion with a respirator mask engaging portion 104, as illustrated in a back view of an example particle holder in FIG. 1C.

For its part, a cover 101 provides an outer element that secures a particle filter 100 inside a cartridge. The cover 101 may be secured/engaged to and released/disengaged from the base portion 103 by a mechanical mechanism. For example, the cover 101 may include a base engaging element 102, which in the illustrated examples comprises a single piece. The base engaging element 102 may be secured to the cover 101 in a variety of ways, for example via a central attachment to a stud 106 of the cover (refer to FIG 3(A-B)).

The base engaging element 102 may engage the base 103 in a releasable fashion by rotating about the stud 106. For example, as illustrated in FIG. 1B, base engaging element 102 is illustrated in an open position where the base 103 and the cover 101 are disengaged. Thus, in the open position, the cover 101 is released from the base 103, and the filter 100 may be extracted from the particle holder, as illustrated in FIG. 1E. As illustrated in FIG. 1F, the particle filter 100 is securely enclosed within the particle holder because the base engaging element 102 is in a closed position. In the closed position, further illustrated in FIG. 1D, the base engaging element 102 has an edge (refer to FIG. 4(A-B), element 112) that, when base engaging element 102 is rotated about stud 106 covers a lid 105 of the base 103, thus securing the cover 101 to the base in a releasable fashion.

Referring to FIG. 2A, the base 103, which in this example includes a chemical cartridge for additionally filtering chemicals that may be contaminates in the air, is disengaged from the cover 101 because the base engaging element 102 is in the open position. FIG. 2B illustrates the base 103, the particle filter

100, and the cover 101 partially assembled. Once sandwiched together, the base 103, the particle filter 100, and the cover 101 may be secured together by rotating base engaging element 102 about the stud 106 into the closed position. As illustrated in FIG. 2C the base 103 may include a chemical cartridge.

In FIG. 3 and FIG. 4, an example cover 101 is shown where the base engaging element 102 takes an example shape, referring to FIG. 4(A-B), including a central or main portion 113, and two arm portions 111 terminating in curved edge portions 112 that engage a lip 105 of the base (refer to FIG. 1D). Within the central portion 113 an opening may be provided such that stud 106 of cover 101 may secure base engaging portion 102 to cover 101. For its part, cover 101 may include features to guide the base engaging portion 102 into the closed position. For example, referring to FIG. 3C, the cover 101 may include indentations 107, 108 that act to forestall movement of the base engaging element 102 once rotated therein. Thus, indentations 107, 108 may provide a stabilizing function for maintaining the base engaging element 102 in a closed position.

Referring generally to FIG. 5(A-B), cover 101, particle filter 100 and base 103 may be formed into a cartridge that is loaded/secured onto a respirator mask 115. Twin cartridges may be secured to the respirator mask 115 via connections provided in the base 103 of each cartridge, for example the respirator mask engaging portion 104 (refer to FIG. 1C). Once the mask is secured onto a user, the user is protected from breathing air having particles therein because the air necessarily passes through particle filter 100 via opening(s) in the cover 101, and possibly through an additional chemical cartridge if such is provided with the base 103, prior to reaching the user.

In the event that the user wishes to change out a particle filter 100, the user simply needs to release the lock to open the cover 101, such as by rotating the base engaging portion 102 to the open position (refer to FIG. 6(A-B)). Likewise, in the event that the user wishes to securely lock the cover 101, the user simply has to lock the cover in place, such as by rotating

the base engaging portion 102 into the closed position (refer to FIG. 6(A-B)).

It is apparent that embodiments, as described in the examples contained herein, provide a locking mechanism for a particle filter holder. The locking mechanism may take a variety of forms, but should engage a cover to a base portion in a secure fashion, and thereby retain a particle filter there-between. The locking mechanism should also be provided in an easily releasable fashion, such that a user may unlock and remove a cover to a particle filter holder with one hand.

Regarding the materials used for producing the particle filter holder and components thereof, the cover and portions thereof may be fashioned from a variety of materials, one example being plastic. The base, for its part, may be fashioned from a variety of materials as well, one example being a combination of plastic and metal.

It is possible that components such as the cover and the base could be substituted one for the other, for example by providing the locking or securing mechanism as part of the base, with the base 103 including the one or more base engaging elements 102 and the lip 105 being part of the cover. In such an alternate configuration, the base engaging elements 102 would be simply engaging elements that interface with a lip of the cover. Likewise, other parts or components mentioned herein may be re-oriented or arranged differently, so long as the functionality described is obtained. Likewise, certain parts may be integrated, forming a single part having the functions of more than one separate part, as described above. Likewise, a single part described above may be separated into a plurality of discrete parts while maintaining the functionality described. Other variations and modifications may well be employed while still falling within the scope of this description.

In the drawings and the specification there has been set forth example embodiments. Although specific terms are used, the description thus given uses the terminology in a generic and descriptive sense only and not for the purpose of limitation.

Accordingly, it should be understood that this disclosure has been presented for the purposes of illustration and description and is not intended to be exhaustive or limiting. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiments chosen as examples for description were so chosen to highlight principles and provide examples of practical application, and to enable others of ordinary skill in the art to understand the disclosure for the various embodiments with or without modifications as suitable for the particular application.

CLAIMS

What is claimed is:

1. A respirator mask particle filter holder device comprising

a base of a respirator mask particle filter holder;

a cover for said base, said cover comprising a particle filter retaining portion having at least an opening therein to direct airflow through a particle filter and at least one base engaging element

said at least one base engaging element being movable with respect to the cover between at least two positions wherein in a first position of said at least one base engaging element the cover and the base are engaged and wherein in a second position of the at least one base engaging element the cover and the base are not engaged.

2. The apparatus of claim 1, wherein the one or more base engaging elements comprise a base engaging element having a central portion for connection to the cover and two arm portions terminating in curved edge portions that engage a lip of the base.

3. The apparatus of claim 2, wherein the central portion includes an opening configured to permit attachment of the base engaging element and a stud of the cover.

4. The apparatus of claim 3, wherein the central portion is configured to rotate about the stud of the cover to obtain the first position and the second position.

5. The apparatus of claim 4, wherein the lip of the base includes one or more indentations for securing the curved edge portions in a predetermined position.

6. The apparatus of claim 1, wherein the one or more base engaging elements is comprised of plastic.

7. A system, comprising:

a base of a respirator mask particle filter holder, the base having a respirator mask engaging portion;

a cover for the base;

the cover comprising a particle filter retaining portion, the particle filter retaining portion having an opening

therein directing airflow through a particle filter; and

one or more engaging elements;

the one or more engaging elements being movable with respect to the cover to obtain at least two positions;

wherein in a first position of the one or more engaging elements, the cover and the base are engaged; and

wherein in a second position of the one or more engaging elements, the cover and the base are disengaged.

8. The system of claim 7, wherein the base comprises a chemical cartridge.

9. The system of claim 7, wherein the one or more engaging elements are provided on the base.

10. The system of claim 7, wherein the one or more engaging elements comprise a base engaging element having a central portion for connection to the cover and two arm portions terminating in curved edge portions that engage a lip of the base.

11. The system of claim 10, wherein the central portion includes an opening configured to permit attachment of the base engaging element and a stud of the cover.

12. The system of claim 11, wherein the central portion is configured to rotate about the stud of the cover to obtain the first position and the second position.

13. The system of claim 12, wherein the lip of the base includes one or more indentations for securing the curved edge portions in a predetermined position.

14. The system of claim 7, wherein the one or more base engaging elements is comprised of plastic.

15. A respirator mask, comprising:

a face seal that covers the nose and mouth of a user;

a harness that attaches the face mask to the head of a user; and

at least one respirator cartridge that can be attached to the face seal, wherein the respirator cartridge has a particle filter therein;

a base that can be attached to the face seal;

a cover for the base;

the cover comprising a particle filter retaining portion, the particle filter retaining portion having one or more openings therein directing airflow through a particle filter; and

one or more engaging elements;

the one or more engaging elements being movable with respect to the cover to obtain at least two positions;

wherein in a first position of the one or more engaging elements, the cover and the base are engaged; and

wherein in a second position of the one or more engaging elements, the cover and the base are disengaged.

16. The system according to claim 15, wherein the one or more engaging elements are provided on the base.

17. The system of claim 15, wherein the base comprises a chemical cartridge.

18. The system of claim 15, wherein the one or more engaging elements comprise a base engaging element having a central portion for connection to the cover and two arm portions terminating in curved edge portions that engage a lip of the base.

19. The system of claim 18, wherein the central portion includes an opening configured to permit attachment of the base engaging element and a stud of the cover.

20. The system of claim 19, wherein the central portion is configured to rotate about the stud of the cover to obtain the first position and the second position.

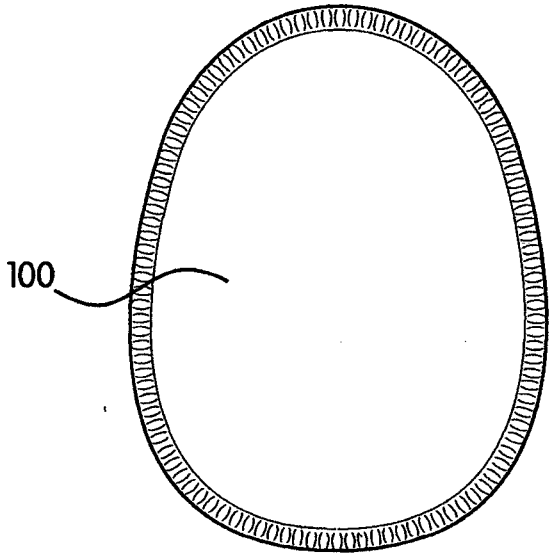

FIG. 1A

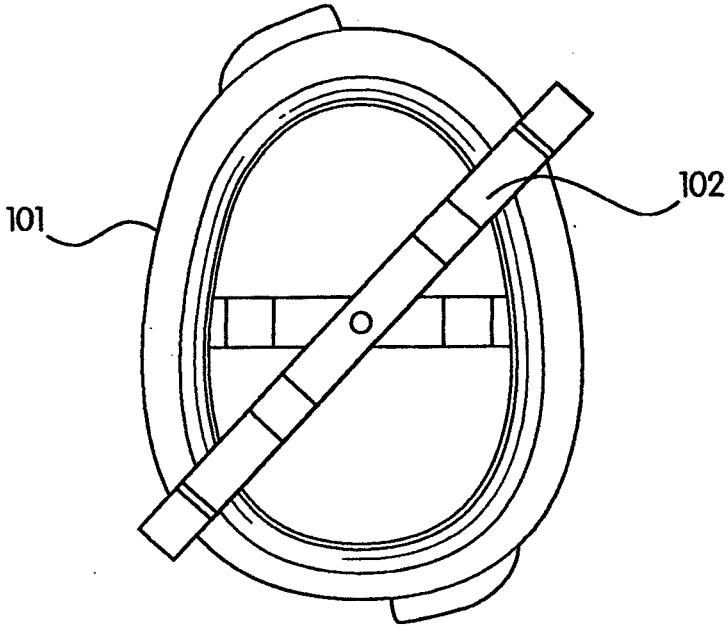

FIG. 1B

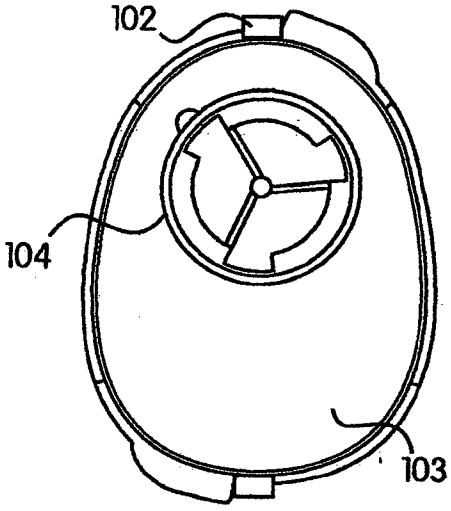

FIG. 1C

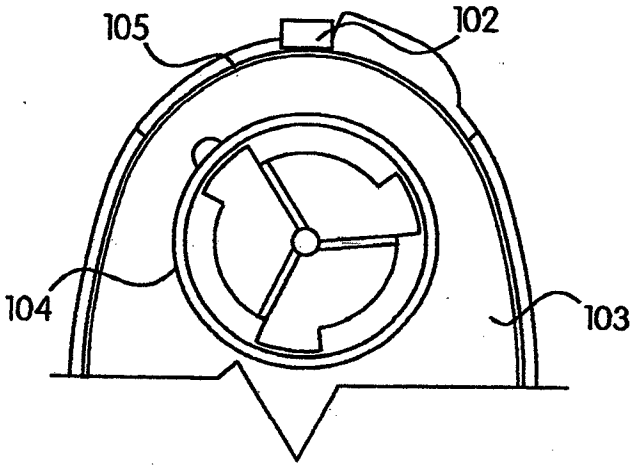

FIG. 1D

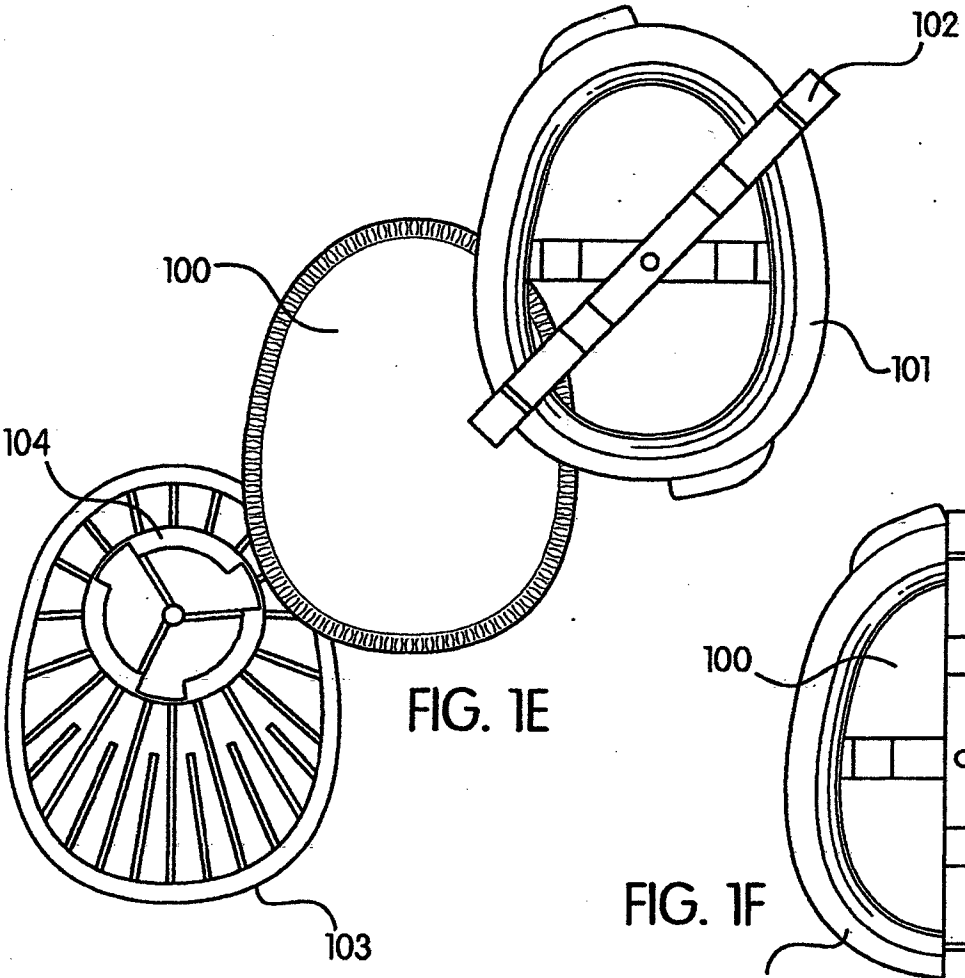

FIG. 1E

FIG. 1F

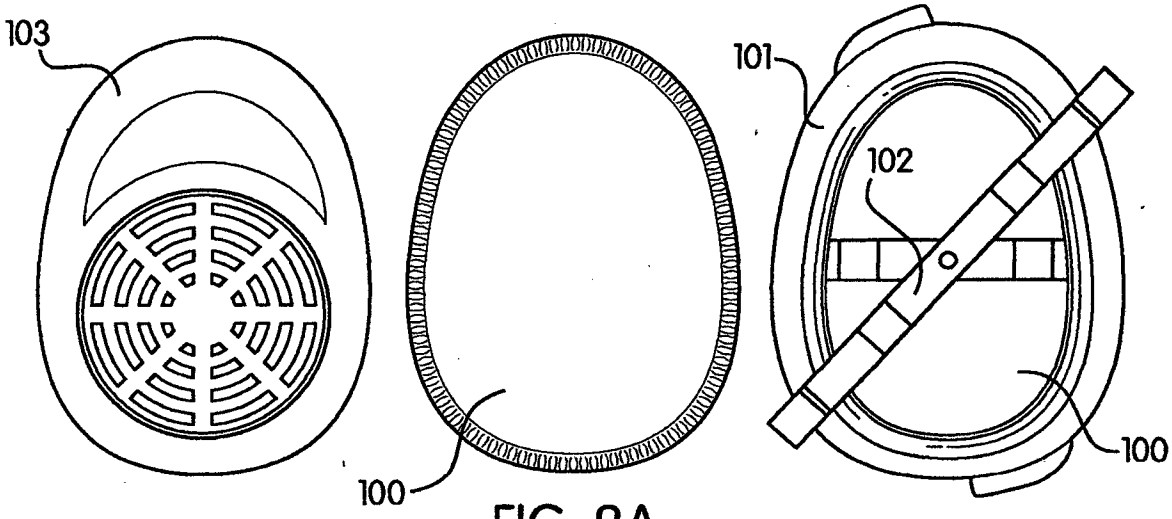

FIG. 2A

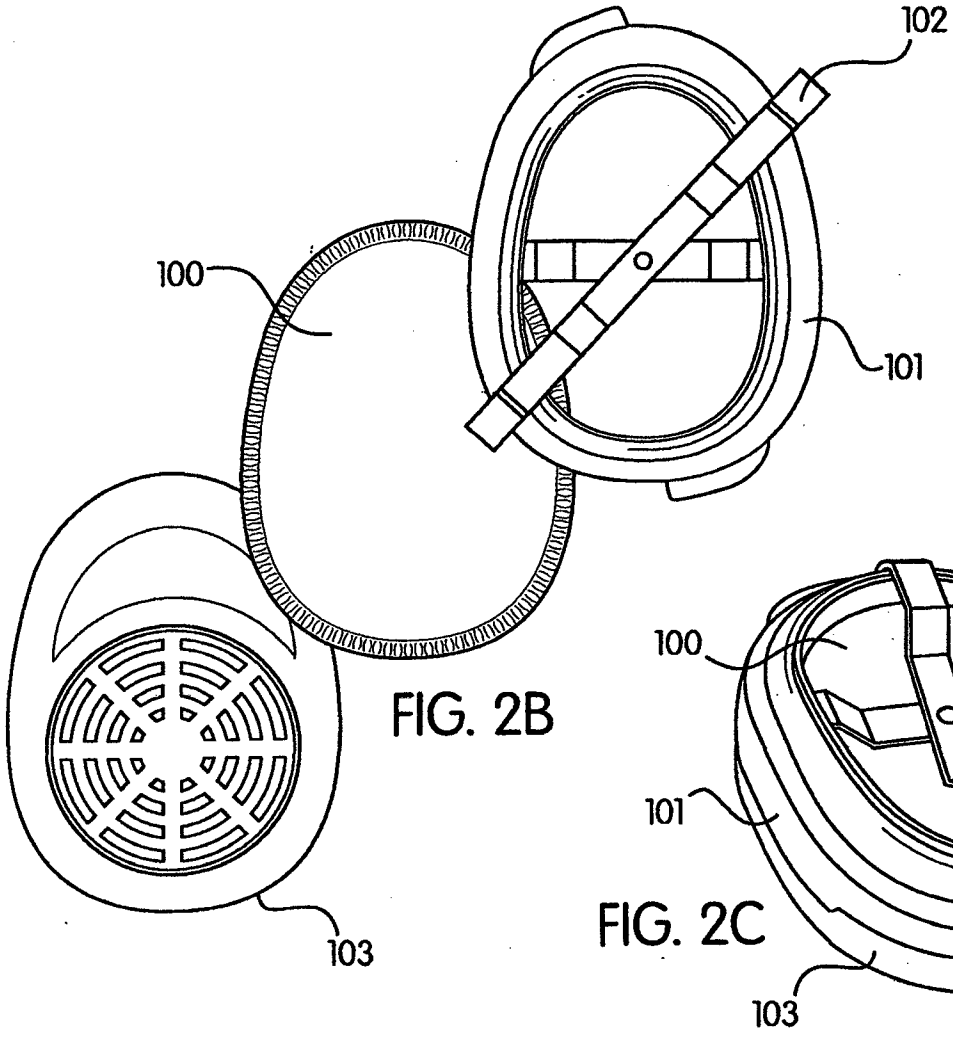

FIG. 2B

FIG. 2C

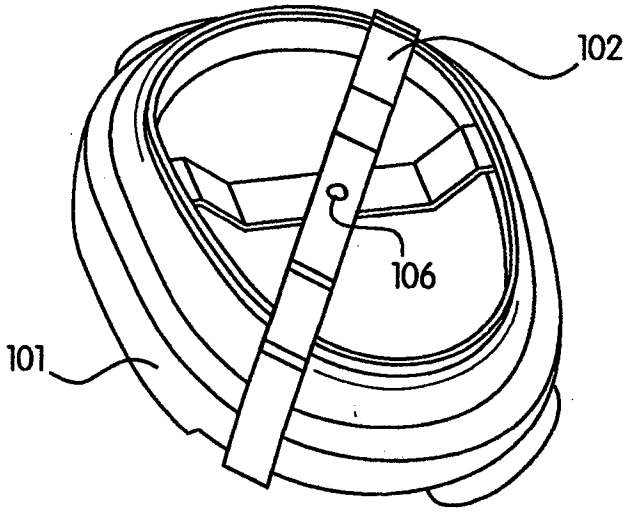

FIG. 3A

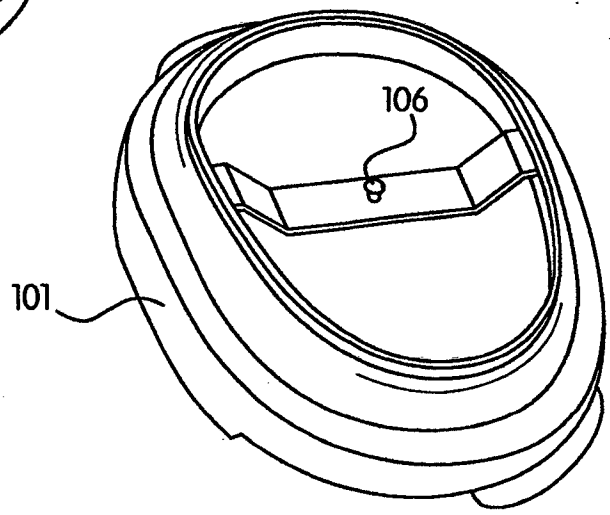

FIG. 3B

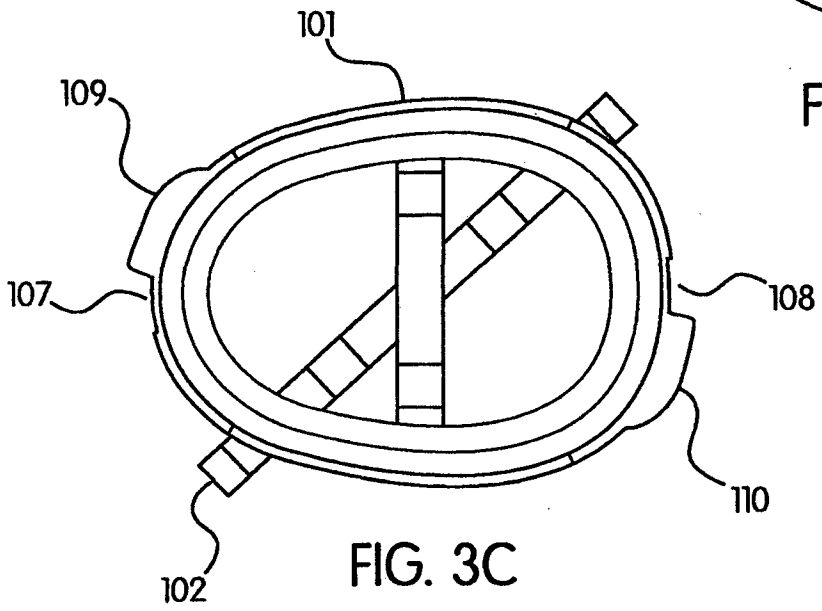

FIG. 3C

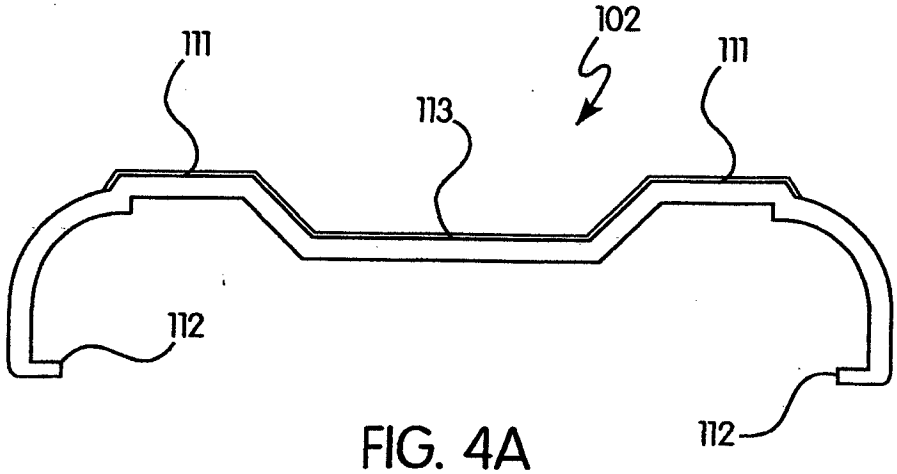

FIG. 4A

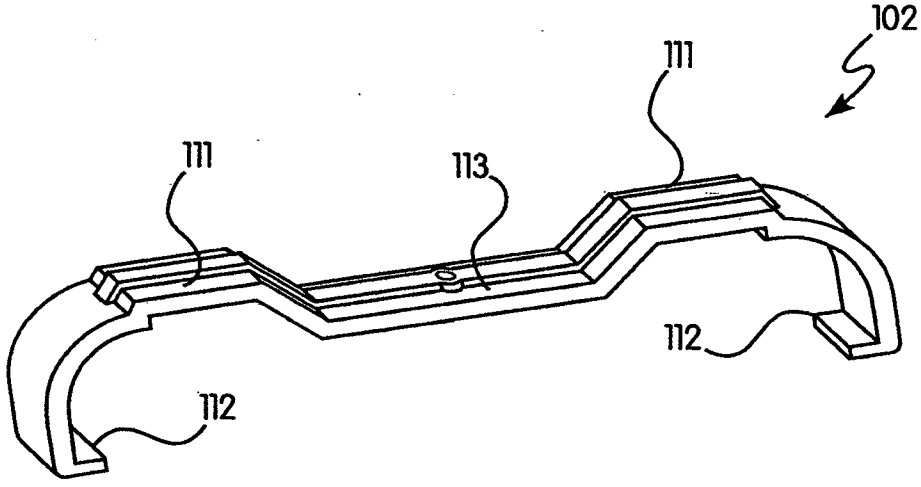

FIG. 4B

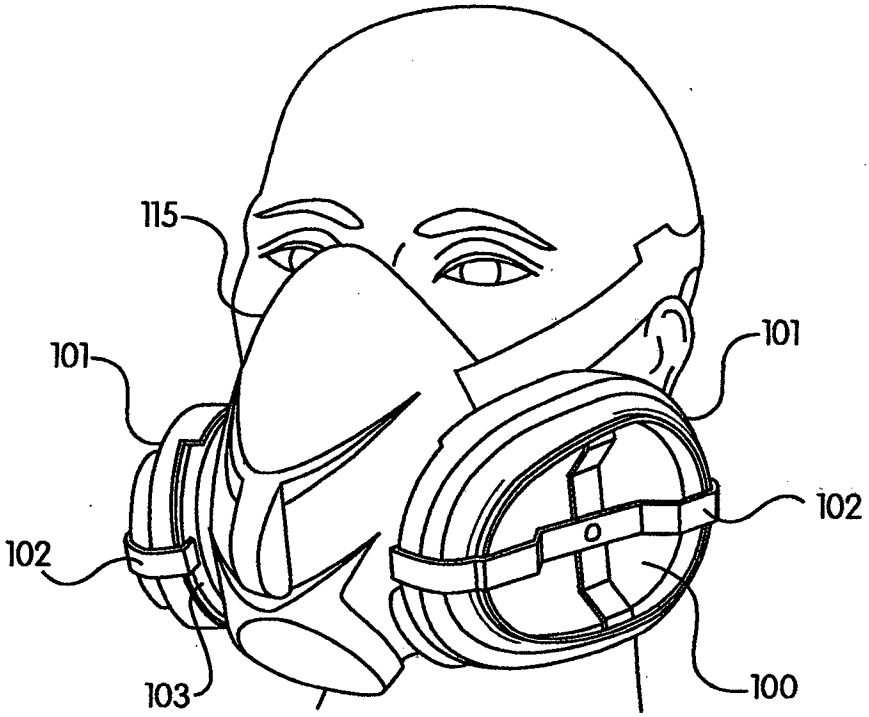

FIG. 5A

FIG. 5B

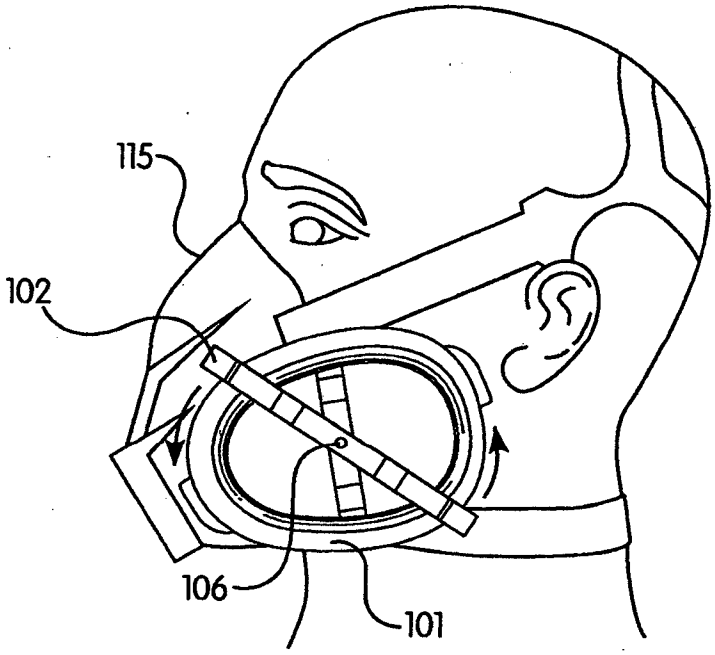

FIG. 6A

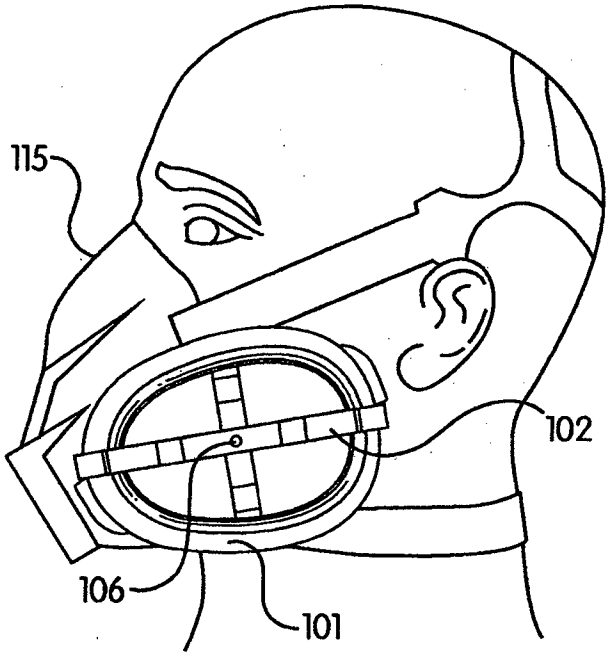

FIG. 6B