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Attorney Docket No. 84121

SELF CONTAINED LITHIUM HYDROXIDE CURTAIN

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by the Government of the United States of America for Governmental purposes without the payment of any royalty thereon or thereafter.

BACKGROUND OF INVENTION

(1) Field of the Invention

This invention relates to a device, which removes carbon dioxide and carbon monoxide from the atmosphere of a submarine during a casualty when no power is available to run the air scrubbers.

(2) Description of the Prior Art

Many vessels play a major role in the United States Navy, including submarines. Submarines are effective in our military because they provide a stealth way to enter into enemy waters and possibly attack. Submarines are also necessary to counteract another country's submarines.

While submarines are most prominent in navies, they are also used in other venues. In recent decades, submarines have become commonly used as research tools. Submarines allow scientists to travel deep into the sea and study deep water sea life, while providing a safe means for conducting such research. Submarines have also become more popular in tourism. These vessels will take tourists close to the ocean floor, in a dry, safe medium. However, the tourist submarines are usually much smaller and contain less gadgets than navy submarines. Whether used by the navy, researchers or tourism companies, submarines are great tools that can be used for exploration and navigation of areas that are not accessible with a scuba tank and a wet suit.

Since submarines are closed under-water vessels, submarines are equipped with air scrubbers to remove carbon dioxide (CO_2) and carbon monoxide (CO) from the atmosphere. However, if problems arise causing a submarine to lose its power, the air scrubbers do not function. As such, a major concern regarding submarines has been removing carbon dioxide and carbon monoxide from the air if the motors on the scrubbers are not working, such as because of a loss of electrical power.

During a loss of electrical power on a submarine, lithium hydroxide (LiOH) can be used to remove carbon dioxide and carbon

monoxide from the air. One way this has been done is by using a hopper to spread lithium hydroxide through the submarine. However, the granular material is caustic to the skin and respiratory tract. Also, the lithium hydroxide is stored in canisters which take up precious limited space on a submarine.

DESCRIPTION OF THE PRIOR ART

The prior art discloses various devices using lithium hydroxide to remove carbon dioxide from a submarine's atmosphere. One such device is a lithium hydroxide curtain developed by Battelle Memorial Institute, located in Columbus, Ohio. This curtain may be hung from a compartment overhead space and filled with lithium hydroxide. However, this device still requires canisters of lithium hydroxide, saving no storage space.

Also known in the prior art is Fletcher et al., U.S. Patent No. 4,168,706, which is said to disclose a re-breathing system that uses a bed of lithium hydroxide to remove carbon dioxide from exhaled gas. This device is designed as a portable re-breathing system for use by one person. The device is a mechanical system in which exhaled gas is passed through a packed bed regenerative heat exchanger to adjust the temperature and humidity of the exhaled gas and is then passed through a

canister of lithium hydroxide to remove the carbon dioxide. The carbon dioxide-free gas is then passed through the regeneration heat exchanger, wherein the gas's temperature and humidity are returned to normal breathing conditions.

Also known is Landy, U.S. Patent No. 5,120,331, which is said to disclose a gas filtering unit having sheet(s) of flexible, coilable, permeable, carbon impregnated fabric that are wound around a center core structure. This device is an active system with impellers requiring power input.

Also known are Zhang et al., U.S. Patent No. 6,296,689 B1, Zhang et al., U.S. Patent No. 6,464,757 B2, and Zhang et al., U.S. Publication No. 2002/0073846 A1, which are said to disclose a lithium hydroxide and hopcalite based filter which can be used in combination with a chemical oxygen generator for removing chlorine gas and carbon monoxide from the oxygen produced by such a system by filtration to provide a safely breathable gas.

Other devices may be known for removing carbon dioxide and carbon monoxide from the air. These devices, along with the devices above, have various shortcomings including being overly complex and expensive, bulky and taking up precious space, limited to one user per device, having a limited area of use, and requiring electrical power for use. The shortcomings of these devices are addressed by the present invention.

SUMMARY OF THE INVENTION

The present invention is a device for removing carbon dioxide and carbon monoxide from the atmosphere. The device is especially useful on a submarine during a casualty when there is no electrical power to run the air scrubbers, the usual method of removing carbon dioxide and carbon monoxide from a submarine's atmosphere. The device is comprised of a fabric material infused with lithium hydroxide. The fabric material may be hung like a curtain from any suitable place, such as a pipe or railing in a submarine. Prior to use, the device may be vacuum sealed in plastic to retain its functional properties and for easy storage.

Thus, it is the primary objective of the present invention to provide a device for removing carbon dioxide and carbon monoxide from the atmosphere which does not require a power source and which can be adapted for use in any number of areas and benefiting multiple users, not just one user per device.

It is also a primary objective of the present invention to provide a device for removing carbon dioxide and carbon monoxide from the atmosphere that is light, simple to use, easy to store and requires little storage space.

BRIEF DESCRIPTION OF THE DRAWING(S)

Referring now to the drawing(s):

FIGURE 1 illustrates a front view of the lithium hydroxide curtain of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The present invention is a device for removing carbon dioxide and carbon monoxide from the atmosphere which does not require a power source. Referring to Figure 1, the device of the present invention is a lithium hydroxide curtain 10, which is comprised of a fabric material 12 infused with lithium hydroxide 14. The fabric material 12 may be any suitable material, but is preferably a mesh-type fabric such as gauze or woven cotton. The fabric material 12 may also be any suitable size and shape, but it is preferred to be of a size that can be easily hung, especially in a submarine, and functions to remove carbon dioxide and carbon monoxide from the atmosphere in an effective manner. In a preferred embodiment, the fabric material 12 is substantially square or rectangular shaped.

Lithium hydroxide 14 is then infused into the fabric material 12 by soaking the fabric material 12 in lithium hydroxide 14 and then drying the fabric material 12. However, any suitable method of infusing the fabric material 12 with the lithium hydroxide 14 may be used. Also, lithium hydroxide 14

may be used or a suitable mixture which contains lithium hydroxide may be used. Additionally, any suitable quantity of lithium hydroxide 14 may be used per curtain 10 or used per certain dimensions of the fabric material 12.

The lithium hydroxide curtain 10 may preferably be hung like a curtain from any suitable place, such as a pipe, railing, etc. in a submarine. In order to accomplish this, the fabric material 12 also comprises hanging elements 16. Any suitable number and type of hanging elements 16 may be used. However, in a preferred embodiment, the lithium hydroxide curtain 10 has two hanging elements 16, one substantially near a first corner 18 of the fabric material 12 and another substantially near a second corner 20 of the fabric material 12. The first corner 18 and the second corner 20 are preferably substantially parallel and opposite from each other.

The hanging elements 16 may be any suitable type of hanging elements such as, but not limited to, hooks, wires, ropes, velcro, etc. In the preferred embodiment, the hanging elements 16 are velcro straps. The hanging elements 16 can easily be placed over a pipe or railing and secured, thereby providing a quick and easy method of hanging the lithium hydroxide curtain 10.

Once manufactured, the lithium hydroxide curtain 10 may be vacuum-sealed in plastic. This enables the lithium hydroxide

curtain 10 to retain its properties until it needs to be used. Additionally, this allows the lithium hydroxide curtain 10 to be easily accessible and easily stored, thereby taking up very little space. This is especially beneficial on submarines where space is very limited.

The exemplary embodiments herein disclosed are not intended to be exhaustive or to unnecessarily limit the scope of the invention. The exemplary embodiments were chosen and described in order to explain the principles of the present invention so that others skilled in the art may practice the invention. As will be apparent to one skilled in the art, various modifications can be made within the scope of the aforesaid description. Such modifications being within the ability of one skilled in the art form a part of the present invention and are embraced by the appended claims.

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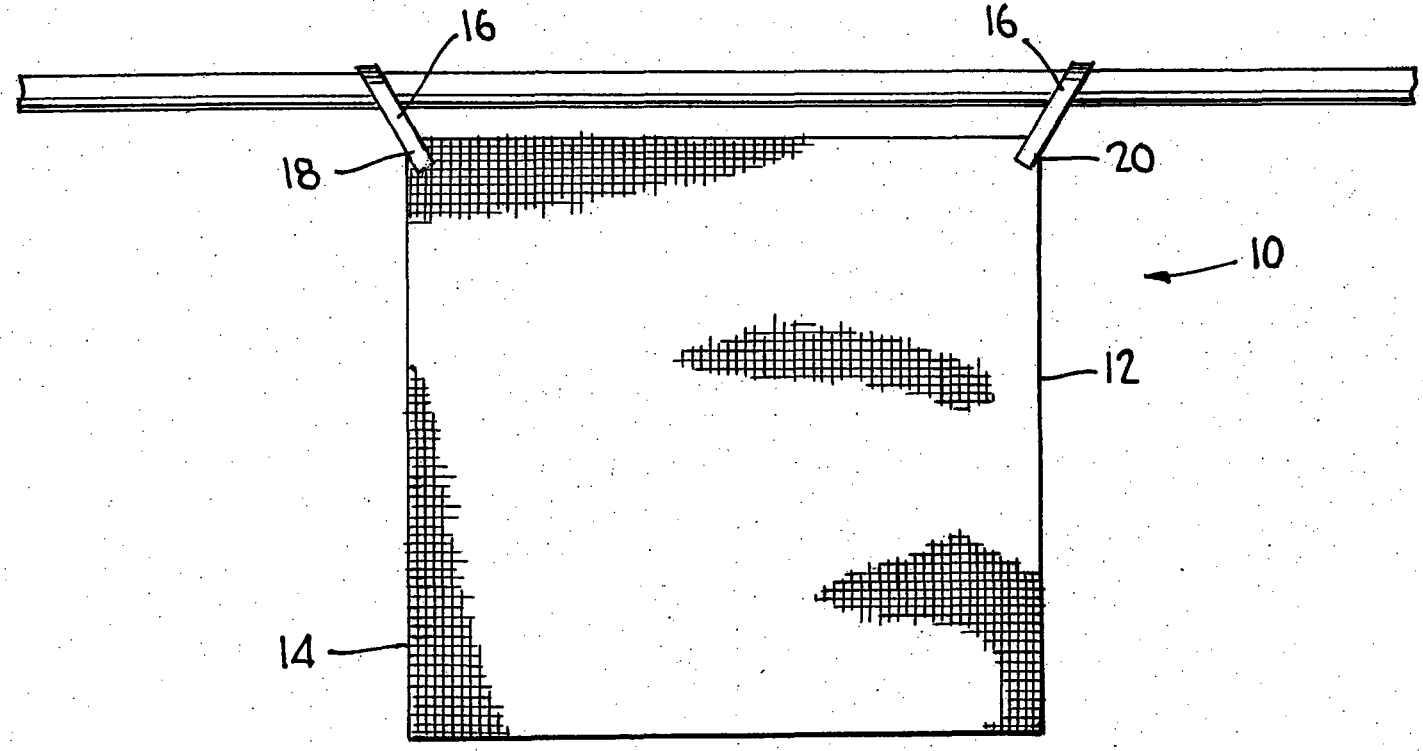
ABSTRACT OF THE DISCLOSURE

The present invention is a device for removing carbon dioxide and carbon monoxide from the atmosphere which does not require a power source. The present invention is a lithium hydroxide curtain, which is comprised of a fabric material infused with lithium hydroxide. The lithium hydroxide curtain is preferably hung like a curtain from any suitable place, such as a pipe or railing by hanging elements. Any suitable number and type of hanging elements may be used.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