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Remarks:

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(54) **Filtering face mask having one or two straps**

(57) A face mask (10) includes a headband assembly (20) configured for having two straps (24) extending around the back of the neck and head of the wearer. The straps include end connectors (30) that can mount to

studs (14) on the mask in a single strap configuration. In a double strap configuration, the end connectors (30) connect to a mask mounting member (50) in a diverging spaced apart relationship. The mask mounting member pivotally connects to the studs (14) on the mask..

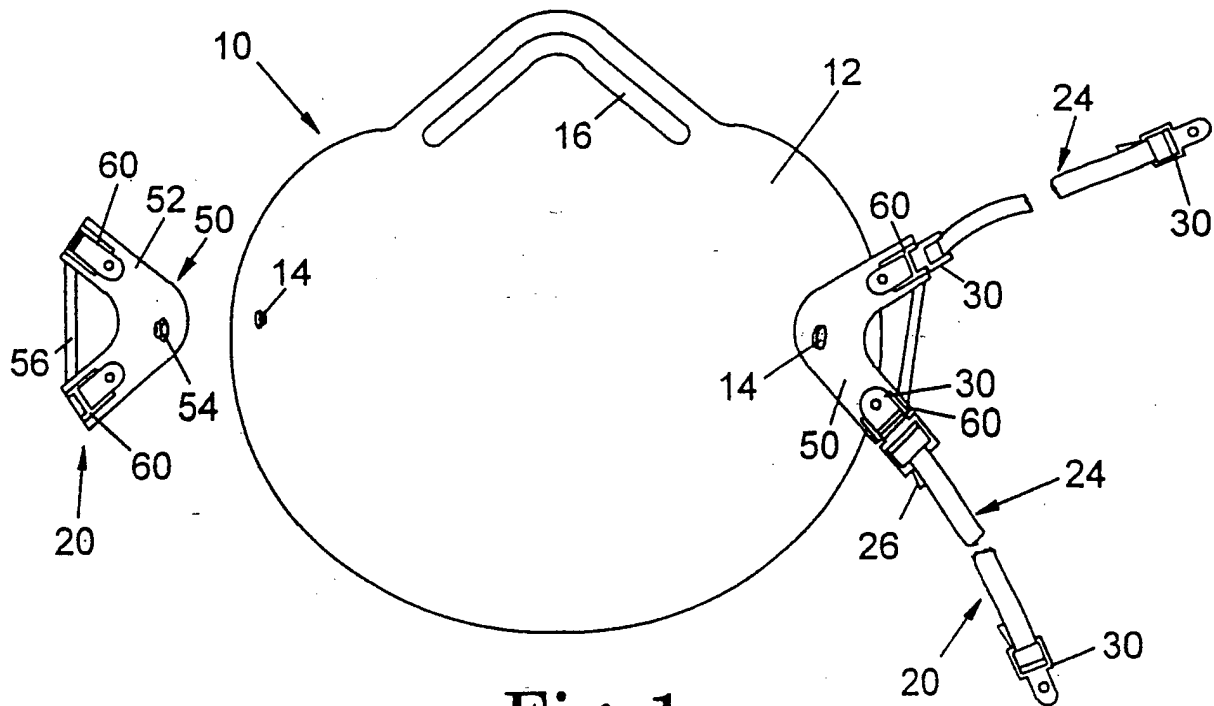


Fig. 1

DescriptionTECHNICAL FIELD

[0001] This invention pertains to a multi-purpose headband for a filtering face mask and, in particular, to a multi-purpose headband that may use one or two straps to mount to the face mask.

BACKGROUND

[0002] Filtering face masks (also referred to in some instances as "respirators") are worn over the breathing passages of a person for two common purposes: (1) to prevent impurities or contaminants from entering the wearer's breathing track; and (2) to protect others from being exposed to pathogens and other contaminants exhaled by the wearer. In the first situation, the respirator is worn in an environment where the air contains particles harmful to the wearer, for example, in an auto body shop. In the second situation, the respirator is worn in an environment where there is a high risk of infection, for example, in an operating room.

[0003] To accomplish either of these purposes, the respirator must be able to maintain a snug fit to the wearer's face. To achieve a snug fit, filtering face masks typically have a headband extending laterally from the mask around the back of the wearer's head and neck. The headbands usually include an elastic strap member that adapts to a range of sizes to provide a comfortable fit. Some masks have a headband that uses a single strap while others use two straps.

[0004] Because there are differences in wearers' preferences and hair styles, some wearers may prefer a single strap while others may prefer dual straps extending around the back of the wearer's head and neck. Masks typically are only manufactured with either one strap or two straps and are not able to accept interchangeably either a single strap or double straps. Uneven tension from a two strap configuration may exert forces that skew the mask from its intended wearing configuration. This can cause leaks around the mask perimeter, creating safety concerns and an incumbent decrease in utility.

[0005] Examples of face masks that accommodate two straps are shown, for example, in U.S. Patent No. 2,353,643 to Bulbulian, U.S. Patent No. 3,220,408 to Silverberg, U.S. Patent No. 5,191,882 to Vogliano, and U.S. Patent No. 5,086,768 to Niemeyer. Although these face masks and respirators accommodate two straps, the devices all require that both straps be attached to the mask body for proper positioning of the mask. None of the patents disclose a mask with a single strap or a system that can accommodate either a single strap or double straps.

SUMMARY OF THE INVENTION

[0006] In view of the above, it can be seen then that a new and improved headband system for a face mask is needed. Such a system should provide for mounting either a single strap or double straps to the face mask at a single attachment point to establish a good seal against the wearer's face. The system should also provide for utilizing an essentially identical strap for either the single strap configuration or utilizing two of the same straps in a double strap configuration. And the system should interchangeably mount either the single strap or two straps to the mask. The present invention addresses these, as well as other shortfalls associated with known face mask headbands.

[0007] In a first aspect, the invention provides a headband assembly configured for connecting to a mounting member that is disposed on a mask body of a filtering face mask. The headband assembly comprises a first strap connector for connecting a strap to the mounting member and a second strap connector for connecting two of the straps to the mounting member.

[0008] In a second aspect, the invention provides a face mask headband system that is capable of being attached to a mask body of a filtering face mask where the head band system comprises (a) a single strap device attachable to the mask, and (b) a double-strap device attachable to the mask interchangeably mounting with the first strap device.

[0009] In a third aspect, the present invention provides a face mask that comprises a mask body, a mounting stud located at each side of the mask body, a single headband having end connectors configured for pivotally connecting to the mounting studs, and a double headband assembly configured for mounting to the mask body interchangeably with the single headband. The double headband assembly includes a mask mounting member having a connector for pivotally connecting to the mounting stud. The mask mounting member also includes a mechanism that allows two of the single headbands to be attached thereto.

[0010] In a fourth aspect, the present invention provides a face mask that comprises a mask body and a harness assembly. The harness assembly is configured for pivotally connecting to the mask body. The harness assembly comprises a first strap connector for connecting to a first strap and a second strap connector for connecting to a second strap.

[0011] For a single strap configuration, the strap is inserted through a connector that includes a retainer member receiving one end of the strap. Each connector includes a tongue member with an orifice formed there-through for mounting onto one of the studs of the mask body. There is a slight interference fit between the widened portion of the stud and the orifice in the tongue so that the connector snaps onto the stud but is retained by the widened end portion. The connectors provide for adjusting the length of the strap and for fitting various

head sizes. In addition, the connectors rotatably mount to the studs, providing for a pivotal connection between the strap and the mask body.

[0012] When a dual strap configuration is used, the same end connectors are utilized. A harness assembly having a mask mounting member, however, is utilized that receives a pair of strap end connectors. In a preferred embodiment, a mounting member includes two end connector receiving portions that extend in a diverging arrangement to one another to provide for a spaced apart mounting configuration between the ends of the dual straps.

[0013] The end connector retaining portions include a recessed base receiving the tongue of the end connector with a pin extending upward from the base. The pin includes an angled upper portion to provide for sliding the tongue into a receiving portion and over the pin. The innermost side of the pin is, however, not angled and retains the tongue once inserted. Sides and a cross bar retain the remainder of the end connector flat against the mask mounting member. The mask mounting member also includes an orifice formed therein similar to the orifice in the end connector for mounting to the studs of the mask body. The mask mounting member pivotally connects to the mask body to provide for a range of adjustment and a more comfortable fit for the wearer.

[0014] The present invention is advantageous in that the same end connectors used with a single strap configuration may also be utilized with a dual strap configuration. In addition, the same stud members on the mask body are utilized, providing for easy mounting and interchanging between a single strap connector or dual strap headband assembly. The face mask and headband assembly of the invention provide for easily interchanging either a single or dual strap configuration using the same elements for reducing the total number of parts required.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Referring to the drawings, where like reference letters and numerals indicate corresponding structure throughout the several views:

FIG. 1 shows a front elevational view of a face mask having a double headband assembly mounted at one side of the mask according to the principles of the present invention;

FIG. 2 shows a partially exploded perspective view of a portion of the mask and double headband shown in FIG. 1; and,

FIG. 3 shows a perspective view of a single headband mounted to the mask according to the principles of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0016] In FIG. 1 there is shown a filtering face mask, generally designated **10**, that includes a mask body **12** having a nose brace **16** at an upper portion of the mask body. The mask **10** is generally configured to follow the contour of the wearer's face, and the nose brace **16** is pliable to adapt to the contour of the wearer's nose. At either side of the mask body **12** are mounting members shown in the form of studs **14** extending outward from the surface of the mask body **12**. The mounting studs **14** include a cylindrical portion with an upper widened end. The mask body **12** attaches to a headband assembly, generally designated **20**. As shown in both FIGS. 1 and 2, two straps **24** may be utilized to retain the mask **10** on the wearer. Straps **24** are attached to a first strap connector **30** that is capable of connecting to a second strap connector **50**. Or as shown in FIG. 3, the headband assembly **20** may take on a different configuration where a single strap **22** is used in the headband assembly such that connector **30** attaches the strap **22** to the mounting member **14** on the mask body **12** rather than to the second strap connector **50**.

[0017] Referring to FIG. 1, the second strap connector **50** mounts to the mask body **12** on the stud members **14**. The orifice **54** is sized so that it fits onto the stud member **14** with an interference fit over the widened end portion of the stud member **14** similar to the direct mounting of the end connector **30**. Once the stud member **14** has been inserted through the orifice **54**, the widened end portion retains the base **52** against the mask body **12**. With this configuration, the base **52** is free to rotate about the stud **14**, and the second strap connector **50** is pivotally mounted to the mask body **12**. When the mask **10** uses only a single strap **22** as shown in FIG. 3, the strap extends between two end connectors **30**, one connecting to each end **26** of the strap **22**. The end connector **30** includes a tongue portion **32** having a rounded end and an orifice **34** (FIG. 2) formed there-through. Each end connector **30** includes a strap receiving portion **36** that has a gripping member **38**. The gripping member includes a hinge **40**, shown as a living hinge in the preferred embodiment for reduced cost and ease of manufacture, and a leading serrated edge **42**. The gripping member **38** pivots between an open position, shown in FIG. 3, for inserting the end **26** of the strap and a closed position, shown in FIG. 1 where the strap **22** is firmly retained. When the gripping member **38** is closed, following insertion of strap **26** end through the receiving portion **36**, the serrated leading edge **42** engages the strap **22** and secures the connector member **30** to the strap **22** at the selected position.

[0018] This adjustable retaining system allows the length of the strap **22** to vary to a size that fits most comfortably around the neck and head of the wearer. As explained below, dual straps **24** also connect to the same connector members **30**.

[0019] The end connectors 30 easily attach to the mask body 12 by inserting them onto the mounting studs 14. The stud 14 inserts through the orifice 34 (FIG. 2) formed in the tongue 32. The widened end portion of the stud 14 has a slight interference fit with the orifice 34 to enable the stud member 14 to be forced through the orifice 34 so that the connectors 30 snap onto the studs 14. Once inserted, however, the widened end portion of the stud member 14 retains the tongue 32 against the mask body 12. When the end connector 30 has been attached to the mask body 12, the connector 30 rotates about the stud 14, and a pivotal connection is formed between the stud member 14 and the end connector 30. This configuration provides greater flexibility in adapting the mask to the shape and size of the wearer's head to achieve a more comfortable fit.

[0020] In FIG. 2, there is shown an embodiment of the headband configuration 20 for the mask 10 which uses a double band assembly. When double straps 24 are used around the back of the head and neck of the wearer, a second strap connector 50 is utilized. The second strap connector 50 includes a base 52 that has an orifice 54 formed in the base. The base 52 includes two strap receiving portions 60 extending at substantially right angles to one another with a brace 56 extending therebetween. The strap receiving portions 60 are configured for receiving the end connectors 30 and forming a harness assembly connecting to double straps 24. Although this embodiment uses two straps 24 or a double band harness, a single one of the straps 24 may be mounted as shown in FIG. 3, for use as a single strap 22 in a single band harness assembly. Therefore, the interchangeability of the straps 24 and 22 having the same end connectors 30 provides for a more adaptable mask retaining system.

[0021] Each of the strap receiving portions 60 includes a retaining pin 62 extending upward from the base. The pin 62 includes a slanted face portion 64 angled toward an insertion end of the strap receiving portion 60 to allow connector tongue 32 to be easily and readily secured to receiving portion 60. Near the outward end of the strap receiving portion 60, a retainer 66 forms a space for receiving the tongue 32 of the end connectors 30. The retainer 66 includes sides 68 and a recessed base 70. A cross member 72 is spaced apart from the recessed base 70 and is configured for sliding the tongue 32 into the strap receiving portion 60. When inserted, the tongue 32 extends under the cross member 72 and over the recessed base 70. The tongue 32 is flexible enough to bend upward and slide over the angled face 64 of the pin 62 until the retaining pin 62 is in registration with the orifice 34. The resiliency of the flexing tongue 32 springs the tongue 32 back to a substantially planer position with the pin 62 extending through the orifice 34. The pin 62 and the cross member 72 cooperate to retain the end connector 30 in the mask mounting member 50. The substantially right angled diverging configuration of the two strap receiving portions

60 provides for spacing the ends of the double straps 24 apart from one another for a more stable and comfortable fit for the wearer.

[0022] Using the invention, identical straps 22 may be employed with either a double or single headband system 20. The mask body 12 does not need to be modified for receiving either a single or double strap. The present invention also provides for a headband 20 that pivotally mounts to the mask body 12 with either a single or double strap configuration.

[0023] Although numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and that changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

Claims

1. A filtering face mask that comprises:

(a) a self supporting filtering face mask body that does support filter cartridges and that is adapted to fit over the nose and mouth of a wearer to filter air before being inhaled by the wearer;

characterized by

(b) mounting members (50) that are disposed on opposing sides of the filtering mask body to detachably receive a harness assembly (20) that can support the filtering mask body on such a wearer's face.

2. The filtering face mask of claim 1, wherein the mounting member is a stud (14).

3. The filtering face mask of claims 1 or 2, wherein the filtering mask body comprises a nose brace (16) that is pliable to adapt the mask body to the wearer's nose.

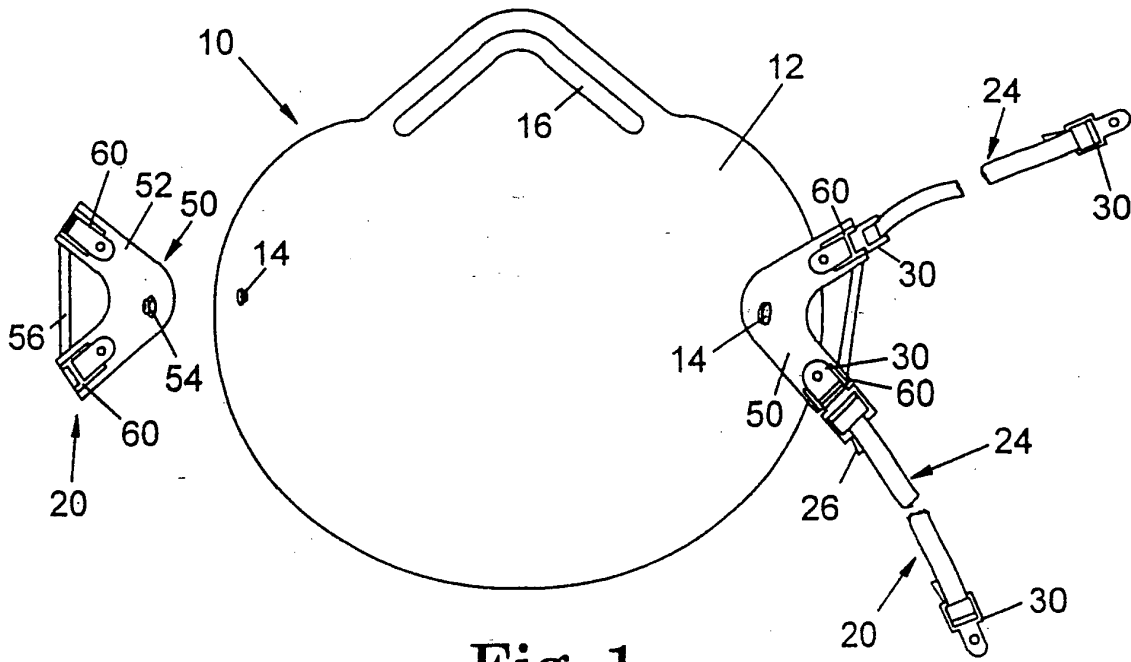


Fig. 1

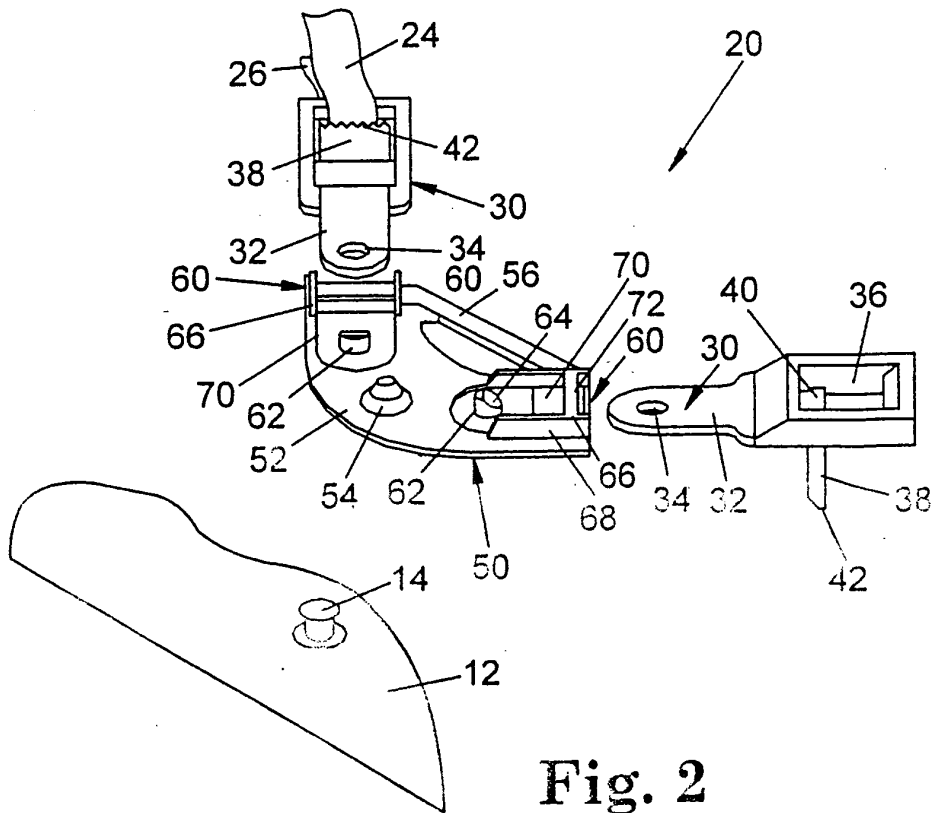


Fig. 2

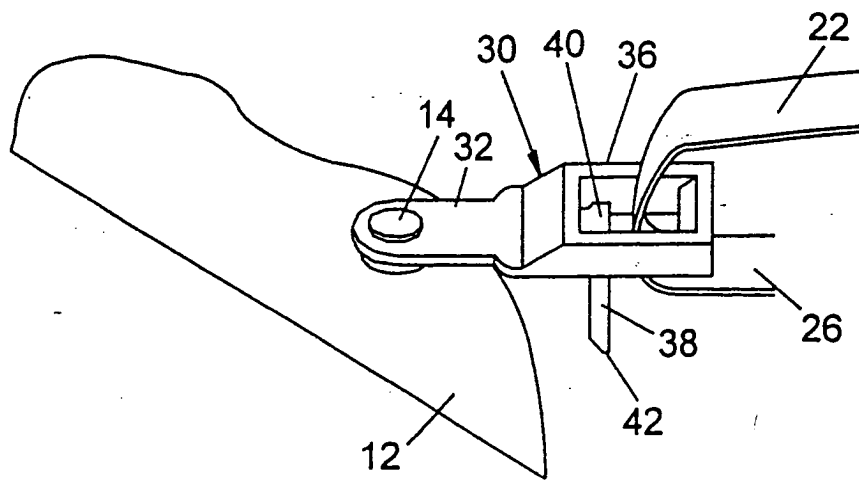


Fig. 3