ACTIVE VENTING SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a venting system, and more particularly, relates to an active venting system for use in protective gears and respiratory devices to effectively remove exhaled air inside the protective gears and the respiratory devices.

Description of the Related Art

Masks and respirators are used as protective gears against air pollutants such as haze and influenza. Commercially available products without active ventilation are classified into two main categories: single-use disposable respirators and reusable respirators with detachable filter cartridges. These products without active ventilation often come with a one-way valve (passive valve) to allow the exhaled air to escape. However, the efficacy of these passive valves in removing the warm and humid exhaled air is highly dependent on breathing depth and pressure.

Often, the exhaled air is forced to exit through the filters due to the limited window of the one-way valve. Moisture in the warm exhaled air condenses as it flows through the cold filters and blocks the air channels within the filters partially or completely. The reduction in the size of the air channels directly increases air resistance which causes breathing difficulties. In addition, lack of a proper exhalation pathway causes the hot and humid exhaled air to circulate within the respirator body thus, creating discomfort to the user.

To solve this problem, respiratory devices with positive pressure or air supply powered by fans and/or blowers are available. These devices are designed to supply

airflow to cater to the breathing needs of an individual. These products are typically bulky and require significant power supply to maintain a prolong airflow and pressure. The power supply is usually external and not part of the protective body to meet the high airflow rates. These products are therefore, not suitable for daily usage of general public.

Therefore, an active venting system is needed which when incorporated into respiratory devices or protective gears, can be used comfortably for prolong usage and is suitable for general public. Further, such device should minimize facial contact of the hot and humid exhaled air which causes discomfort to a wearer and have an effective means of exhausting heat and moisture in each exhalation cycle.

BRIEF SUMMARY OF THE INVENTION

It is, therefore, an aim of the disclosed embodiments to provide for an active venting system for venting heat, moisture and exhaled air from a protective gear or a respiratory device covering mouth and nose.

The active venting system for attaching on a protective gear or respiratory device according to an aspect of the present invention comprises: a shell; a blower placed within the shell and having a first inlet, a second inlet and an outlet, the first inlet corresponding to the interior of the protective gear or the respiratory device, the second inlet facing to the interior of the shell, the blower venting the exhaled air from the protective gear or the respiratory device via the first inlet and the outlet and venting the air from the interior of the shell via the second inlet and the outlet; and a control unit placed within the shell and controlling the blower.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide further understanding of the invention, and are incorporated into and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

FIG. 1 is an exemplary illustration of a perspective view of the active venting system according to the present invention;

FIG. 2 is an exemplary illustration of a exploded view of the active venting system according to the present invention;

FIG. 3 is an exemplary illustration of a side view of the active venting system attached on the mask;

FIG. 4 is an exemplary illustration of a perspective view of another embodiment of the active venting system according to the present invention; and

FIG. 5 is an exemplary illustration of a exploded view of another embodiment of the active venting system according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 is an exemplary illustration of a perspective view of the active venting system according to the present invention. FIG. 2 is an exemplary illustration of a exploded view of the active venting system according to the present invention. As shown in FIG. 1 and FIG. 2, an active venting system 1 is provided for the protective gears or the respiratory devices such as the masks or the respirators. The active venting system 1 comprises a shell 10, a blower 11 and a control unit 12. The blower

11 and the control unit 12 are placed within the shell 10, and the control unit 12 is coupled to the blower 11 to control the blower 11.

The shell 10 has a first opening 101 and a second opening 102, and the blower 11 has a first inlet 111, a second inlet 112, an outlet 113 and a plurality of blades 114 (as shown in FIG. 3). The first inlet 111 is corresponding to the first opening 101, the second inlet 112 faces to interior of the shell 10, and the outlet 113 is corresponding to the second opening 102. The control unit 12 includes a printed circuit board 121 and a battery 122 (power source), the battery 122 is set on the printed circuit board 121. The printed circuit board 121 has the control circuit and is operated as a control circuit board.

The control circuit drives the blower 11. The battery 122 provides a power source to the blower 11 and is recharged via an electrical wire or a cable coupled between a power bank and a port 124 set on the printed circuit board 121. The control unit 12 is stacked on the surface having the second inlet 112 of the blower 11 according to this embodiment, and therefore the second inlet 112 of the blower 11 faces to the printed circuit board 121 according to this embodiment. Further, a switch 126 is set on the printed circuit board 121 to turn on/off the blower 11.

FIG. 3 is an exemplary illustration of a side view of the active venting system attached on the mask. When the active venting system 1 is attached on a mask 2 or a respirator, the first opening 101 of the shell 10 is corresponding to an opening or an exhalation valve 21 of the mask 2 or the respirator, and therefore the first inlet 111 of the blower 11 is corresponding to the opening or the exhalation valve 21. Blades 114 of the blower 11 aren't parallel with a surface 22 of the mask 2, so the active venting system 1 has better venting effect, smaller volume and less noise.

The blower 11 is driven by the control unit 12, air in the interior of the mask 2

is vented via the first inlet 111 by the blower 11 for venting moisture, heat and carbon dioxide in the interior of the mask 2, and air including moisture and heat from the interior of the shell 10 (ex: the moisture and the heat produced by the control unit 12 in operation) is vented via the second inlet 112 by the blower 11. The moisture, the heat and the carbon dioxide in the interior of the mask 2 and the shell 10 are vented via the outlet 113 and the second opening 102 of the active venting system 1. Thus, the active venting system 1 has optimal airflow and cooling effect.

Then, when the active venting system 1 is attached onto the mask 2, the second opening 102 isn't upward, and therefore the vented air would not contact the eyes of the user and cause discomfort.

The active venting system 1 is detachable from the mask 2, and the mask 2 can be used without the active venting system 1. When the mask 2 is disposed, the active venting system 1 still can be attached onto another mask or respirator. So the active venting system 1 can be reused to prevent from wasting resource.

The shell 10 has an air space 103 which is between a top surface 104 of the shell 10 of the active venting system 1 and the blower 11. This allows some air being sucked through the first inlet 111 that cannot be vented out fast enough through the outlet 113, to bypass to the air space 103, which decreases the pressure at the secondary inlet 112, thereby reducing the noise and vibration of the active venting system 1. To form the air space 103, the top surface 104 of the shell 10 can be a curve.

Refer to FIG. 2, the active venting system 1 further comprises a guiding component 13 disposed between the outlet 113 of the blower 11 and the second opening 102 of the shell 10. The guiding component 13 guides the vented air from the outlet 113 to the second opening 102, and therefore the vented air would not

reflow to the interior of the shell 10.

FIG. 4 is an exemplary illustration of a perspective view of another embodiment of the active venting system according to the present invention. FIG. 5 is an exemplary illustration of a exploded view of another embodiment of the active venting system according to the present invention. As shown in FIG. 4 and FIG. 5, the control unit 12 and the blower 11 are located alongside of each other, the control unit 12 isn't stacked on the blower 11 according to this embodiment, and therefore the second inlet 112 of the blower 11 faces to the top surface of shell 10 according to this embodiment.

Although the present invention and the advantages thereof have been described in detail, it should be understood that various changes, substitutions, and alternations can be made therein without departing from the spirit and scope of the invention as defined by the appended claims. That is, the discussion included in this invention is intended to serve as a basic description. It should be understood that the specific discussion may not explicitly describe all embodiments possible; many alternatives are implicit. The generic nature of the invention may not fully explained and may not explicitly show that how each feature or element can actually be representative of a broader function or of a great variety of alternative or equivalent elements. Again, these are implicitly included in this disclosure. Neither the description nor the terminology is intended to limit the scope of the claims.

What is claimed is:

1. An active venting system for attaching on a protective gear or a respiratory device comprising:

a shell;

a blower placed within the shell and having a first inlet, a second inlet and an outlet, the first inlet corresponding to the interior of the protective gear or the respiratory device, the second inlet facing to the interior of the shell, the blower venting the exhaled air from the protective gear or the respiratory device via the first inlet and the outlet and venting the air from the interior of the shell via the second inlet and the outlet; and

a control unit placed within the shell and controlling the blower.

2. The active venting system as claimed in claim 1, wherein the shell has an air space which is between a top surface of the shell and the blower.

3. The active venting system as claimed in claim 1 or 2, wherein the shell has a first opening and a second opening, the first opening is corresponding to the interior of the protective gear or the respiratory device, the first inlet of the blower is corresponding to the first opening, and the outlet of the blower is corresponding to the second opening.

4. The active venting system as claimed in claim 3, further comprising a guiding component disposed between the outlet of the blower and the second opening of the shell.

5. The active venting system as claimed in claim 3, wherein the second opening of the shell isn't upward when the active venting system is attached on the protective gear or the respiratory device.

6. The active venting system as claimed in any one of claims 1 to 5, wherein the control unit comprises a control circuit board and a power source, the control circuit board controls the blower, and the power source provides a power source to the blower.

7. The active venting system as claimed in claim 6, wherein the power source is a battery.

8. The active venting system as claimed in any one of claims 1 to 7, wherein the control unit is stacked on the surface having the second inlet of the blower, and the second inlet of the blower faces to the control unit.

9. The active venting system as claimed in any one of claims 1 to 7, wherein the control unit and the blower are located alongside of each other.

10. The active venting system as claimed in any one of claims 1 to 9, wherein the active venting system is detachable from the protective gear or the respiratory device.