FACE MASK HOOD SEALING AND RETAINING SYSTEM AND METHOD

TECHNICAL FIELD

This invention generally relates to diving equipment and more particularly to a retaining system for the hood, face seal, and mounting band(s) of facemasks that have a hood and/or a face seal that are sealed and securely mounted to the mask using a band type of clamping method. The retaining system may include a redundant system that may not allow the mask to be separated from the hood, face seal, and the mounting band(s).

BACKGROUND ART

There may be many different types of personnel protective masks (diving, firefighting, mining, confined space, etc.) that may use a mounting band type clamp to securely mount and seal the hood and/or face seal components to the mask.

The mount band(s) on these masks may be a hose clamp-type of design. They may be a long strap that may be configured to couple the ends together, which is utilized for adjusting or tightening a hood to the mask. The tightening action of the mounting band(s) may be what securely clamps and seals the hood, and/or face seals the mask. This may allow the hood and/or face seals to be regularly maintained or changed.

The masks may have a groove or mounting surface around the back edge of the mask where the hood and/or face seal fit across and/or into for mounting to the mask. The mounting band(s) then may fit over the hood and/or face seal into this groove in the mask. This groove may help to hold everything in place when it has all been installed and tightened. There may be, however, nothing that physically or mechanically connects and secures the mounting band(s) to the mask, it may be merely the clamping force of the mounting band holding the hood and/or face seal and mounting band(s) in the groove and sealing them to the mask.

Some of the mounting band(s) may have head harness mount studs or buckles attached to them. A problem may arise when masks using mounting band(s) are not correctly maintained and properly adjusted, as they may become loose. If the band(s) become loose there may be the potential that the mask may separate from any combination of the hood, face seal, or mounting band(s), or the mask from all of them at once.

The hoods and/or face seals currently being produced for personnel protective masks may use the mounting band(s) design to mount the hood and/or face seal, may have a flat mounting flap-type of area for the attachment/sealing of the hood and/or face seal to the mask. This flap area, when installed, may be clamped between the mounting band(s) and the mask securing and sealing the hood and/or face seal to the mask.

There may be several different types of hoods and/or face seals. Some may be just a hood or just a face seal. Some may have the face seal glued to the inside of the hood. Some may stack the face seal, then the hood under the mounting band(s) on the mask.

Some hoods and/or face seals may have a mating groove molded or created into them for the mounting band(s) to mate or fit into. Some of them may have a bump or protrusion at the end of the mounting flap that may help prevent the mounting flap from being extracted or pulled out from between the mounting band(s) and mask. Both the mating groove and bump or protrusion at the end of the flap may fail if the mounting band(s) are not properly maintained, are out of adjustment, or if there is a catastrophic failure (broken bolt, stripped nut, etc.).

What is needed is a retaining system that may provide a redundant, retrofittable, and safer system for retaining masks, and the like, a greater level of safety, and may be retrofittable to existing systems.

DISCLOSURE OF INVENTION

Exemplary embodiments may include a mask retaining system, including a mask, a hood configured to cover a head of a user, a mount band integral with the hood, configured to couple to the mask, and to form a seal between the hood and the mask, and a harness configured to couple to the mask and the mount band.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a perspective view of a retaining system according to an exemplary embodiment.

Figure 2 is a close up view of a portion of a system according to an exemplary embodiment.

Figure 3 is a close up view of a portion of a system according to an exemplary embodiment.

Figure 4a is a perspective view of a portion of a system according to an exemplary embodiment.

Figure 4b is a perspective view of a portion of a system according to an exemplary embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

MODE(S) FOR CARRYING OUT THE INVENTION

The detailed description set forth below in connection with the appended drawings is intended as a description of exemplary embodiments and is not intended to represent the only forms in which the embodiments may be constructed and/or utilized. The description also sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. However, it is to be understood that the same or equivalent functions and sequences may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of the invention.

Exemplary embodiments may incorporate a hood and/or face seal that may be produced with the mounting flap area of the hood and/or face seal being able to securely couple to a mounting band. The front edge of the mounting flap area of the hood and/or face seal may be extended, then folded back and attached (sewn, glued, molded, etc.) to itself creating a strong tube-like hollow area large enough to be configured to receive the mounting band(s). The tube-like hollow space may have orifices or apertures, formed within it, which may allow the mounting band to be slipped into, or fed therethrough, and into the hollow area, thereby coupling the mounting band(s) to the hood, within the hollow area. Screw(s) or other coupling devices and configurations may then be installed into the mounting band(s). With this configuration, there may be no possible way for the hood and/or face seal to separate from the mounting band(s). There may also be additional holes adjacent to the hollow area, which may allow the head harness mounts, coupling structures, or buckles that may be attached to the mounting band(s), to be accessible to a user.

Once the hood and/or face seal that couples to the mounting bands are properly fitted and installed onto the mask, the mounting band(s) may be mechanically coupled to the mask. This may be achieved with several different

methods, including, but not limited to, connecting plate(s), wire or cable(s), or drilling through the mounting band itself and using screws, bolts and nuts. The connecting plate(s) design may be preferred because of ease of manufacturing, less maintenance, and better sealing arrangement to the mask, as well as easier retrofitting of existing systems.

One exemplary embodiment of the connecting plates may allow for retrofittability to the existing mount bands and masks. This connecting plate may have an orifice or hole with an elongated slot at one end. The hole may be slipped over the head of the head harness mount stud, or coupling structure, on the mounting band(s). The connecting plate may then be moved, such that the slot is caught between the head of the head harness mount stud and the mounting band itself. Using a separate smaller hole in the connecting plate, the connecting plate may then be securely coupled to the mask by drilling a hole in the mask and using screws or a bolt and nut to mechanically fasten the connecting plate to the mask, or other coupling configuration, as desired.

An exemplary embodiment of the connecting plate may allow for retrofitability to the existing mount band(s), and may provide a head harness mounting stud or head harness adjustment buckle that may be attached, or an integral part of the connecting plate. This may allow the force of the pull created by the head harness to be distributed to the connecting plate rather than the mounting band(s).

A diving mask retaining system according to an exemplary embodiment is shown in Figure 1, generally at **10**. Figure 1 is an exploded view of a system according to an exemplary embodiment. System **10** may include a hood **12**, a mask **14**, and a band **16** configured to couple the hood **12** to mask **14**. System **10** may further include a harness **18** configured to couple to band **16**, such that an airtight and/or watertight seal is created and maintained between mask **14** and hood **12**, as well as between hood **12** and/or mask **14**, and a user.

System **10** may also include a top bracket **20** that may be configured to couple to mask **14** and to band **16**, as well as hood **12**. System **10** may further include one or more side brackets **22** configured to couple to mask **14**, band **16**, and hood **12**. With this configuration, mask **14** and hood **12** may be securely coupled together such that when a user is using this system in water or other areas, the portions may be coupled together safely such that air or water may not enter.

Furthermore, band **16** may be integral with hood **12** in that it may be coupled to hood **12** such that if band **16** loosens, it will not allow band **16** and hood **12** to separate. It may also not allow hood **12** to separate from mask **14**. Hood **12** may be configured in a loop-like configuration to receive band **16**, and may include orifices **40** to allow coupling structure **30** of band **16** to extend therethrough. Hood **12** may also include a seam **46** which may secure the hood to itself. This configuration may secure band **16** to hood **12**. It will be appreciated that other hood and band configurations, as well as different coupling configurations may be utilized, as desired.

Band **16** may include coupling structures **30** that may be configured to couple to harness **18** and brackets **20** and

22 such that an airtight and/or watertight seal may be maintained between hood **12** and mask **14**.

Hood **12** may be a diving hood such that it may be configured to enclose the head of a user. Furthermore, hood **12** may be made from neoprene, or other material that may be used for diving, firefighting, or other activity. Hood **12** may further include face seal **34** that may be configured to contact the face of a user such that when the system is utilized, an airtight and/or watertight seal will be maintained between seal **34** and the face of a user such that an alternative breathing apparatus may be utilized for breathing in water, near a fire, or other situation where an alternative breathing apparatus is desired. It will be appreciated that other configurations may be utilized, as desired.

Hood **12** may also be configured with orifices **40** that will allow coupling structures **30** to extend therethrough. Furthermore, hood **12** may be configured to be coupled to band **16** such that band **16** and hood **12** are integral with each other. This coupling may be via a sewn loop within hood **12**, such that band **16** may reside in the area created by the loop, and band **16** may be selectively removable therefrom. In this manner, a band **16** may be removed from a hood such that when a new one is needed or desired, it may be replaced.

Band **16** is typically a hose clamp-type configuration that may be coupled and tightened such that an airtight and/or watertight seal may be created between hood **12** and mask **14**. It will be appreciated that other coupling configurations and designs may be utilized for band **16**, as desired. Band **16** is typically made of metal, but also may be made of other materials such as plastic compounds, rubber compounds, metal compounds, and combinations thereof.

Mask **14** may be a mask utilized for diving, for firefighting, or other activity where an airtight and/or watertight seal is necessary, or when an alternative breathing apparatus is required, desired, or needed, or for other activities.

Top bracket **20** may couple to mask **14** via a screw, bolt, rivet, adhesive, or may be integrally formed with mask **14**, or other coupling configuration, as desired. Top bracket **20** may include an orifice **50** that may be configured to allow coupling structure **30** to extend therethrough to secure band **16** to mask **14** and top bracket **20**. Top bracket **20** may be made from metal, plastic compounds, rubber compounds, and combinations thereof, or other materials, as desired.

Side bracket **22** is configured to couple to mask **14** and to band **16** via coupling structures **30**. Side bracket **22** typically includes an orifice **52** to allow coupling structure **30** to extend therethrough and to slide into a second position such that side bracket **22** and mask **14** are securely coupled to band **16**. Furthermore, since band **16** may be integrally coupled with hood **12**, hood **12** may be coupled to mask **14** in an airtight and/or watertight manner. Side bracket **22** may be coupled to mask **14** via a screw, bolt, rivet, adhesive, or other coupling configuration, as desired. Mask **14** is typically a mask used in firefighting, diving, or other activity.

Harness **18** is configured to couple to coupling structures **30** such that an airtight and/or watertight seal may be maintained between face seal **34** and the user's face, and also an airtight and/or watertight seal between mask **14** and

hood **12**. Harness **18** may include flanges **70** and orifices **72**. Flanges **70** may be configured to extend around a head of a user, however, other configurations may be utilized, as desired. Orifices **72** may be configured to couple to coupling structures **30**. More than one orifice may be couple to a single coupling structure **30**, which may be more safe such that harness **18** may be less likely to uncouple from coupling structures **30**. Harness **18** is typically made from a rubber and/or plastic compound; however, other materials may be utilized, as desired.

Figure 2 shows a close-up view of an exemplary embodiment of the system. The system may include hood **12**, mask **14**, and band **16**. The system may also include top bracket **20**, and band **16** may include coupling structure **30**. In this embodiment, hood **12** is configured to receive band **16** such that coupling structure **30** will extend through an orifice in hood **12** such that top bracket **20** may couple to coupling structure **30**. Top bracket **20** may also couple to mask **14** via a nut-and-bolt configuration, as shown, however, other coupling configurations may be utilized, as desired, including, but not limited to screw, rivet, adhesive, and the like. In this manner when top bracket **20** is coupled to mask **14** and to band **16**, and consequently hood **12** via coupling structure **30**, an airtight and/or watertight seal may be created between hood **12** and mask **14** when band **16** is tightened sufficiently to create a compression coupling between hood **12** and mask **14**.

Figure 3 shows an exemplary embodiment again including hood **12**, mask **14**, and band **16**, as well as coupling structure **30**. This system may also include a top bracket **60** that is configured to couple to mask **14**, as well as coupling structure **32**. Furthermore, top bracket **60** may include a coupling structure **32** that is configured to couple to the flanges **70** and orifices **72** of harness **18** to securely couple mask **14** to hood **12** and to create an airtight and/or watertight seal between hood **12** and mask **14**, as well as between the user and the face seal. Coupling structure **30** may also be configured to couple to harness **18** to securely couple hood **12** to mask **14** and to securely couple the system to a user.

Figure 4a shows a hood according to an exemplary embodiment, generally at **12**. Hood **12** may include orifices **40** that are configured to allow a band **16** to be inserted into a space created when hood **12** is folded over and secured to itself. Furthermore, orifices **40** are configured to allow coupling structures to extend therethrough to allow coupling to the mask and the harness of a system. Hood **12** may also include a seam **46**, which may be configured to allow an area for securely receiving a band of the system. Seam **46** may be sewn, however, an adhesive may also be used as well as other coupling configurations, as desired. Furthermore, it will be appreciated that although hood **12** is shown folded over to create the area to receive a band, other configurations may be utilized, such as other devices coupled to hood **12**, among others, as desired.

Figure 4b shows an exemplary embodiment including a user **38**. The face of user **38** is typically adjacent to seal **34** such that an airtight and/or watertight seal may be created between seal **34** and the user **38**. Hood **12** may include a face seal **34**, however it will be appreciated that face seal **34** may be coupled to other parts of the system including the

mask and others, as desired. Again, hood **12** includes orifices **40** to allow the harness to be received and for coupling structures to extend therethrough to allow coupling of the mask **14** to band **16**, as well as harness **18** and hood **12**.

With these configurations, the force of the harness may be distributed to parts of the system other than the mount band. This may increase the safety of the system, and allow the band to last longer before being replaced.

In closing, it is to be understood that the exemplary embodiments described herein are illustrative of the principles of the present invention. Other modifications that may be employed are within the scope of the invention. Thus, by way of example, but not of limitation, alternative configurations may be utilized in accordance with the teachings herein. Accordingly, the drawings and description are illustrative and not meant to be a limitation thereof.

What is claimed is:

1. A face mask retaining system comprising:

a face mask;

a hood configured as a head cover;

a mounting band integral with said hood and configured to couple to said face mask and form a seal between said hood and said face mask;

a head harness configured to hold said face mask against the face of a user; and

at least one bracket configured to couple said face mask to said integral mounting band,

said integral mounting band comprising a plurality of spaced apart coupling structures configured to couple to said head harness and to said at least one bracket,

said at least one bracket being configured to couple to said coupling structures of said integral mounting band,

said at least one bracket comprising a coupling structure configured to couple to said head harness,

said head harness comprising a plurality of flanges configured to extend around said hood, and a plurality of orifices within each of said flanges configured to couple to said coupling structures of said integral mounting band and said coupling structure of said at least one bracket.

2. A face mask retaining system comprising:

a face mask;

a hood configured as a head cover;

a mounting band integral with said hood and configured to couple to said face mask and form a seal between said hood and said face mask;

a head harness configured to hold said face mask against the face of a user; and

at least one bracket configured to couple said face mask to said integral mounting band,

said integral mounting band comprising a plurality of spaced apart coupling structures configured to couple to said head harness and to said at least one bracket,

said at least one bracket being configured to couple to said coupling structures of said integral mounting band,

said at least one bracket comprising a coupling structure configured to couple to said head harness,

said head harness comprising a plurality of flanges configured to extend around said hood, and a plurality of orifices within each of said flanges configured to couple to said coupling structures of said integral mounting band and said coupling structure of said at least one bracket, wherein more than one of said plurality of orifices is adapted to couple to each of said coupling structures.

3. A face mask retaining system comprising:

a face mask;

a hood configured as a head cover;

a mounting band integral with said hood and configured to couple to said face mask and form a seal between said hood and said face mask;

a head harness configured to couple to said face mask and to said integral mounting band; and

at least one bracket configured to couple said face mask to said integral mounting band, said at least one bracket comprising a coupling structure configured to couple to said head harness,

said integral mounting band comprising a plurality of spaced apart coupling structures configured to couple to said head harness and to said at least one bracket,

said head harness comprising a plurality of flanges configured to extend around said hood, and a plurality of orifices within each of said plurality of flanges configured to

couple to said coupling structure of said integral mounting band and said coupling structure of said at least one bracket.

4. A system for retaining a mask over the face of a user, comprising:

at least one mounting band;

at hood with a substantially tubular end adapted to receive and hold said at least one mounting;

at harness adapted to fit over said hood, said harness configured for coupling to said at least one mounting band; and

at least one bracked adapted to engage said harness and securely couple the mask to said at least one mounting band when said at lesat one mounting band is being held by said hood.

5. This system of Claim 4, wherein said at least one mounting band is equipped wih a plurality of mouting studs.

6. Ths system of Claim 5, wherein said at least one bracket is adapted to engage at least one of said hood mounting studs.

7. The system of Claim 5 wherein said substantially tubular end of said hood is provided with a pluralilty of orifices.

8. The system of Claim 7, wherein said mounting studs are adapted to extend through said orifices.

9. The system of Claim 7, wherein at least one of said orifices is adapted to receive said at least one mounting band.

10. A system for retaining a mask over the face of a user, comprising:

at least one mounting band;

a hood with a substantially tubular end adapted to receive and hold said at least one mounting band;

a harness adapted to fit over said hood, said harness including a plurality of flanges adapted for coupling to said at least one mounting band, and at least one bracket adapted to engage at least one of said flanges and securely couple the mask to said at least one mounting band when said at least one mounting band is being held by said hood.

11. The system of Claim 10 wherein said at least one bracket is equipped with at least one harness mounting stud.

12. The system of Claim 11, wherein at least one of said flanges is equipped with a plurality of orifices.

13. The system of Claim 10, wherein said at least one harness mounting stud is adapted to engage at least one of said orifices.

14. A system for retaining a mask over the face of a user, comprising:

a first strap;

a second strap adapted to be clamped to said first strap, each of said first and second straps being equipped with a plurality of mounting studs;

a hood with a substantially tubular end adapted to receive and hold said first and second straps, said substantially tubular end being provided with a plurality of orifices, said mounting studs adapted to extend through said orifices;

a harness adapted to fit over said hood, said harness including at least one flange adatped to be engaged by at least one of said mounting studs; and

at least one bracket configured to engage said at least one flange and securely couple the mask to at least one of said mounting studs when said clamped first and second straps are being held by said substantially tubular end of said hood.

15. The system of claim 14, wherein said at least one flange is equipped with a plurality of orifices.

16. The system of claim 15, wherein said at least one bracket is equipped with at least one harness mounting stud.

17. The system of claim 16, wherein said at least one harness mounting stud is adapted to engage at least one of said flange orifices.