

A SYSTEM AND METHOD FOR STORING AND DEPLOYING A SOFT SHELTER FOR PROTECTION AGAINST NBC WARFARE

Field of the Invention

The present invention relates to a protection system for providing a Toxic-Free (TF) protected space for persons and pets against NBC warfare and acts of terror using NBC warfare components. More particularly, the invention relates to a system for providing an immediate available and easy to deploy protected space, against the penetration of contaminated air and/or gases, liquids or aerosols.

Background of the Invention

As is known, there is an increasing need for protection against the penetration of contaminants into a sheltered space, given the threat of military attacks and acts of terror using nuclear, chemical or biological (NBC) means of warfare. Such protection is provided by the use of shelters and protected spaces located inside buildings ("hard" shelters), or tent structures ("soft" shelters). Such shelters are provided with professional NBC air filtration systems including blowers, which form an overpressure inside the protected space and preserves cleaned and filtered air. The overpressure is required in order to ensure a clear direction of airflow from inside the protected space to the outside atmosphere, through ever-present leaks in the walls of the shelter, the door and the window seals. Use of this method assures that no contaminated air will penetrate into the protected space.

The typical soft shelter is the only solution when no hard shelter is available, since being a sealable space, it provides the possibility to create an overpressure with filtered clean air. The disadvantage of the soft shelter is that the preparation of all components and the erection of the soft shelter itself inside a room in a flat, takes a relatively long time. Unfortunately the current alert time due to a threat is in the range of three minutes only. This is too short a period of time to install a soft shelter. To have a soft shelter permanently installed is not a practical solution in the daily living area. Therefore, there exists a need to have a system inside a flat that provides

protection within less than three minutes and that is not occupying much space nor is unacceptable from an esthetic aspect.

Disclosure of the Invention

It is therefore an object of the present invention to overcome the disadvantages of the presently used soft shelter systems and to provide a protected soft shelter structure ready to be deployed within the shortest time that is reliable and easily usable for all the population in homes and offices, commando posts and emergency centers.

According to the invention, there is therefore provided a system for storing and deploying a soft shelter for protection against NBC warfare, comprising a two-part cabinet including a storing part and a door part; a soft shelter made of a foldable skin defining a protected space upon being unfolded; said skin being attached at least at one end to said storing part or at least indirectly to said door part, wherein upon the opening or displacement of said door part, the foldable skin is expandable to form said protected space.

The invention also provides a method for storing and immediate deployment of an NBC protection system comprising a two-part cabinet having a storing part and a door part, a soft shelter made of a foldable skin defining a protected space upon being unfolded; attaching said skin at least at one end to said storing part or at least indirectly to said door part; displacing said door part from said storing part to expand said skin for forming said protected space.

Brief Description of the Drawings

The invention will now be described in connection with certain preferred embodiments with reference to the following illustrative figures, so that it may be more fully understood.

With specific reference now to the figures in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

In the drawings:

Fig. 1 is an isometric view of a cabinet storing a soft shelter and essential apparatus and units to provide protection against NBC contaminants;

Fig. 2 is an isometric view of the cabinet of Fig. 1 in its open state, showing constructional details of preferred embodiments;

Fig. 3 is a top view of the cabinet and soft shelter, showing on the left side the deployed mode, and on the right side the closed, storing mode;

Figs. 4a and 4b show isometric views of a further embodiment of the cabinet in the open and close states;

Figs. 5a and 5b show top views of still a further embodiment of a cabinet in the open and close states, and

Figs. 6a and 6b show isometrical top views of a cabinet in open and close states of a modification of Figs. 5a and 5b.

Detailed Description of Preferred Embodiments

The cabinet with the integrated soft shelter according to the present invention, thus has three modes of operation:

- a) Storage mode – wherein the soft shelter with all elements is prefixed inside the cabinet and the cabinet is in its closed contracted state;
- b) Opening/closing mode – access door is slightly opened to let air flow in or out of the soft shelter, and
- c) Protect mode – fully deployed soft shelter and the entrance door closed with blower for NBC air filtration is started, to achieve overpressure inside the soft shelter.

Referring to Fig. 1, the cabinet 2 is shown in its storage mode. The cabinet 2 includes a front cover 4 which is fastened to the storing body 6 and the door 8, leading to the soft shelter (not shown), closed. The door 8 may be made in the storing body 6 and/or in the front cover 4, as shown.

In Figure 2 the cabinet 2 is shown in semi-open mode. The door 8 is open and the front cover 4 is pulled away from the storing body 6. The front cover 4 is parallel to the storing body 6 by foldable and/or extendible connection elements 10 affixed e.g., at the top of both the cabinet 2 and the cover 4. The connection elements 10 may be in the form of multi-hinged links 10', lazy tongue 10'', telescopic members (not shown), or the like. To these connection elements 10, gas-impermeable skin 12 constituting the soft shelter, is hanged by strips 14, or otherwise attached. The front cover 4 is advantageously equipped with rollers or wheels 16, which are synchronized by an axis 18. The opening and closing can operationally be automatically effected by inflatable and contractible hoses 20, which are filled or emptied by means of an air pump or a blower system (not shown). The hoses 20 may be installed at the upper and/or lower sides of the cabinet. Purified air is blown into the soft shelter by means of an NBC air filtration unit affixed onto the inside rear wall of the storing body 6, which unit includes a blower 22 for sucking air from the outside via a hose 24 through an NBC air filter 26. Similarly, the opening and closing may be effected by means of mechanically extendable interconnecting elements of the type described above.

The skin 12 of the soft shelter is configured as a pipe. The ends of this pipe are attached to the front cover and the body of the cabinet in an air- and gas-tight manner by pressing the skin 12 along its circumference between mechanical coupling elements, e.g., elements configured to have a groove and tongue for clamping the edges of the skin 14 at one end to the storing body 6 and at the other end to the front cover 4.

Figure 3 shows a top view of a soft shelter, wherein the left side shows it in its open state, and the right side in its close state. It is easy to see where the multi-hinged links 10' of the connection elements 10 are located in both, expanded and contracted states. Also visible are the hose 20 in its expanded and contracted states, as well as the soft shelter skin 12 and the hanging strips 14 in the deployed mode only.

While for clarity, the cabinet 2 is shown to include six rigid walls (front, top, bottom, deck and side walls), it should be noted that, in fact, the cabinet 2 may include only four walls (front, top and two side walls), and that the cabinet 2 may be located near a wall of a room with the edges of the side and top walls contacting the wall. The skin of the soft shelter disposed inside the cabinet should, however, be closed from all sides, including a floor, so as to form a TF protected space, including, of course, an access and egress closable aperture. Provision should also be made for affixing a filter and a blower, *per se* know.

In Figs. 4a and 4b, there is illustrated an embodiment in which the front cover 4 is hinged by hinges 28 to a lateral edge of the storing body 6, so as to facilitate swiveling by 90 degrees. On the side of the storing body 6, that does not hold the door, skin supporting arms 30, 32 hinged at 34 and 36 are provided. The hinges enable the arms to be swiveled out, in order to guide the skin 12 to its unfolded state. At the inside of the front cover 4, a guiding system 40 is affixed to guide the soft shelter out from the storing body 6. The entrance 38 to the soft shelter is not rigid like the door 8 of Fig. 1, but is flexible like the doors in other soft shelters.

Referring to Figs. 5a and 5b there is illustrated an embodiment in which the front cover 42 is foldable, e.g., at its middle, and does not include guiding members. The guiding of the soft shelter skin 44 to its expanded state is done by two swivelable support frames 46, 48, hingedly mounted on each side of the cabinet body 6. The height of affixing the guiding support frames 46, 48 to the sides of the cabinet body 6 may be different and a slight inclination is recommended as an option.

Figs. 6a and 6b illustrate a cabinet body 6 with split-cover panels 50, 52. Guiding arms 54, 56 for guiding the soft shelter skin 58 are affixed diagonally inside the cover panels 50, 52. In order to extend the length of the arms 54, 56, they may be embodied as telescopic arms. The supporting arms can be held or affixed in the expanded and contracted states by hooks provided on the door.

It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrated embodiments and that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

WHAT IS CLAIMED IS:

1. A system for storing and deploying a soft shelter for protection against NBC warfare, comprising:

a two-part cabinet including a storing part and a door part;

a soft shelter made of a foldable skin defining a protected space upon being unfolded;

said skin being attached at least at one end to said storing part or at least indirectly to said door part;

wherein upon the opening or displacement of said door part, the foldable skin is expandable to form said protected space.

2. The system as claimed in claim 1, wherein at least a portion of said cabinet is made of at least a semi-rigid material.

3. The system as claimed in claim 1, wherein said skin comprises a closable aperture for access and egress to said protected space.

4. The system as claimed in claim 1, wherein said door part comprises a closable aperture for access and egress to said protected space.

5. The system as claimed in claim 1, wherein said storing part comprises a closable aperture for access and egress to said protected space.

6. The system as claimed in claim 1, wherein said door part is provided with a closable opening enabling access to said space.

7. The system as claimed in claim 1, wherein said door part is furnished with rollers or wheels facilitating its displacement from said storage part.

8. The system as claimed in claim 1, wherein said door part and said cabinet part are articulated by connecting elements.

9. The system as claimed in claim 1, wherein said door part and said cabinet part are interconnected by extendible connecting elements selected from the group of hinged, foldable links, lazy tongues, telescoping members or inflatable hoses.

10. The system as claimed in claim 1, further comprising at least one supporting and guiding arm foldably hinged at one end to any of said cabinet part or door part for guiding said soft shelter during expansion and supporting it during its expanded state.

11. The system as claimed in claim 1, wherein said door part comprises at least one wing hingedly attached to one said of said cabinet part.

12. The system as claimed in claim 10, wherein there are provided two supporting and guiding arms diagonally disposed along the inside surface of each of said wings during the non-displaced state of said door part.

13. The system as claimed in claim 1, further comprising an NBC filter and blower unit attachable to any portion of the cabinet part.

14. A method for storing and immediate deployment of an NBC protection system comprising:

a two-part cabinet having a storing part and a door part, a soft shelter made of a foldable skin defining a protected space upon being unfolded;

attaching said skin at least at one end to said storing part or at least indirectly to said door part;

displacing said door part from said storing part to expand said skin for forming said protected space.

15. The method as claimed in claim 14, wherein said door part is hingedly articulated to one side of said storing part, said door part being displaced by swiveling.

16. The method as claimed in claim 14, wherein said door part and said storing part are interconnected by extendible connecting elements selected from the group of hinged, foldable links, lazy tongues, telescoping members or inflatable hoses and the displacement of said door part is added by said connecting elements.

17. The method as claimed in claim 14, wherein said door part and said storing part are interconnected by extendible connecting elements selected from the group of hinged, foldable links, lazy tongues, telescoping members or inflatable hoses and the displacement of said door part is automatically effected by inflating said hoses.

18. The method as claimed in claim 14, further comprising the step of fitting said door part with rollers or wheels for facilitating ease of displacement.